Chapter 8

FUTURE FREIGHT POLICY FOR THE INDIAN RAILWAYS

8.1 Critical Findings from the Study

8.1.1 The Railways as Infrastructure

Infrastructure has engaged the attention of both academic and policy economics because of the intrinsic stimulus it provides to economic development. Instead of being defined as a specific product or activity, infrastructure is better identified in terms of the characteristics which render it distinct from other production processes. Usually representing a *social* output rather than a measurable output quantity, the principal identifying characteristic of infrastructure is the creation of *external* economies through its existence, as a result of which the net benefits yielded by it are far greater than its quantifiable product. Inevitably, the scale of the processes that yield such external economies is large to the extent that the financing of these involves public policy questions. For a long time the role of government in the provision of infrastructure has remained implicit and theoretically unquestioned, even though several instances exist in practice where infrastructure has been created on private initiative, albeit with active government encouragement.

The capital financing needs of infrastructure are large. The investments made require a long gestation before they begin to yield a long and sustained stream of benefits. In theory, the creation and maintenance of infrastructure becomes the responsibility of the government *by default*, i.e. in the absence or inadequacy of private capital commitment, and infrastructure is classed as a *public good.* The largescale presence of governments in infrastructure through most of the present century has therefore been justified on the 'merit good' argument, even when the infrastructural service in question does not possess the canonical virtues of *non-rivalry* among users and *non-excludability* from consumption. It is only in the present decade that this viewpoint has been challenged by the inability of governments to mobilise the scale of infrastructural financing required, making new inroads possible for private capital.

The railways which have been the principal point of focus for the present study are an important constituent of transport infrastructure. Although by no means universal in their presence, the railways have been intimately associated with the process of world industrialisation witnessed over the last 150 years, heralded by what has come to be known as the 'Transport Revolution'. Provision of railway services on a large spatial scale was mainly a product of the second half of the 19th century; the stream of backward and forward external economies this yielded was however sustained through most of the 20th century even though accompanied by a second revolution through the advent of road transportation. India, interestingly, was an early witness to the railway revolution, but without being leveraged into the same commanding economic positions that the railways engendered elsewhere. Against this historical backdrop, the present study has closely examined the process of transport-led economic development in the period after Indian Independence and the institution of economic planning. Comparisons have inevitably been made with the position of railways in a world perspective, as a potential reminder that the problems that currently beset railway transportation in India are to an extent policy-determined, rather than being mere symptoms of management failure. But instead of confining itself merely to transportation economics and the technical efficiencies of railway operations, the study has approached the problem from the infrastructural and policy perspectives, namely through examination of the determinants of capital finance and technological capacity. Such an approach has necessitated a look beyond the confines of five decades, and has indeed reviewed salient features of the entire railway experience of India. A brief summary of findings and conclusions drawn therefrom can now be attempted.

8.1.2 Infrastructural Policy Issues

Transportation provides an impetus to the flow of economic goods and services. In this, not all forms of transportation are equal, just as not all economic goods are equivalent. As a infrastructural service, the main predecessor of the railways were the waterways including man-made canal networks, as is brought out by international comparison. It is important to note in this context that both systems competed in providing transportation to bulk traffic at economical rates, allowing cheap movement of minerals and metallurgical outputs to industrial locations, which had previously been impossible. Nevertheless, the ascendancy of the railways was *technologically* determined, *i.e.* by the smaller extent of capital that needed to be sunk into providing railway track overland than in the massive earthworks required to dig canals. The principal reason for the unimpeded success of the railways during the first phase of world industrialisation was possibly the absence of a rival transportation mode which could compete on equal footing without necessitating new sunk investment.

Nevertheless, the scale of railway investment during the 19th century called for a scale of capital mobilisation even beyond the latent ability of sovereign governments, let alone a colonial government such as that which existed in India. *Large* government is a creation of the 20th century Keynesianism; in the 19th century the limited task of government was to direct the flow of private capital into the desired direction. Support of the government to railway enterprise was achieved indirectly through the important means of land grants and interest guarantees, yet the 'Golden Age' of the railways did not last beyond the phase of railway construction. Possibly, the asymmetricity of information which allowed railway construction companies to mobilise huge capital balances from the London Money Market on the promise of high and guaranteed returns faded with the launching of railway operations. By the 1870s, slack had set in the pace of railway construction through most of the world, during which governments in India and elsewhere reviewed debt outgos against commercial returns and decided in favour of government entry into railway operations. Thus the transition from the Old Guarantee system to State construction in India is echoed in parallel developments on many other railway systems. Without the support of private capital, however, railway development dwindled to a position from which it has never really recovered. An important insight offered from the foregoing discussion relates to current problems of infrastructure development in India. The same sequence of events - from state-supported capital formation, to low returns and a capital squeeze - is being rewitnessed.

Partly as a fallout of the earlier experience, the attitudes of governments towards railway operations changed towards a philosophy of regulated enterprise. This is true even in the case of railroads in the US, where government has never directly entered railway operations. A period originating in the penultimate years of the 19th century during which railway construction was renewed over most of the world coincides with the New Guarantee period on Indian railways. Capital mobilisation was now made by the state from private sources on less liberal terms, but with the state offering the protection of the natural monopolies that railway operations enjoyed. A fundamental contrast between this and the previous phase of private capitalisation of railway infrastructure relates to the perspective from which railway investment was viewed by the private investor. Where railway investment during the railway boom had been fuelled by information asymmetricity and had attracted substantial inflows of *risk* capital, in the second phase of private capitalisation of railways, public perceptions were no longer swayed by the promise of astronomical returns, since the reality of operating profits and losses on the railways was already in view. Instead, railway investment lost its speculative dimension and became a *safe* investment guaranteed by governments, subject to maintenance of the railway monopolies. Primarily because of this vital difference, the scale of capital inflows was much reduced, and in India has led to nonrealisation of the route targets set by the Mackay Committee even after eight decades.

Particularly in India, the state did not immediately become a railway entrepreneur. Railway operations were entrusted instead to professional managements acting on behalf of the state, with the commercial operations becoming more dividend-centred. The state involvement with the commercial viability of railway operations led to a phase of restructuring and/or amalgamation of several small railway companies into larger and commercially-viable units. The process received an impetus from an appreciation of the strategic importance of railway communication which had been created by WWI. Both in railways in Britain (the mother country) and the Indian railways, concerns were also expressed about the lackadaisical way in which railway maintenance expenditure was being funded till then. Consolidation of larger railway companies brought about the realisation that the financial arrangements within which railways operated had to be ordered to the scale of railway capital-at-charge, which included the vast amounts invested in railway *sunk* capital in the

form of track and railway estate. The railway reform committees set up in Britain and India voiced common issues including the need for separating railway finances from the general exchequer and for making provisions for depreciation charges before extracting railway operating surpluses.

It is a pity that the recommendations of the Indian Railway Committee (Acworth Committee), which sought to make a total break with the past, were so quickly beset by the recessionary wave that spread across the world at the end of the 1920s. As is normally the case, the recessionary impact was greatest on capital goods and on capital-intensive infrastructural investment. Thus the more far-reaching recommendations, such as those on comprehensive periodic maintenance of track and bridgeworks under depreciation provisions, and on zonalisation of the Indian railway network to improve competitive efficiency were effectively shelved. Since the philosophy underlying railway infrastructure in the Committee recommendations foresaw government eventually assuming full responsibility for this vital sector because of its importance as a merit good, implementation of the full range of recommendations would have instituted a proper public policy in relation to railway finance. As matters transpired however, reformulation of public policy remained in abeyance till Independence and railway nationalisation two decades later. The interregnum in fact saw magnification of the capital squeeze being induced by world recession, and no significant additions to railway capacity occurred as a result.

Fundamental changes were wrought to railway operating equations all over the world by the advent of road transportation. While the maximal impact of freight competition was probably felt in the USA, the common response of the state-protected railway systems was to preserve their monopolies by regulating the access of the new entrant to existing routes. Regulation of this nature drew an academic footnote with the establishment of transport economics as a separate subdiscipline, and a gradual focus on transport pricing in the associated literature. That this development appears at its strongest in the US context may be attributed to the absence of state-operated railroads in that country as well as to the vastness of its physical space, which added more contestability to the existing freight market. In India at the other end, competition from roadways was restricted by the more drastic stratagem of not constructing roads in order to preserve railway monopolies. It was only during the 1960s and 1970s, following improvements in road transport technology and a change in the commodity-character of national freight markets that the roadways appeared as formidable competitors both elsewhere and in India.

At the policy level therefore, both in India and elsewhere, a transition was marked by the shift from the initial period of railway *construction* to that of railway *operation.* Where the first phase had required voluminous injections of sunk capital which was beyond the government's capacity to provide and hence had seen substantial partnership with foreign private capital, the phase of operations changed the policy focus to efficiency questions. While no immediate pressures seem to have arisen for railways to operate on commercial lines, the tendency for railway monopolies to be abused by fixation of railway rates at unreasonable levels quickly drew government attention. Recognising the stimuli that the railways could provide to economic growth and development, the overriding imperative before government was to keep rates low. The means for doing so involved direct arbitrage (*e.g.* through the ICC), monitoring checks on railway company accounting through the use of traffic indicators (*e.g.* introduction of physical traffic ratios such as net tonne kilometres), and through takeover and nationalisation in the extreme event. The two countries where the latter means seem to have made the earliest advent were Japan and France. Gradual involvement of government in railway rate maintenance soon brought about realisation of the conceptual difficulties of railway pricing and the creation of a new pricing literature around that time - as exemplified in the famous Pigou-Taussig controversy - which was not entirely divorced from more far-reaching debates around the feasibility of pricing without the intervention of markets. Rooted in this discourse also were prominent railway and infrastructural pricing mechanisms such as 'what the traffic will bear', differential rate-setting and long-run marginal cost pricing. With the railways as the largest public or government-regulated enterprise the world over, the period saw the formulation of railway economics *per se.*

Inspite of the richness of infrastructural pricing literature, the major issues raised within it remain open-ended till the present day. This is partly because the issue of whether government should at all be in the business of infrastructural provision is not yet finally resolved. The phases of development in the pricing literature therefore reflect the phases of government involvement in railway pricing. The issues here are multidimensional. Although the reason for keeping railways as a natural monopoly relate to the cost-efficiency of having a single provider of bulk transportation, and those for keeping them under the watchful eye of the

government relate both to the regulation of monopoly power and the maximisation of their infrastructural potential, the presence of *joint costs* or *sunk costs* ensures that railway efficiency varies directly with a rise in traffic. However with traffic itself being subject to the seesaws of economic expectations, a holding principle appears necessary for the guidance of railway pricing. Very logically, two orders of aggregation are involved here. Where railways have to recover fully-distributed operational costs, the first order of computation has to be based on cross-sectional aggregation of costs and revenues across all traffic categories and all segments of the railway network at a given *point* of time. However, a second and more complex computation has to be based on the aggregation of costs and revenues over a fairly extended *period* of time in order to capture the infrastructural impact of the railways. Thus while the period of railway construction was not reasonably expected to lead to revenue realisation of an order that matched railway costs, the period of railway operations was anticipated to yield a large outflow of revenues without significant outlays of cost. This feature - possibly the most pervasive principle within railway finance and operation - intrinsically defines profitability for the railways as a longterm variable, thus imparting to the railways the character of infrastructure. Explicit recognition of this pricing principle is made in the literature on social time preference, where present costs are juxtaposed to the stream of future social benefits in assessing the viability of infrastructural investment.

For nearly a century after their advent and comprehensive ascendancy over the waterways, the monopoly of the railways over overland transportation remained unchallenged, the invention of the internal combustion engine notwithstanding. The fact that trucking first arose in the US indicated the initial complementarity of the railways and roadways, with the latter mainly stepping in into the contestable freight-market segments of break-bulk and intercity traffic. Trucking technology limitations were partly responsible for this low-key entry, and in a country as vast as the US, expansion of roadways did not immediately imply direct confrontation with the railroads. Very often, the roadways served to complement railroad freight flows by assembling and feeding traffic smalls into consolidated trainloads. Even so, the major proportion of US railroad freight comprised the traditional bulk-freight commodities of coal, minerals and metallurgicals, to which petroleum tanker traffic was gradually added. Thus in the US as well as in other countries, the railways operated with the cushion of captive traffic, recognised in principles such as differential rate-setting. Perhaps the most serious longterm challenge to the railway monopoly was mounted by the nature of investments called for by roadways. Except for the roadbeds - where a similar order of sunk investment was involved as in railway track-laying, capital investments on road stock and rolling stock differed significantly in nature. Railway rolling stock required consolidated investment, posing an entry barrier to private competition. The roadways on the other hand opened the doors to freight competition because of the small and discrete capital outlays required per road vehicle which in any case was little more than a self-propelled cart. This divisible character of road stock vis-a-vis the indivisibility of railway investments soon made the roadways emerge as formidable competitors in countries of more restricted size, where the road and rail networks inevitably involved a substantial amount of duplication. To protect the state monopoly, recourse was often taken in such cases to the establishment of legislative barriers against the entry of road competition. Such examples were seen both in Britain, and in India until fairly recently.

The advent of road competition also brought to light the phenomenon of rate competition, especially during the period of cheap petroleum. The alternative means of contending with this that could have been adopted by railways were either to seek protection of the state (*non-competition*), or to lower railway operating costs through technological upgradation, such as through introduction of diesel and electric traction. While the latter means in effect made the transport monopoly more cost-efficient, they also led to the same conceptual difficulties of sunk costs and social time preference regarding their eventual benefits. Thus, since roadways operators were largely free of these conceptual constraints, they were not necessarily deterred by this, and resorted to counterveiling technological upgradation of their own, again without having to incur sunk costs. Legislative barriers to road competition were therefore often seen as necessary evils by governments keen on stabilising the railways.

Perhaps the principal impediment to the natural evolution of multimodal transport lay in the competition between public policy and private enterprise, embodied in road-rail competition. A single freight authority, with jurisdiction over all modes of transport, would have hastened a compromise through multimodal sharing of the freight market. The existence of such an authority was however hard to conceive in the non-socialist world, and the same goals had to be achieved through negotiation and persuasion - a far more difficult

process that still has not been accomplished in entirety.

Another important factor in assessing road-rail freight competition has been the technological indivisibility of railway technology versus the relative divisibility of technology on the roadways. Through much of their history, railway operations had maintained country-wise specialisation, with citable evidence from the multiplicity of railway gauges and rolling-stock and coaching designs. India, as an example, offers the unique instance of three different railway gauges being operated within a single country-network. Noncompatibilities of this nature also led to specialisation in other equipment and eventually to the need for the railways to establish maintenance and manufacturing facilities of their own, adding to cost overheads. Against this, advances in roadways technology in one country soon found their way to roadways in other countries through vehicle and equipment exports; moreover, production could be centralised with a few major automotive manufacturers to protect scale economies. Technological innovation on the roadways therefore proliferated faster than that on the railways, even though the economies created by innovation may have been larger in the latter case

Indivisibilities of cost and railway technology, as also the other infrastructural issues explored above, have been major determinants of railway operational performance in India. Only two distinct periods may be identified when social time preference held sway in deciding government railway policy. The first was obviously the period of trunk-network construction in the 19th century, when the government soldiered ahead without any firm guarantees of traffic,. The second occurred over the first fifteen years of post-Independence transportation planning, when technological upgradation of the railways was underwritten by expectations of economic development occurring further downstream. A notable difference does exist however between the two periods in terms of the sources of infrastructural finance; where in the former, reliance had been placed on the inflow of private foreign capital, in the second instance the government sought to mobilise the entire capital outlay from budgetary sources. The direction of transportation policy by an 'act and wait' philosophy was strongly reflective of the principles of infrastructural finance and time preference. Although - to a lesser degree - another phase of building railway capacity ahead of demand occurred again in India during the 1980s, and on a more continuing basis in continued subsidisation of loss-making zonal networks, the financial rationale operating behind these stressed capital-borrowing as a *source*, and improvements in profitability as the mode of *repayment*, thus departing from the earlier philosophy. In practice, the departure has been seen to be self-defeating, since it has led to the retreat of the Indian Railways from open freight competition into the shelter of guaranteed captive traffic, opening vast portals for the roadways to enter.

8.1.3 Financing the Railways

The post-Independence phase of railway operations in India commenced with nationalisation of the Indian railway companies. Although several companies had earlier passed into state ownership under buy-out clauses, complete nationalisation of the network opened new vistas for the reorganisation of railway services and railway finance. It is important to note that railway nationalisation, which in India followed precedents set earlier in Japan, France and Britain, also transferred the liability of capitalising the railways to the state, and to plan-finance in the Indian case. Certain advantages were anticipated from the step. For instance, unification of railway management would allow transference of operating surpluses from one segment of the network to others, permitting optimal expansion of freightage capacity in all segments. Unification was also conducive to standardisation of track and traction equipment and permitted greater economy in the modernisation of railway capital. Economies in haulage could also be anticipated from the promotion of through traffic encouraged by unified railway operations. But certain other objectives also stand out in the Indian context and need to be noted.

Following Indian Independence, nationalisation of the railways was deemed important to the task of nation-building through infrastructural development. As such, with railway development on the nationalised IR being geared to the needs of a growing economy, social objectives often loomed ahead of purely commercial considerations, allowing short-run losses on certain traffic segments to be carried on the strength of differential tariffs and anticipated longterm gains. Such gains were not expected to be internal only to IR but were expected to be converted into external economies which would benefit the industrialisation process. Considering, however, that the period since the 1920s had seen considerable capital depreciation and hardly any railway expansion, the implication of state control was that a massive amount of capital resources had to

be raised by the state and sunk into post-Independence railway modernisation and expansion. Instead of leaving the capitalisation decision entirely to IR managers, the planning apparatus of the state was inducted into decision-making, with a view to maintaining parity between the needs of the economy and IR's capacity to provide. The crucial assumption behind this was of continuous traffic growth and buoyancy in IR revenues - something that the planners also sought to ensure by raising the public sector to the commanding heights of the economy. While in the first instance, the investments in railway capacity were large enough to keep pace with the rise in public and private sector demand for transportation, a shortfall in the former during the 3FYP reversed expectations and consequently changed perceptions of IR profitability.

Economic pessimism regarding the financial viability of the IR infrastructure deepened with the onset of recession in the mid-1960s. With hindsight, it would also appear that the timidity of the state in financing railway expansion during this crucial period caused the infrastructural character of IR to change. Thus from the objective of providing general transportation services to all economic sectors, IR began to cater only to special traffic categories because of shortages in capacity. These special categories comprised captive traffic which remained tied to the railways for two distinctive reasons:

(i) either the traffic on offer was so heavy that it could not be carried by alternative haulage modes; or

(ii) the traffic was composed of essential commodities to be carried, as a matter of public policy, at subsidised freight rates unmatched by alternative modes.

In either case, carriage by IR made sound technological sense. Both traffic categories generally comprised bulk commodities and came in full rakes allowing economies in handling and haulage, and in most situations had to be freighted over long leads. However, subsidisation of the latter had to be compensated by the rates set for the former for cross-subsidisation to work, particularly since general freight gradually disappeared from the railways. It is important to note that captive high-tonnage freight in the first category was largely composed of producer goods, and that the passing on of high freight charges to ultimate users led to cascading escalations of costs in the economy. At the same time, the mixed economy instituted by planning in India ensured the operation of state monopolies in both capital goods production and haulage. Thus despite declarations that the state sector was intended to pin down costs in the economy, in practice both monopolies operated at lowered production levels and higher costs - a reversion to the case of classic monopoly. While operation on these lines was sustainable so long as downstream users and producers were willing to absorb additional costs, the situation was aggravated by the later budgetary practice of frequently increasing IR freight rates, which came into vogue after the decline in support to IR from the state exchequer.

Thus escalation in costs in the Indian economy might be closely linked to the dwindling of government finance for railway infrastructure. It was no longer the gamut of IR services which was being viewed as a public good; conversely, only selected traffic and network segments were deemed eligible for continued subsidisation by the state.

Strangely, the reordering of infrastructural priorities which led to pressure on IR to raise capital support from internal sources did not reduce dividend and other associated obligations. For one thing, renewed expansion in IR capital-at-charge without overaged assets being written off raised interest liabilities. With dividends from net revenues to the state being accorded the status of *first* charge, commitments to dividend were made ahead of reserve fund appropriations leading to substantial deferments of replacement expenditure at times when railway revenue performance was poor. The practice of carrying dividend liabilities in perpetuity, it had earlier been noted, was instituted by the IRC in 1924 and was designed to compensate the state for the loss of direct revenues which followed the separation of railway finances from the general exchequer. To this day, dividend payments still remain a major assured contribution to the revenues of the Government of India. Thus despite considerable debate over the issue and recommendations of several Railway Committees for either lessening or abolishing dividend charges, the government has been reluctant to accede. The net impact on the capital position of IR has been damaging in at least three ways. Firstly, the dividends paid out are not necessarily matched by equivalent current injections of railway capital by the state. Secondly, since in bad years dividend charges have had to be paid ahead of contributions to the depreciation reserve, IR replacement and maintenance suffer and lead to a backlog of dead stock - this has been highlighted, in the course of the present study, particularly in the context of the IR wagonfleet where substantial backlogs in replacement have been created. Thirdly, the annual outflow of railway revenues against dividends weakens the operating surplus earned by IR and has in recent years forced greater dependence on borrowing and

lease-finance for capital mobilisation.

An appeal that has been made on several occasions by IR which was also echoed in the most recent White Paper relates to the social burden carried by the railways on uneconomic services and sectors. This burden, which exists on most major railway systems across the world because of the public-good character of railway services, was estimated by IR to amount to Rs.3282 crore in the year 2000-1001.[1] The practice of fully subsidising national railways for such losses, as followed in most countries, does not exist in India. Thus IR in essence carries *dual* social obligations: firstly, it has to absorb operating losses on uneconomic sectors within the operating surpluses earned from others and yet show positive surpluses overall; secondly, it has to support the general budgetary resources of the government by contributing dividends and additional amounts when its financial performance is positive. The joint operation of these obligations deeply affect the viability of internal resource mobilisation for railway development. IR is placed at a relative disadvantage in this respect when compared to other major state-owned railway systems like SNCF. Moreover, the fact that subsidisation of a segment of railway operations in India is in effect made by IR rather than by the Government of India speaks rather poorly of government attitudes towards maintaining the 'public-good character' of railway services. In practice, it is neither government nor IR which subsidise unremunerative services. It is instead the captive users of IR's bulk-freight services who carry this liability in the form of the cross-subsidisation. In a sense, IR is again forced to misuse its monopoly position to pass on social burdens in the form of inflated freight charges adding to the eventual costs of producer goods. The reality is even more disturbing, with a shrinking number of bulk transporters having to carry not only the burden of subsidising low rated freight traffic such as in foodgrains, but also of subsidising passenger services, unremunerative lines, as well as IR contributions to the finances of the Government of India!

IR has therefore appealed (so far without result) for either the writing-off of dividend obligations on past investment after a fixed period or for full offsetting of the notional subsidy that has to be borne on account of its social burdens. The present financial arrangements under which IR operates have only promoted higher and higher freight tariffs and have led to substantial losses in traffic in the highly-rated categories. For railway services in India to be restored to competitiveness and for their infrastructural potential to be revived, a thorough financial review would be needed.

8.1.4 Railway Operational Trends in India

Closer focus on trends in railway operations in India since Independence reveals both *evolutionary* growth and *physical* (*i.e.* quantitative) growth. The first feature is hidden within the second and has to be unmasked. Review of the broad indicators of railway operational performance such as tonnages carried and traffic transported show phenomenal increases over their pre-Independence levels. On the surface, such trends might be deemed encouraging, short-term slacks notwithstanding. Division of the entire planning-horizon into subperiods shows sharpening growth trends in the first and third phases, with the intervening phase between the mid-1960s and the late-1970s showing a slowdown. However the exploration of underlying causes also points towards substantial readjustments in the railway traffic profile, rooted particularly in rising specialisation of IR freight operations. In quantitative terms, this hidden trend shows up in the proportion of changes in traffic relative to tonnages. This is captured, for instance, in the trends in average traffic leads over the period.

For the true picture of railway traffic development to emerge, cross-comparison has to be made between freight tonnages, freight tonne-km and freight leads. A rise in loading tonnages unaccompanied by similar increases in freight tonne-km might, for instance, indicate stability of the traffic profile. Conversely, joint movement of the two freight indicators in the same direction endorsed by corresponding changes in freight leads would indicate a substantial shift in traffic profiles. Thus a review of aggregate operational trends on IR since the 1950s throws up interesting conjectures. Over most of the period, the growth in tonnages has reflected the growth of bulk-freight operations, rather than growth over all categories of freight. With bulk-freight (particularly coal) having to be carried over increasing distances in consonance with plan priorities, the rise observed in net tonne-km traffic has been characterised more by growth of traffic *leads* than of traffic *loads*. This is verifiable also, for most of the period reviewed, from the trends in average freight leads.

While it would therefore appear that freight trends in this direction were dictated by planning policy rather than by accident, since the economic philosophy underlying Indian planning has traditionally emphasised

state-sponsored development of the producer goods sector, the possibility would remain that the order of specialisation observed from IR freight trends was actually more than was bargained for. Particularly in the 1970s when average freight leads rose to phenomenal levels, and in the 1980s when the rate of growth of freight tonnages had also sharpened, the latter possibility appears more probable since IR over the relevant period was in troubled financial straits because of the lowering of fiscal support. Another curious phenomenon in marked evidence over the latter period was the emergence of pronounced cyclicity in IR operational performance, with transitions from traffic growth to traffic slack becoming far more frequent. Analysis has shown that freight specialisation in IR has been achieved at the cost of traffic surrender to the roadways. Thus what has been witnessed in practice over the period is the stratification of the Indian freight market into distinct *bulk*-freight and *general* freight traffic-segments. While IR has retained its monopoly over the former because of the intrinsic cost-efficiency of railways in transporting bulk-freight, its erstwhile presence in the general freight segment has been severely contested by smaller freight players belonging to the roadways. Over time, the attrition of IR market share in this market segment has been so severe as to reduce it virtually into a non-player. Since it is general freight which is the most high-valued market segment, the withdrawal of IR from the segment has had serious revenue implications and has partly been responsible for the erosion of IR's financial viability. Meanwhile, the success achieved by the initial roadways players has sparked off intense competition in the roadways sector leading to uncoordinated growth.

Superficially, this sequence of events reflects similar positions and responses that have occurred on railways in many countries. Except possibly in the erstwhile socialist bloc, of which the experience of China had been briefly surveyed, the roadways emerged as serious freight competitors after the 1960s through technological innovations such as containerisation and improved handling. Upgradation of highway networks and the removal of restrictions on intercountry operations have provided an institutional boost which has also increased the competitiveness of road transport in the developed countries. Once again, the discrete nature of vehicular units and the smaller scale of capital investment required have worked to the longterm advantage of the roadways in freight competition. The continuing ascendancy of the railways in the socialist countries, on the other hand, may possibly be attributed to restrictions on the entry of private transport operators. In sum, the growing contestability of the small freight market in India need not be regarded as an isolated feature, but is also characteristic of the transportation sector in large parts of the world. It had also been noted that industrial transformation and growth of the consumer goods sector since the 1960s has generally been conducive to the growth of roadways, because of the low-bulk and low-lead character of the traffic this generates. In this, the railways were clearly outclassed since their operational efficiency lay in bulk traffic and full rake-loads to be transported over long leads. Resultant segmentation of the freight market, to a some extent, was inevitable.

What is of crucial importance to this review however, is whether the change apparent in IR freight structure over a period of five decades has originated from demand failure or from supply restriction. In the event of the former, much more attention would have been drawn to issues like freight-pricing, etc., since the drifting away of certain categories of traffic to the roadways would be wholly explained by the railway rate-structure. On the other hand, the possibility of supply failure would bring in issues relating to longterm capital financing in addition to rate-structure problems. The point needs to be elaborated.

Given the public character of IR, freight demand-supply gaps would not immediately bid up freight rates, allowing excess freight demands to persist in the short term. In the long run, a bridging of this gap would then be accomplished if capital investment were to be made at an adequate level. However, because of the public objective of low tariff operation, capacity gaps in particular freight segments would not immediately impart buoyancy to operating profits in view of the delinking of railway rates and profits from public policy objectives. As a result, excess demand in a particular freight segment would not be interpreted as a signal for reordering freight capacity and freight investment, and the bridging of the gap would then depend entirely on autonomous investment decisions made in accordance with infrastructural priorities. Similar inferences could also be drawn if excess supply prevailed in other freight segments.

With nationalisation, investment on IR came to be identified very strongly with public policy. Under the new objectives, the decision to invest on the railways was guided by the concerns of economic development further downstream, rather than by the commercial profitability of railway operations. The scope for *market correctives* became correspondingly limited.

What emerged then were classic command-economy disequilibria between traffic demand and capacity, the problem being rendered more intractable by the infrastructural character of investments. With longterm

freight growth trends over the period of planning passing from growth to slack to growth again, and short-term freight responses inevitably being lagged compared to growth in freight capacity, obviously the same corrective would not be applicable over all situations. What this implied more subtly was a choice between breaking even (in capacity-utilisation terms) in the short run *versus* breaking even in the long run. By their nature and because of the bulkiness of railway capacity investment, both goals would not be achievable simultaneously, since the removal of traffic slack in the long run would mean that short run slacks would have to be tolerated. This inner economic logic was embodied in the strategy adopted during the early plans of building railway capacity *ahead* of demand, and represented a more public-policy oriented principle of railway operation. By the end of 3FYP however, the inability of IR to raise sufficient revenues brought about a sense of fiscal alarm, rendered more severe by the fact that the railways in India remained a departmental undertaking contributing directly to general public revenues. What followed therefore was a squeeze in fiscal support which had direct bearing on further additions to IR capacity.

Besides the circumstantial impact of two oil crises, where in fact the impact on the railways should have been beneficial, the funding crunch appears to have been the main factor in changing the freight structure of IR. With lower energy costs of operation and the ability to use electricity as an energy substitute, the railways should not have encountered heavy weather over the oil price hikes. Rather, the restructuring of production and freight markets following the energy crisis should have enabled IR to reenter freight segments where roadfreight rates had risen substantially. However for this to be accomplished, slack capacity would have had to be on hand which could be switched to the contestable freight categories. It was here that IR fell short. With railfreight services not being close substitutes for roadfreight, the latter was able to hold on to a considerable part of the small freight segment even at higher rates. A primary reason for this was the unavailability of wagon capacity on the railways to carry general freight, because of the prior investment squeeze on wagon acquisition.

A predicament of this kind is not immediately apparent from the IR freight trend figures, because of their cumulative nature. On the surface therefore, freight tonnages and traffic continued to increase along with substantial additions to BG rolling stock. A more glaring camouflaging factor was the practice of reporting annual performance and setting Railway Budget freight targets in tonnage terms rather than in traffic (net tonne-km) terms, thus masking shifts in the freight structure. As a result of the practice, the growing dominance of coal freight in the IR freight structure masked the losses of low-bulk-freight share without revealing the immediate consequences of the fiscal squeeze on railway freighting capacity. For these hidden features to emerge, special investigation was therefore made into the growth and nature of IR freight capacity, which is determined principally by the IR wagonfleet.

It may be noted, in passing, that the oil crises had also engendered upheavals in the freight market in other countries with advanced railway systems. In these countries, the railway response had been to escalate capital investment in upgradation and modernisation so as to compete with the roadways for freight market share on technological superiority. In the case of SNCF for example, it was seen that the bulk-freight sector - the area of core competency for the railways - grew considerably as a result during the 1970s. However SNCF did try to carry competition into the low-bulk segment on the same technological principles, *i.e.* by consolidating low-bulk-freight into full trainloads, by offering superfast or value-added services, or by increased containerisation in order to lower handling costs. Moreover, with the highway and roadway systems and multimodal transport in these countries also being technologically advanced, what traffic was surrendered by their railways in the process of freight restructuring was absorbed by the roadways. In India, on the other hand, the level of infrastructural and technological competition was low - the Indian roadways having primarily evolved either as auxiliaries to the railways (*e.g.* in feeder networks) or as small individual ventures built around the traffic that IR was unwilling to carry. Further, the relative state of underdevelopment of highways in India reduced the multimodal complementarity of the two transportation systems and slowly increased direct competition in limited parts of the transportation network such as the Golden Quadrilateral.

8.1.5 The Growth of IR Freight Capacity

Over nearly 150 years of railway operations in India, considerable change has been witnessed in the railway technology adopted. Besides improvement in handling and traction technology, the changes having most profound impact on railway freighting capacity have been in wagon technology. It is pertinent to note however

that technological progress on the colonial railways was necessarily limited by the low scale of capital investment once the period of railway construction was over. Thus for a long period from the turn of the century till Independence, railway capital stock in India remained essentially of an old design. The situation changed materially after the infrastructural thrust imparted by the FYPs, which sought rapid augmentation of freighting and haulage capacity to keep pace with the anticipated growth of the economy. With the present analysis being limited to freight operations on IR, it is the nature of innovations in wagon design that becomes important.

It was noted earlier that the wagon industry in India had developed downstream of the Indian metallurgical industries, and for this reason was principally located around Calcutta. Although a pre-Independence creation involving reputable rupee companies incorporated in India, the wagon industry occupied a position ancilliary to the Indian railway companies. As such its sophisticated metallurgical inputs were supplied through the direct agency of the railway companies, and methods of construction remained labour intensive because of relative cheapness of the labour market. Even after nationalisation of the railways, this organisational mode was retained. However, where innovation had been lacking in the earlier period, consolidation of IR and the launching of railway development plans called for radical upgradation in wagon design and in wagonfleet composition. Having inherited the past ancilliary structure, IR took on the direct responsibility for providing 'free supply' inputs which were of a more sophisticated nature, while preserving the labour intensive methods of construction. Because of this industrial structure, the pace of wagon innovation was solely dictated by IR both as the single monopsonistic buyer, and also as the wagon designer through its auxiliary units such as RDSO. While the arrangement had obvious merits with respect to design standardisation and also relieved the wagon industry of the burden of R&D costs, it placed impediments to the organisation of the wagon-producing units into full-fledged manufacturing and industrial units. The system of contracted buying further reduced the financial resilience of the WPUs and in most cases they remained merely fabricators. Thus when the capital squeeze was applied and orders became uncertain, several WPUs inevitably succumbed to industrial sickness. A few private-sector units like TEXMACO did prove more resilient because of their diversified product lines, indicating that stability of the wagon industry depended very much on its escape from the clutches of a monopsonistic market. But since the majority of the units were located in the public sector, diversification hardly existed and innovation was slow. The market device adopted as an escape from ruinous competition for wagon orders was cartelisation of the WPUs under Wagon India Limited. Although as a sellers' consortium, WIL represented the exercise of countervailing power on the part of the WPUs, the cartelisation protected producer inefficiency and through a vicious circle pegged wagon prices to unjustifiably high levels. The net result was a cutback in wagon orders, with IR occasionally taking recourse to direct wagon imports from countries like Spain which shared the same BG gauge with the IR, as a means of forcing down wagon prices. The fact was obscured that - with freight cross-subsidisation burdens in India increasingly being borne by the steel producers - IR was also contributing to the rise in prices of Indian-built wagons. At the present point of time, IR is well on its way to scrapping the system of consortium buying by instituting an open tender system for placement of wagon orders.

Inspite of such vicissitudes in wagon acquisition, the complexion of the IR wagonfleet has changed considerably with the upgraded BOXN wagon well on its way to becoming the *de facto* IR *standard wagon.* This change also demarcates the shift in the direction of freight policy since the 1980s. With the standard bogie-type wagon being particularly suited to rapid bulk haulage of commodities like coal and minerals in full trainloads, the rising percentage of such wagons in the IR wagonfleet reflects the withdrawal of IR from a large segment of the Indian freight market comprising both high value low-bulk traffic and unconsolidated traffic smalls. The overwhelming freight capacity shortage is therefore of covered wagons suitable for safe carriage of commodities like foodgrains, cement and general merchandise. Moreover, the technical specifications of the upgraded wagons are designed towards assembling specialised rakes for mechanised lading and high-speed haulage. Since traffic meeting these specifications is available primarily on trunk routes and is unidirectional in nature, there has been a rise in the number of empty wagon-km as well as a shrinkage of IR freight operations to the detriment of the feeder network.

The response of IR to the challenge of high energy prices is therefore seen to have been *technological,* and has more or less mimicked the technological responses of major world railways. The nature of this response has been dictated by declaration of a new national transport policy for multimodal transportation. However, where containerisation has been the principal means by which major world railways have sought to retain

general freight, the overall resource constraints on IR have prevented a similar breakthrough. Also, the *organisational* component of the changes in freight management witnessed in countries like Britain and Japan, which have gone in for corporatisation of services and outright privatisation of rail services, has not been witnessed on IR. Instead, the departmental structure of IR remains firmly entrenched with operational decisions remaining under the tight control of the Ministry. It might be remarked in general that organisational adaptation would be the more appropriate response for development contexts. Thus limiting the IR response to the technological adaptation that has been instituted by developed railway systems has robbed the adaptation process of its potential infrastructural impact, even while superficially improving freight-efficiency indicators such as wagon turnaround times and wagon-km per day.

Certain crucial transport policy decisions taken during the early-1980s have marked the watershed between the return of wagon efficiency to IR, and the prior period. Efficiency of freight operations has actually been achieved by technologically upgrading the special wagonfleet and reducing the traffic focus to bulk-freight and full trainloads. The two decisions are actually intertwined. The technology introduced for improving wagon efficiency, which is designed around specially adapted BOXN wagons and mechanised handling, is conducive for the efficient haulage of coal. Over the time since, coal has become the dominant commodity freighted by the railways and is carried mainly to steel plants and to thermal power stations. Thus the technological adaptation has in fact reduced the spread of IR's freight services, a trend borne out by the high rate of increase in freight tonnages and leads over the 1980s. On the other hand, the degree of specialisation that the IR wagonfleet has undergone after the mass introduction of BOXN wagons leaves far too little traction and carriage capacity for general freight. Moreover, since shipments of coal generally move in one direction from the mining pitheads to the plants, return traffic is often unavailable. Consequently, empty wagon-km have risen considerably. In recent times, IR has in desperation been offering special rebates for the shipment of foodgrains and cement (which have reverse leads) in open BOXN wagons. There are few takers however, since both these commodities require safe carriage in covered wagons which IR is unable to supply in adequate number.

The other crucial policy decision taken during the same period has been to phase out MG freight. Recollection of the history of railway expansion in India points out that the MG network actually came into existence on feeder routes. Thus when both MG and BG freight networks were in full-scale operation, the MG routes had a critical role to play in the consolidation of general freight for IR. To this day, the freight-mix on surviving MG services differs radically from the BG freight-mix. Since the alternative plan of converting the MG routes to BG under the UNIGAUGE project has made tardy progress, a part of IR's freight network has actually withered away and the commodities freighted there have switched over to the roadways. It is a matter of pity that the UNIGAUGE conversions had to be undertaken as a result of the resource crunch rather than as part of a consolidated transport plan which included prior traffic appraisal. The consequence is that the conversion projects remain incomplete, heavy sunk costs are added and anticipated traffic volumes do not materialise, all of which further aggravate the resource position of IR.

With hindsight, therefore, the policy decisions seem ill-conceived. In all fairness, it might still be said that the National Transport Policy document had envisaged retention of the railway share of general freight rather than further attrition. For this, fiscal support to IR would have had to remain high, so that the modernisation programme could proceed apace with regular wagonfleet maintenance and renewal. However, fiscal policy changes during the 1980s queered the pitch by making the modernisation programmes heavily dependent on external borrowing by IR. The result seems to have been a truncation of maintenance and renewal expenditure - at the cost of railway safety, as certain recent observers point out. Ironically, the adjustment of IR to the freight situation following the oil crises has resembled the adjustments made by advanced railway systems in another unintended way. Where the advanced systems have deliberately curtailed uneconomic network services and reduced the freight focus, network contraction on IR has been achieved by default because of the downgrading of MG services. The difference is that while the advanced systems made proper provision for consolidating miscellaneous freight-flows at fewer terminal points to increase the throughput of wagon trains, IR has proved unable to do the same because of the basic shortage of appropriate wagons.

The preceding observations draw attention to wagon capacity as a crucial determinant of the scale and nature of railway freight operations. It must be noted also that wagon specialisation segments the overall freightage capacity of a railway system into non-substitutable compartments. Thus the effect of wagon-

supply constraints on the railway freight market is to separate it into several independent freight categories, depending on commodity-characteristics, directions of flow and distance-leads. Such segmentation can render several market segments contestable, especially if the railways lack freightage capacity of particular kinds. The context makes it useful to investigate the policies and decisions on wagon acquisition for IR and their freight impact.

Two aspects are important to this analysis. Firstly, the will of the state is often reflected in the strength of allocations made to public capital. Thus a state mindset which is well-attuned to the nature and potential of infrastructure development will make budgetary decisions after careful consideration of their possible consequences on railway operations and performance. Fairly strong will on the part of the state was in evidence, for example, during the first three FYPs. It is therefore pertinent to explore whether prior operational factors have exercised any influence on IR decisions relating to wagon acquisition. The other aspect, which is probably of equal if not greater importance, relates to the projection of anticipated traffic. In summary terms, the matter for investigation therefore is whether the changes noted earlier in wagon acquisition policy were guided by the experience of the past, or by anticipations of the future, or by neither. The realm for investigation is the railway component of the National Transport Policy as declared by the NTPC in 1980, and IR performance and performance-projections in the years preceding and following this declaration.

It has been noted in this context that plan allocations to the transportation sector had already begun to dwindle from the mid-1960s, as a consequence of industrial recession. Thus the exuberance of the early plans regarding the importance of public investment in infrastructure was already fading. A mixture of fortuitous circumstances and macroeconomic disequilibrium precipitated a fiscal crisis which temporarily derailed the planning exercise. Inability of the economy to return immediately to the growth path triggered bureaucratic complacency about capacity levels - evidence of which is also seen in other infrastructural sectors such as power. Thus excess capacity which was at best a momentary consequence of the recession was allowed to lengthen into a capacity crunch. With transportation being the hub of commodity-flows within the economy, the squeeze on transport imparted a squeeze on economic growth. Even so, and without any substantial restoration of plan allocations to infrastructure, the economy had begun to recover in the 1970s. But with low levels of capacity addition, IR was inadvantageously placed to absorb traffic flows affected by the impact of the Oil Shocks. Some restoration of plan grants to transportation and infrastructure is evident from the 1980s, coinciding with the implementation of National Transport Policy. However, this was with the rider that IR undertake a similar exercise in augmenting internal resource generation to fund its capital expansion. Intentionally or unintentionally, this imparted short term focus to the capacity-expansion exercise, since IR began to seek operating surpluses by focusing on its efficient *i.e.* bulk-freight operations, curtailing uneconomic operations whenever permitted to do so. Also, the overall shortage of capital combined with the exigencies of expanding bulk operations changed the direction of application of capital funds to special freight rather than general freight.

8.1.6 Freight Capacity Planning and IR Freight Preferences

Changes were made in the freight policy that governed IR when the proposals in the NTPC and RTEC Reports were implemented during the early 1980s. The primary thrust of the policy change was towards modernisation and upgradation of railway freight services, rather than towards their outward expansion. Still, in view of projected increase in the size of the freight market, it was anticipated that IR would increase freight tonnages and traffic considerably, while maintaining its market-share vis-a-vis the roadways. Thus the technological components of the modernisation were geared more towards maintaining railway efficiency than towards freight specialisation. It should also be remembered that the terms of reference of the NTPC were very broad, encompassing the roadways as well as multimodal transportation. Thus its projections of the freight market included both IR and roadways shares.

Several other exercises at freight projection were also conducted during the mid-1970s and 1980s. Of these, only the NTPC projections were holistic. That so many projections were being made at that time reflects the level of concern that existed in the country over the persisting disequilibrium in freight services induced by the Oil Shock. Departure was thus made from the prior practice of supply management on the basis of assumed freight demand, to the projection of freight demand itself. Although attributable to differences in projection methodology, the wide range of divergence observed between successive projection estimates

carries lessons of its own. Projecting infrastructural demand is a difficult art, because of the need for estimating infrastructural multiplier effects including the genesis of new sectoral demands downstream. Thus *ceteris paribus* conditions cannot be maintained. Gravity methods, such as those that were adopted by outside consultants for their projections, are much more sensitive to potential multiplier effects and project high levels of future freight demand provided that present freight growth has followed an optimal path. Trend-related methods, on the other hand, are much more conditioned by the immediately preceding experience and tend to project lower future demand levels. Although the policy-making exercise by the NTPC adopted the latter methodology, the projections by outside consultants now reveal the possible extent of infrastructural opportunities foregone by IR. The fact that even the NTPC's more modest freight targets have not been realised by IR till date offers an avenue for further investigation of the malaise afflicting railway freight operations. Firstly, since tonnage shortfalls between freight targets and freight actuals are not as large as the shortfalls in traffic, there is sufficient reason to believe that the unanticipated loss fell disproportionately on the low-bulk category of traffic. Secondly, since the wagon and handling modernisations suggested by NTPC were directed to more efficient carriage of bulk-freight, it would seem that policy implementation tended to focus much more on advancing IR bulk operations than on retaining general freight. In view of the precipitous decline in the IR wagonfleet since that time, one begins to wonder whether the non-achievement of projected freight targets in the subsequent period reflects the skewing of IR freight capacity *i.e.* the *supply* of freightage, rather than an overall shortage of the freight *offer* or freight demand. In such circumstances, current freight achievements by IR reflect the *restricted demand* for freight services, rather than the total railway freight offer of the economy revealed by the gravity-projections. The shortfall between the restricted and unrestricted freight demands in such a case would not entirely be transferred to the roadways because of routing and cost factors. Thus the transfer of freight share from IR to the roadways masks the more deep-set capacity shortages which have shown up as transportation bottlenecks in the economy.

Analysis must therefore focus on the IR wagonfleet and IR wagon acquisition levels. Provided that these wagon acquisitions were being targeted to projected traffic, a certain regularity should have characterised the placement of wagon orders. In view of the overall resource squeeze applied on IR capital acquisitions, it would be unrealistic to assume that its annual wagon order placements represented single-period adjustments of freight capacity to anticipated demand. Rather, the inability of IR to secure adequate capital funding would have led to lags in acquisition of the wagons required to meet the periodically projected levels of freight demand. Thus undercapacity would be likely to prevail in normal years. While the forward linkages of this would, to an extent, depress future flows of freight, the backward linkages from accumulation of unmoved freight inventories of primary freight commodities would depress future production levels. Since the entire production schedule in India was being coordinated through the FYPs, unanticipated interruption in freight-flows at particular points of time would disrupt production schedules, causing excess supply to prevail in certain core sectors and unsaturated demand in other downstream sectors. Thus, what started out as a minor shortfall in freight capacity would be magnified into a *production cycle* by the infrastructural multiplier. The consequences of miscued wagon acquisition would then turn into instability and oscillation within the economy.

In the empirical exercise, the *polynomial distributed lag* [PDL] model proposed by Shirley Almon to model partial adjustment processes was applied to partial wagon-stock adjustments on IR. To monitor the implications of the NTPC recommendations under this methodology, the PDL model was estimated on the dataset used during the NTPC projections. Further, to include existing disequilibrium levels within the analysis, data on physical disequilibrium indicators such as empty wagon-km, etc., were added to the dataset. A study was then made of the relationship of the IR wagonfleet and the annual wagon output by the WPUs to different macroeconomic and physical variables. With railway fund allocations in the FYPs providing distinguishable capital adjustment nodes in the IR wagon acquisition process, the effect of variable fund flow over the plan horizon was captured by postulating a 5-year adjustment lag, after experimenting with other lag structures. While the use of linear estimating equations captured the nature of the partial adjustment process as determined by the levels of various freight demand indicators, the lin-log estimating equations captured the elasticity of the IR wagonfleet acquisitions in response to the rates of growth in the economy as represented in these indicators.

Despite there being as many as 15 variables in the expanded dataset, both IR wagonfleet and wagon output were found to be strongly related only to freight traffic (*i.e.*railway tonne-km). Remembering that the estimation

was done on data for the precursor period i.e.the 17 years from the 3FYP till the time of the NTPC study, which was characterised by industrial slack, it becomes evident that the NTPC recommendations relating to bulk-freight specialisation by IR were made on a severely restricted demand projection. Particularly, since the general freight flows emanated from industrial sectors which had been severely hit by recession, the magnitude to which these might recover in the subsequent period was not correctly anticipated. Thus, as IR went into a modification of its freight capacity structure geared towards bulk-freight specialisation, it shed the vital general freight capacity which had previously been the mainstay of its revenues. Again, because production cycles in the core sector tend to be deeper and have more prolonged consequences, the freight disequilibrium between the two sectors severely disrupted coordination in the FYPs. Ideally, if roadfreight services had been an exact substitute for the shortfall in railway freight capacity, the infrastructural impact might have been minimal. Instead, while the IR freighting capacity shortfall created inroads for roadfreight, the cost economics of the latter directed their entry into the high-valued freight segment only. A mass of important commodity-freight, including produce from the agricultural sector, was thus denied equitable freight services.

Evidence was also found of pessimism on the part of IR regarding the potential growth of traffic, leading to policy concentration on improving efficiency in current freight operations through reduction of wagon turnaround, etc. Addition of freighting capacity was therefore guided by the direction of continuity in past traffic trends and even wagon replacement was lagged as a result. Since the sources of IR finance at the time were primarily budgetary funding under the FYPs, the fact that traffic expectations were being pegged at decidedly low levels kept apparent concordance with the scaling down of plan finances. Although these low-growth anticipations were quite in keeping with the general recessionary mood of the economy, their projection into the future during the NTPC exercise badly affected the subsequent recovery of railway freight operations. Low levels of wagon acquisition by IR during the period also afflicted the wagon industry permanently. Showing evidence that pessimism deepened as the recession ran its course, the study revealed - surprisingly - that the cutbacks in freighting capacity additions and wagon orders made during the early part of the recessionary period were never restored to prior levels thereafter. Since this pessimism affected both replacement and acquisition orders, the wagon industry began to show chronic excess capacity leading to sickness and closure of several WPUs and takeover of others. In the meantime, because of the lowering of traffic targets, IR was able to show that existing freighting capacity was quite adequate for anticipated traffic and hence no move was made through the 1970s to restore freight adequacy in real terms to the IR wagonfleet. To some extent, the inevitable surrender of freight to the roadways formed a part of these expectations and reduced the competitiveness of IR. Since the budgetary deficits incurred by IR were then being underwritten by the exchequer and the growth of passenger traffic volumes had remained largely unaffected during the recession, gradual shifts occurred in the operational intensity of IR services which raised the level of emphasis on passenger services vis-a-vis freight operations. Since the financial health of IR depended on the latter, the shifting emphasis had grave implications for the internal resource position. Again surprisingly, no evidence was found of wagonfleet and wagon acquisition bearing any noticeable relation to industrial and economic growth rates of the economy, which would have extended the recovery of economic activity into optimistic traffic expectations. Eventually therefore, even the pace of economic recovery was constrained by transportation bottlenecks. Evidently, the infrastructural role of IR freight operations was severely circumscribed by the experience of recession and the changing composition of freighting capacity thereafter. So, although IR tonnage loadings still continue to be an important indicator of the state of economic performance of the heavy industrial sector, railway transportation in India appears to have lost its capacity to lead the economic recovery.

8.1.7 Evolution of IR Freight Handling Patterns

Wagonfleet capacity thus materialises as the principal determinant of freight handling by IR. In view of the changing composition of the IR wagonfleet and the commercial policy factors adduced earlier, it becomes relevant to consider the impact that changing wagonfleet composition may have had on the commodity patterns of IR freight movement. A certain degree of disaggregation in the analysis now becomes necessary because of the peculiarities of transportation infrastructure as an economic sector. Firstly, transportation is a *spatial* variable and is therefore subject to regional commodity specialisation. Secondly, transportation is a *development* variable which undergoes evolution in terms of its commodity character as a result of economic

growth and the creation of new commodity flows. Thirdly, transportation is an *indicative* variable which at different points of time reflects prevailing levels of economic flux in the producing sectors of the economy and their various constituents. Thus while wagonfleet composition and carrying capacity adequately delineate supply factors and constraints within freight transportation, freight handling by IR is representative of both spatial and developmental demands for transportation as articulated by the economy. Disaggregation of freight handling patterns on a regional and sectoral basis is therefore useful in the identification of partial slacks and excesses in transportation demand. Availability of credible timeseries data from CSO on the IR wagon loadings of different commodities allowed thorough investigation of these issues to be made.

A visual review of the commodity-wise freight trends displayed in the wagon-loading datasets confirmed that the nature of wagon loadings was responsive to evolutionary factors and structural change in the Indian economy. Thus while the growing dominance of coal in IR freight could be viewed in association with the decline in wagon loadings of general freight, the precise points at which these changes appeared tied in very closely with the external reference points identified by the planning and policy literature. Most noticeable in the data trends however was the gradual redistribution of wagon loadings over the BG and MG networks, caused partly by reduced transhipment but also mainly reflecting the change in gauge emphasis and gaugewise freighting capacity following the traffic readjustments of the 1970s. What became amply clear was that the imperative of increasing shipments of coal for power generation in the wake of the changing energy scenarios during that period caused coal shipments to thrust their way into the limited wagon capacity available on IR, thereby displacing the freight commodities which had hitherto occupied a dominant position. It has already been noted in the preceding discussion that the accommodation of this new freight stream was not made so much by incrementing the IR wagonfleet as by substituting its freight-flows for other commodity-freight. Inevitable consequences appear to have followed which have been captured in the mutual relativity of BG and MG wagon loadings after the 1970s. It was not only that wagon loadings of general commodities were displaced by coal, but also that the commodity streams which had traditionally entered the IR network through its feeder MG services began to wither away, lowering the overall commercial viability of MG operations. It was then but a short step to the decision to write off the 100-year old MG network and turn the tide in favour of UNIGAUGE.

The analytical exercise on freight demands therefore considered the evolution of IR commodity freight in terms of wagon loadings on its BG and MG networks over a continuous period from 1955-56 to 1989-90, during which most of the freight policy initiatives and modifications that have been described above had occurred. It was thus known *a priori* that the freight impact of technological change and specialisation in wagonfleets, shifts of freight-policy focus from MG to BG networks and the resulting spatial patterns of development were present in the variances of the wagon-loading series in different commodities. Multivariate regression analysis was then used to identify the patterns of evolution of bulk-freight dominance in IR freight loadings in terms of the impact of increased bulk-freight handling on the variances of other commodity-freight flows. The use of wagon units rather than tonnages or tonne-km as the basis of demand analysis tied in these findings with the changing composition of IR freighting capacity *i.e.* the freight supply variable demarcated earlier.

While regression results indicated that certain bulk and essential freight commodities such as coal, iron & steel, iron and manganese ore, raw jute, sugarcane and sugar, and oilseeds at least partially retained importance in the evolving IR freight-mix, as reflected by the wagon loadings of these commodities, several other commodities appeared to have lost relevance altogether. For commodities of the first group, falling MG loadings were at least partially compensated by increased BG loadings over the relevant period. Only in the particular case of cement were wagon loadings on both gauges seen to remain similarly high, because of the locationally-specific nature of the cement industry relative to widely-dispersed consumption demand which necessitated freight distribution of the commodity across the country. Also, although BG commodity loadings became more dominant with time in the case of most of the listed commodities, MG movements of coal & coke, sugar and sugarcane did not decline by as large a factor as in the others. The patterns observed suggested the working of a complex chain of economic factors within the evolution of IR commodity freight. While a primary constraint existed in the shortage of wagonfleet capacity (particularly in MG operations during the later period), short-lead traffic in industrial raw materials was less affected by this because of proximate location of user industries. Only in the case of coal & coke - where the commodity flows had to be carried over long leads to reach distantly located power stations, and in the case of cement - where the commodity

flows again had to be carried over long leads to reach dispersal and distribution points, could the relevant IR commodity loading patterns be described as having remained dominant and relatively stable over time.

Although the estimation of commodity-freight coefficients through simple OLS was vitiated by sizeable presence of serial correlation between the wagon loadings of consecutive years, this situation was not entirely unexpected. Serial correlation is a common characteristic in longitudinal data in most empirical situations. In the situation of constrained wagonfleet capacity at hand, where the nature of commodities loaded by IR was defined partly by its earlier investment decisions concerning the wagon-mix to be maintained, serial correlation appeared as a logical consequence of gradual change in IR freight composition and deserved separate study on its own. Accordingly, an autoregressive scheme was applied to the serially-dependent errors obtained from OLS, in order to estimate an appropriate lag structure for the correlated component of the residuals. Quite obviously, such residuals captured unforeseen freight displacement, freight adjustment and other such factors. The results of this exercise proved extremely interesting. It was seen that the process of commodity-freight adjustment was cyclical with considerable growth of amplitude during the 1970s and 1980s. The impact of railway freight cyclicity in India has also been noted in several studies and reports in the literature, without hard evidence being provided. In the present study too, the earlier exercise of fitting a polynomially distributed lag to IR wagon stocks had also shown evidence of cyclic acquisitions of wagons by IR in response to phased funding sanctions over successive FYP periods.

Interpreting this close coincidence of circumstances in association with the correlated residual patterns, it thus became possible to reconstruct the infrastructural implications of IR wagonfleet specialisation on consequent commodity-freight movements, with particular reference to the 3FYP experience and after, which may be hypothesised as follows. The initial years in every FYP start an upsurge in autonomous public investment, which flows into enhanced production plans at the PSUs and into related capital acquisitions by IR to aid realisation of these production plans and circumvent possible transportation bottlenecks. Since the concerned PSUs operate primarily in the heavy industrial sector, the emerging freight flows are of bulk nature, to which IR freighting capacity has to adapt accordingly. However, since planning in India deals with a mixed economy, downstream derived demands from private-sector units for additional capital goods output from the PSUs are estimated on an indicative basis, conditioned by expected growth of the economy and expected improvement in incomes and consumption demand. Experience has shown that actual economic growth in most FYPs has been substantially slower than that anticipated leading to the mismatch of PSU production plans and derived demand realisation from the private sector, as well as to a slowing in the release of FYP capital grants. In such an event, sizeable accumulation of inventories occurs at the PSUs forcing them to scale down their production and their transportation demands. At such a point, IR - which has steadily been specialising its wagonfleet in keeping with the anticipated needs of the PSUs - encounters a traffic slack and cuts back wagon acquisitions. Finally, towards the closing years of the FYPs, when PSU inventories have declined, release of the remaining plan grants initiates another spurt of autonomous capital investment in both the PSUs and IR causing bulk-commodity loadings to pick up.

The role of BG and MG wagon capacity in the hypothesised scenario is critical. While not dominating IR commodity loadings in any way, MG wagon loadings retain a complementarity arising out of the origins of the Indian MG network as a feeder to BG operations, evident for example in the radically different composition of the MG freight-mix. While traditionally the MG operations provided the means for mobilising scattered traffic from the hinterland and marshalling it into loading units that were appropriate for BG carriage and vice-versa, changes in the IR freight-focus in favour of bulk commodities have obscured this former role. In normal situations where bulk traffic expectations materialise, the role of MG operations is automatically marginalised by the inability of IR to allocate adequate BG wagon capacity to the transhipment of MG feeder flows. This marginalisation has in fact been reinforced by the planning process which has created a substantive degree of autonomous commodity-flow in the economy through the agency of the PSUs, ultimately warranting the writing-off of MG freighting capacity. However in periods of slack when bulk traffic expectations refuse to materialise - again because of the autonomous nature of their freight flows, the remnant freighting capacity of the MG wagonfleet serves as a buffer to IR freight operations by once more attracting disaggregated non-bulk commodity flows to the IR network for transhipment and onward transportation on BG. While shortening of MG wagon capacity reduces this buffer role, the high degree of specialisation in the BG wagonfleet aggravates it further, since - even with abundant freighting capacity overall - there is a shortage of particular wagons capable of handling general freight. At certain times therefore, even routine

feeder-flows from the MG network vanish causing a general slack to appear in IR freight operations. These three alternative freight demand situations in fact sum up the common freight scenarios encountered by IR which are further explained in the Factor Analysis, and account also for the triangulation noticed in the patterns of correlated residuals and their cyclic nature.

To correct distortions in the estimated OLS commodity coefficients introduced by the presence of serial correlation, resort was made to the Cochrane-Orcutt adjustment procedure. Use of the C-O procedure reallocated observed variances in the wagon-loading data to the commodity flows most responsible for these, giving rise to corrected estimates with uncorrelated residuals. It was noted that substitution of Cochrane-Orcutt coefficient estimates did not materially affect the inferences for bulk loadings of the major IR freight commodities like coal & coke and cement. The remarkable result of the C-O transformation was the identification of both *displacing* and *displaced* commodity flows which could then be interpreted in terms of the sectoral and spatial characteristics of the commodities involved. In general, it was seen that with increased wagon specialisation and increased loadings of bulk-freight on the BG network, freight flows of general manufactures were displaced on both BG and MG networks, providing indication of freight replacement as well as of shortages of appropriate covered wagon capacity. Nevertheless the MG network, which did not witness technological specialisation before or even during the process of being written off, retained such general freight flows as could be carried over short leads, *i.e.* within its network. In most cases these comprised raw material flows from cultivating or mining destinations to production centres which, by inference, could be transported over reverse leads allowing two-way utilisation of freighting capacity. The produced outputs then either entered the BG network or roadways transport for onward distribution across the country. In other cases, where for instance only distributive flows were involved, commodity traffic tended to leave the IR system altogether, except in the subsidised 'essential goods' segment. In contrast, BG commodity loadings showed evidence of increased traffic polarisation as well as of partial takeover of the erstwhile MG bulk-freight flows. It would stand to reason, on the basis of the earlier structural analysis of IR capital acquisitions and the IR wagonfleet, that these freight trends were induced by the critical freighting capacity constraints that arose from financial stringency. The infrastructural impact which the constraints had on the Indian economy has been both *sectoral* and *spatial.*

Attention was drawn to the critical phenomenon of IR freight cyclicity by the phase-analysis of OLS residuals prior to the C-O adjustment procedure. Because of serial dependence, these residuals comprised an autonomous or stochastic component as well as an autoregressed component that represented unmet or over-realised traffic expectations. Although the latter situation was found to be extremely high, it was noticed that the amplitude of freight cycles had been smaller when IR BG freighting capacity had been complemented by adequate freighting capacity on the MG network, thus enabling feeder freight operations to step in whenever there were critical BG bulk-freight shortfalls. The economic adjustments to Oil Shocks which occurred over 4FYP and 5FYP vastly increased the importance of coal freight operations, dislocating IR's MG freight operations because of the shortage of general freighting capacity on the BG network. Thus the cyclic oscillations of IR freight flows increased phenomenally in terms of wagon handling during the 1970s, even though this remained cloaked in the corresponding tonnage and traffic figures because of increased bulk-freight loading and the expansion of freighting leads. The surrender of general freight occurred in the subsequent period when intermodal competition between the roadways and railways was deregulated by liberalising the national permit system for roadways carriers. Because of their ability to handle low-volume freight flows and to reach the more isolated corners of the country, the roadways were able to compete more effectively with IR's MG freight networks which served similar general freighting needs. Thus while the BG network remained insulated because of its absolute cost-advantages in bulk carriage and its captive freight flows, the MG freight operations were slowly driven to virtual obsolescence because of freight contestability and the lack of capital investment on MG freighting capacity and infrastructure. As a result, although the freight-focus of IR BG operations has gradually narrowed down to a group of seven captive bulk-commodities whose freight flows are seen as being more dependable in traffic terms, this has required substantial capital investment in specialised railway technology and infrastructure, without yielding equivalent revenue increments for IR. Widening of the freight cycle over the 1980s may thus be seen as the result of the production-lag between producer goods and consumer goods in the economy, with periods frequently occurring when IR faces considerable bulk-traffic slack.

After their estimates had been corrected by the C-O adjustment, the commodity-coefficients estimated from

the wagon-loading datasets provided a better idea of the freight elasticities of different commodities present in the IR freight-mix, enabling the joint identification of the displaced and displacing freight flows. It was thus seen that IR freight-specialisation towards mining and core-sector freight flows had tended to displace railway movements of agricultural commodities and light manufactured goods, primarily because of rising shortages of general freighting capacity because of line saturation on the BG network and increasing wagonfleet specialisation. Because of the consequent inability of the BG network to provide trunk linkages to the freight flows of IR's MG network, commodity-freight that originated on the latter tended to lose presence in the IR freight-mix. Thus only essential or strategic commodity movements such as those of grams & pulses, coal and cement still continued to have visible presence in IR's joint freight operations.

8.1.8 Freight Operations & the Evolution of Commodity-Freight Patterns

The changing IR freight-mix and the disappearance of certain commodity flows which had traditionally been important to railway freight operations in India were then assessed for their spatial and sectoral implications. This in itself was a complex exercise since it involved the decomposition of IR's aggregate freight operations by commodities and regions. The key link for this was provided by the associations between regional commodity flows and the regional patterns of economic activity. While insights into these had been provided by certain studies in the earlier literature, these had focused on regional development in India rather than on the spatial economics of railway freight transportation. Accordingly, the spatial analysis in the present study was made by assessing the freight performance and other operational parameters on IR's nine zonal railways. A vital component in this assessment was the unequal distribution of BG and MG routes over the zonal networks, as a consequence of which important arterial railways like ER, SER, NR, CR and WR were able to record higher freight turnovers and better profitability, vis-a-vis largely MG-based zonal networks like NER and NEFR which served the country's extremities and recorded consistent operating losses. Attention was thus also drawn by the spatial analysis to the weaknesses of freight operations on the IR system, as a result of the increasing concentration and congestion of bulk-freight flows along the HDCs linking the golden quadrilateral, and the retreat of freight operations elsewhere because of the dislocation of feeder-freight flows from the main IR freight corridors. Once again, a critical role was played by the IR freight policy shift that had favoured bulk-freight, which reallocated more railway investment towards technological change and the upgradation of specialised BG capacity in order to relieve freight congestion on the HDCs. Changes were also found to have occurred in the IR freight booking policy which now favours full wagonload and trainload traffic over parcels and smalls, in order to improve freighting efficiency on the BG network. Since the adverse consequences of this policy fell disproportionately on IR's MG network, it was found to have placed the regions and IR zones served by MG-dominated zonal railways at relative disadvantage. These changes in the regional commodity-freight flows and in gaugewise freight operations were also likely to have influenced the IR freight-mix, with the freight offers of different regions and commodities receiving less attention because of IR's increasing preoccupation with BG bulk-freight.

Consequently, a separate multivariate study examined the longterm cross-commodity and crossgauge evolution of the IR commodity-freight mix, which made explicit use of Factor Analysis. Although previous applications of this technique were found in two instances in the regional planning literature, no previous instance was found where the technique had been applied to the analysis of railway operations. When applied to the IR wagon-loading datasets, Factor Analysis was able to decompose the joint variances of the different commodity-freight loadings and define the freight-adjustments that IR has frequently been called on to make as a consequence of freight cyclicity and the nonavailability of preferred categories of freight. Consequently, a freight-adjustment model was developed around the results of the Factor Analysis. Simulation of IR freighting adjustments through this model revealed that the wagon-loading trends of different commodities on either IR gauge were highly interdependent. In situations described during the phase-analysis, where the freight offer of preferred mining and heavy industrial commodities was small, IR was found to return partially to feeder operations and to allocate more MG and BG wagon capacity to low-bulk general freight. When freight offers from the core sector - comprising the seven major IR bulk-freight commodities - were high, IR's BG line capacities and wagonfleet capacity tended to get saturated, causing traffic congestion on the golden quadrilateral and freight-slack over the rest of the IR network, which adversely affected the feeder-freight operations and the general freight segment.

Over the entire course of IR freight operations during the period reviewed, generalised slack that had affected

the entire IR system was only found to have occurred during the 3FYP. The freight traffic anomalies noticed in connection with the Oil Shocks of the 1970s were found to represent wild swings in IR freight operations between general freight and bulk-freight. The subsequent period which coincided with IR's decision to phase out MG operations was found to have reduced freight traffic swings, but was also responsible for IR's loss of traffic share in the remunerative general freight segment. In most common situations encountered over the 35-year period of study, the freight offer from the bulk commodities tended to be smaller than expected, leading to the partial wastage of specialised freighting capacity which had been added at great cost to the IR system.

The freight adjustment model also allowed exploration of the patterns of commodity-dominance and commodity-displacement which have gradually developed within the IR freight-mix. These were captured in the *communalities* of the freight-adjustment vectors defined by the model to illustrate IR's freight response in different market situations. Each freight-adjustment vector gave freight dominance to a particular commodity whose wagon-loadings were high in the given situation. The patterns of commodity-displacement in each vector were found to be determined by the compatibility of freight-flows between the dominant commodity and other commodity-freight over the entire IR network. Consequently, while major bulk commodities like cement and coal & coke which had high communality tended to displace other general freight when their wagon-loadings were high, IR was found to substitute other commodity-freight when traffic in these commodities was slack. This had far-reaching spatial and sectoral implications for the entire economy.

It was also noted that the critical variables in the freight-adjustment process were the freighting capacity of the IR wagonfleet and the units in which the freighting-capacity was defined *i.e.* the IR railway wagons. The introduction of specialised wagon designs and increasing specialisation of the IR wagonfleet which had been resorted to in order to augment the bulk-freighting capability of IR were found to act as a limiting factor in situations of traffic slack, since the freighting-capacity which IR could switchover to the carriage of other commodity-freight, had become progressively limited. Through this step-wise analysis, the present study was able to identify several critical problems which have begun to tell heavily on the operational and financial health of IR.

8.2 Critical Problems of the Indian Railways

After the nationalisation of the company railways and their regrouping into suitable territorial zones, IR began operations as a unified national carrier by expanding its freighting-capacity well ahead of immediately perceived needs. The huge capital investments that went into this tied in closely with the strategy of national planning. Over the early FYPs, IR's freight-focus in its extended BG and MG freight operations was thus to serve the transportation needs of the entire country and provide the vital infrastructure for regional development. While extending its technological capabilities to meet the new requirements of an industrialising economy, IR continued to interlink the freight-flows from diverse points of origin throughout the country through the trunk and feeder operations for which the network had been designed. For this, maintenance of adequate railway infrastructure and freighting capacity on all parts of the network was a prime necessity in order to facilitate the continuous flows of general freight between the country's developing markets. Technological upgradation of IR was visualised as part of the process of asset renewal, during which worn-out railway assets were to be replaced with improved variants that would augment IR's technological capabilities for serving the specialised needs of India's new core sector. Although substantial growth in bulk-freight and strategic traffic was expected as a result of the planning effort, balance was maintained between the commercial freighting needs of the economy and the tactical needs of the core sector by maintaining wagonfleet adequacy. Thus, even during the freight crises of the 3FYP which were sparked off by the non-materialisation of bulk-freight in anticipated volumes,[2] IR's general freight continued to move without much of a hitch.

The subsequent change in IR's freight-focus was a partial consequence of the reconstruction of India's energy priorities following the Oil Shocks. Since the capacity to freight coking coal in huge volumes was critical to the establishment of new thermal power plants, capital investment on railway technology and on IR wagon replacement became increasingly specialised around the freighting needs of this single bulk commodity. The gradual decline of parity between IR's general freighting capacity and the freight offers of the economy because of wagonfleet inadequacies led to growing incidence of freight cyclicity. Because of

route-congestion on the arterial network and the nonavailability of suitable wagons elsewhere, the complementarities between feeder and trunk freight operations on the MG and BG networks were lost, causing constriction in other segments of the freight market, partly because of line congestion and partly because of wagonfleet inadequacies. While the critical deficiencies of the IR system that were attributable to the lack of sufficient capital resources to simultaneously meet the needs of technological upgradation and asset renewal were taken note of during the review of the 6FYP,[3] the railway component of the 7FYP continued to focus on technological renewal rather than on improving wagonfleet adequacy.[4] Meanwhile, IR decided to do away with the mounting arrears in wagon replacement through the simple expedient of deciding to phase out MG operations and shifting the investment focus to gauge conversion. By progressively reducing the freighting capacity of the MG feeder network, the shift of short- and medium-distance general freight to the roadways was ensured.

Deregulation of the Indian roadways had begun in 1975 during the 5FYP period through introduction of the National Permit system for roadways operators as part of the 20-Point Programme.[5] Following the recommendations of NTPC [1980] for developing intermodal transportation in the country, the ceiling on issuance of Zonal and National Permits by the Indian state governments to roadways operators was abolished in January 1986, which allowed the Indian roadways to emerge into formidable competitors in the freight market.[6] It was consequently noted during the 9FYP,[7] that private roadways operators had moved in aggressively to contest the freight-market space that was vacated by IR.

During this duration and over the period since, IR has remained starved of new capital support from public funds, and has been forced to finance its capital requirements for the acquisition of adequate rolling stock through market borrowings from the IRFC and a flurry of tariff revisions. While the mobilisation of market funds has saddled IR subsequently with increasing debt-servicing costs and has eroded its slim operating ratios, the tariff increases led to further captures of high-valued general freight by the roadways forcing IR's share in the Indian freight market to fall continuously. Today, 89 percent of IR freight traffic comprises seven captive bulk commodities, namely coal & coke, chemical fertilisers, cement, POL, essential foodgrains, iron ore and finished steel and the flow of raw materials to the ISPs, with 99 percent of freight revenues accruing from BG operations and 65 percent of freight traffic being carried on the high-density HDN network linking the 'Golden Quadrilateral'.[8]

Yet, in spite of being in dire financial straits, the phenomenon of 'adverse selection' of railway development projects has continued to plague IR ever since the 6FYP.[9] While mounting arrears on physical renewal of track, traction and rolling-stock continue to squeeze IR freighting capacity,[10] as much as 70 percent of IR plan outlays are expended on new railway projects that do not directly generate capacity.[11] Similarly, while around half of the IR capital fund has been absorbed in UNIGAUGE, an estimated 20-30 percent of IR's market borrowings are being invested in the construction of new lines where traffic will take a long time to develop.[12] Meanwhile, essential investments on IR freighting capacity which would have restored resilience and competitivity to IR freight operations are either not made (in the case of MG wagons) or are staggered over such a long period of time that their effectiveness in meeting the freight competition is lost.

8.2.1 Insights into the Weaknesses of IR

A review of the research undertaken of Indian Railways freight mobilisation in the country perspectives reveal two important aspects that have been similar to other major railway systems in the world. Firstly, most of the systems had to undergo reforms owing to organisational conflicts and declining capital investments. Secondly, the travails the railways had to bear owing to intermodal competition have led to reordering of commodity mix and modernisation of freight transport in order to survive the fierce competition. Historical exploration of the railway systems indicate the various ways through which the reforms have been effected, with allowance for the adaptation of each method to the typicalities of the economy. What remains to be researched presently is whether such reforms or measures can be made applicable to IR in order to overcome the present degenerative status.

It has been seen that the capitalisation needs of the railways are recurring by nature and thus any disruption in funding such requirements can create serious bottlenecks in the provision of future services. Such investments are not only recurring but need to be accompanied with increments in the capital outlay, a basic imperative to accommodate the expanding economy. These twin considerations governing the capitalisation

of IR has been greatly impeded by the declining budgetary provisions. In addition, by virtue of its nature as a natural monopoly and the largest public sector undertaking, it is expected to function both as a commercial enterprise and also as a infrastructure to provide a 'socially optimal level' of transportation infrastructure through cross-subsidisation and maintenance of unremunerative services. This is a distinctive feature of IR and the other railway systems reviewed do not necessarily share the same social infrastructure perspective. Thus it is only natural that the reforms undertaken in other systems may not be as viable in the Indian context where generation of internal resources leaves much to wanting along with lack of incentives to achieve cost reduction.

Most of the major railway systems in the world have taken one aspect very seriously under consideration. Their need to upgrade and go for largescale modernisation sometimes have made it necessary for them to reform their organisational structure. For example, the SNCF had undertaken largescale modernisation including rapid transit systems [TGV] and Freight Forwarder Schemes for efficient delivery of freight. This was very much required to compete with the burgeoning road transport. British railways on the other hand, because of passenger domination could privatise their operations to provide the best of services through healthy competition among companies. Japan with its outright privatisation had both political and economic underpinnings. While some have argued about privatisation efforts in the 1980s as similar to 'sale of family silver' during the Meijis in the 1880s, economic arguments are stronger since privatisation could revive the financial health of the JR and also improved the efficiency of the system. Premium services were offered by Shinkansen to enhance efficiency and improve the financial health of the railways. Chinese Railways, with a very similar position as IR, have resorted to private borrowing but at the same time has been expanding its network to increase its internal resources. Whatever be the mode of reform modernisation have always been a priority along with the enhancement of efficiency levels. IR for example, had introduced the Rajdhani and Shatabdi expresses in the lines of TGV and Shinkansen for passenger transport, while leasing schemes like OYW or BOLT were introduced to reduce the burden on freight division to subsidise the capitalisation needs. But the latter was unable to make much headway since private initiatives were not forthcoming and the required monitoring of the schemes were not attended to. Whatever be the *modus operandi* the railway systems have been trying to overcome or handle the major problem of surplus generation without which the continuous capitalisation needs cannot be met. In IR the problem is all the more acute because of the longstanding dividend payments to the government at first charge even when the railways are suffering from severe fund shortages.

8.2.2 Operational Genesis of the Above Problems

A general phenomenon that has affected the major railway systems is related to the consequences of inducting new technology. Ushering in new technology has often been counterproductive as it escalates the cost of acquisition with the laying off of old capital assets. To generate more resources for capitalisation needs, the brunt is usually borne by the heavier segment i.e., the bulk commodities that are subjected to regular tariff revision with escalation in tariffs, as is evident from the IR experience. Consequently high rated traffic is chased away and there is a fall in the demand for freight services resulting in slowdown of industries and the macro economy at large. This phenomenon is stark in railway systems of developing countries like India where resource crunch has had a serious detrimental effect on the growing economy since the 1970s. Thus to maximise its gains from new technology subjected to capital constraints, effective measures have been adopted and often successfully implemented by the SNCF, the JR, the British railways and the American railroads is to make the system cost effective. Enhancing efficiency levels or reducing the costs of operations are the two aspects on which IR needs to stress upon before venturing into other areas of reform.

Thus it is apparent from the previous analysis that capital flows towards infrastructure is the major determinant of its expansions and operations without endangering the capacity utilisation and efficiency parameters. However, the unsustainable and most often erratic nature of budgetary support in the case of IR has its own implications while the situation is aggravated by the operational inefficiencies created within the framework. In the face of declining Government budgetary support to the IR, generation or mobilisation of internal resources for railway development has become an imperative and in the face of this situation proposals for privatisation or deregulation of IR has come to the forefront as suitable alternatives to the existing state-owned structure. The proposed alternatives point towards the commercialisation of railway operations in India following the already privatised or deregulated operations of other countries. But the inherent

inadequacies of IR do not leave any room for emulation but a proper analysis of the constraints and a prescription that is best suited for IR. All possible means of accomplishing revenue generation would need to be explored, including the raising of rail tariffs, and reducing railway costs.

It would be worthwhile to identify the various inefficiencies and their causes while trying to suggest the obvious way out.

8.2.3 Inefficiencies in Management

The first endeavour on the part of the railways to generate more resources and become commercially viable within the existing framework can be understood to be an attempt to reduce the railway costs and to raise the productivity standards with respect to both labour and capital. Certain inefficiencies in both management and operations need to be treated in order to accomplish this. While the aspect of productive efficiency is important in every organisation, special attention needs to be given to those units where efficient handling of operations proves conducive to the growth of the economy and increase in social welfare.

China, comparable both in terms of state ownership and its vast network, shows a much more favourable operating ratio in terms of personnel cost and the total revenue generated [26 percent in China against 45 percent in India; *see ch2*]. Modernisation of railway operations and mechanisation of freight handling in many cases have led to surplus personnel and a consequent decline in labour productivity. Since a significant portion of the revenue generated is earmarked for personnel cost, it has caused IR to be a high-cost organisation since retrenchment possibilities prove difficult in a PSU. With a distinct shift towards a specific freight-mix and the consequent specialisation of wagons, handling of freight operations have become highly specialised and less labour dependent. For instance, specialised wagons for handling coal and other bulk items like the BOX and BOXN are equipped with side discharge arrangements to facilitate unloading of coal at sidings. Bottom discharge wagons like the BOBS/BOBX are specialised to transport ballast and ores which can be unloaded at the plant sidings. Computerisation of certain facilities have also added to the redundancy of railway personnel.

While the immensity of the staffing problem cannot be understated, it is also difficult to arrive at any cogent solution to this issue through privatisation or deregulation. The question remains that can privatisation ensure increased labour productivity with deliberate reduction in manpower? The true yardstick of the success of privatisation is the privatised railway company's ability to pay a stable dividend without recourse to fare increase. In practice, this requires reduction of in the ratio of personnel costs to revenue, so that salary revisions do not introduce a cost cascade. As noted earlier, JNR in its heyday in 1974, had a ratio of 86 percent which in 1986 had declined to 63 percent. Privatisation had however brought an immediate decline to 28 percent in 1988, considerably raising productivity. The eventual target has been to reduce the total number of employees to 68000 through introduction of high technology and computerisation, so that the cost ratio stabilises at 20 percent.

Apprehensions and general misgivings amongst the employees in pre-privatised JR because the government would no longer provide job security had led to initial problems within the privatised JNR. However, JNR could effectively bring down the cost ratio by successfully reallocating surplus personnel to the development of subsidiary business by the railway companies.

8.2.4 Operational Inefficiencies

From the previous analysis it is apparent that labour productivity in the case of IR provides a dismal picture and a reduction in operative cost can be brought about only by curtailing expenditure on salaries or wages or reducing the staff strength. Under the present state-owned structure this avenue being non-applicable, it is necessary to ensure a higher capital productivity to generate higher revenues in the near future. Efficient utilisation of capital assets has thus been the key to resource generation. However, improvement in the efficiency in certain operational indicators *[see ch4]* can arrest the decline in capital productivity in IR as noted earlier. One such indicator is the turnaround time (TAT). An increase in TAT can be attributed to system inefficiency factors like track congestion or slower movement of wagons owing to less tractive effort. Considerable scope exists to achieve a lowering in the costs of railway services through a reduction in TAT. While at the current train-speeds, daily wagon utilisation is of 5-6 hours, optimal utilisation of wagons

requires that each wagon be kept on the move for at least 10-12 hours. Reduction of wagon turnaround time from the present TAT-level of 10-11 days would create additional wagon-loading capacity of another 12 to 15 thousand wagons per day, without raising capital costs or interest and depreciation. Freight efficiency could also be improved by induction of latest wagon technology that would raise axle loads to 24-25T consequently raising loading-weight of the wagons to 100T.[13]

Another aspect that demands exploration is the increasing incidence of empty wagons on track, a fallout of specialisation of freight-mix on IR. This also has a bearing on the increase in TAT. If the policy once again is oriented towards a diversified freight-mix with commensurate wagons that are upgraded general categories of wagons, then the inefficiency owing to running of empty wagons may be reverted. Scope for productivity improvement exists with improvement in coaching utilisation from 408km per day to 600 km per day at an average speed of 40kmph and coach availability of 15hrs per day. Wagon turnaround can be reduced from 11.5 days at present, since at least 8.5 days from this presently go into empty movement and maintenance. Allied to this is the concentration of traffic on the trunk routes leading to congestion and a consequent increase in the TAT. Line capacity utilisation presently varies between 40 trains per track km per day on Golden Quadrilateral routes to 21.4 trains per track km per day overall. Technical feasibility would in fact allow 72 trains to be run per day with mean headway of 20 minutes, substantially raising handling capacity.[14]

A likely alternative to the present system of operations may be investments on new tracks and doubling of the existing lines. However the former alternative is not appealing at this juncture because of the immensity of investments and the long gestation period involved before receiving any returns. Investments would also have to be made on electricity provisions to run the trains unless we acquire diesel-electric engines like France to run on those routes that are not electrified.

Cost reductions would also have a financial dimension. Conservation of railway resources would imply the optimisation of capital-use. In practice, this suggestion would require a rolling-back in the manufacturing activities currently being executed by the Indian Railways, and would permit private-sector manufacture of rolling stock not only to meet the requirements of the Indian system, but also with the intent of achieving exports. Another innovative method of relieving wagon-constraints would be to allow the establishment of leasing companies which owned their own wagons and made these available to shippers under contract. Leasing activity has been the primary impetus behind the growth of the roadways sector over the last few decades, in India and throughout the world. Entry of leasing into the railway freight sector [as in France] would therefore replicate the inflows of credit-capital that expanded road freight operations in India, without overloading the Indian Railways with interest charges. The recent schemes of OYW and BOLT are being floated to derive more resources through leasing. The proposition, although may sound effective in overcoming the capacity constraints, lacks in proving itself as a general phenomenon to cover all commodities handled on both commercially viable routes and commercially nonviable routes but socially desirable routes. Leasing activities in all probabilities will be restricted to those sections where the demand for wagons are assured by the captive traffic and thus the basic thrust on infrastructural development as a national objective may be missed.

On the tariff side, although some extent of cross-subsidisation between inter-freight services and between freight and passenger operations would have to be retained in the interest of social objectives, the general direction of tariff reforms should be to reduce both the spread and the extent of freight subsidies on commodity traffic. Similar rationalisations in case of passenger-subsidies would also relieve financial pressure, particularly if passenger operations as a whole were made self-sufficient, with the cost of subsidies in lower classes of travel being entirely borne by passengers in the upper classes.

8.3 Policy Review & Recommendations

The two broad objectives of IR as laid down in the Status Paper and subsequently in the White Paper on Railway Projects are penetrating by nature but overlook the role of infrastructure as a major determinant of economic growth. The first objective entrusts IR with operating on commercial principles to cope with the 'needs of the burgeoning national economy', while the second requires the IR to fulfill the aspirations of the people as represented by the 'local, State and Central Government agencies'. Nothing really prevents IR from running as a commercial undertaking, but for it to run autonomously and efficiently, a separate corporate identity is deemed necessary. The disadvantages of monolithic and monopolistic organisation are to be

overcome, even as the efficiencies and economies of scale resulting from the organisational mode are retained. While addressing this issue it should be kept in mind that sufficient scope exists to improve coordination between the Railways and their major users both as institutionalising present operations and planning expansions, and also to integrate railway development in the regional planning exercises. A clash inevitably occurs between social and commercial objectives in railway operations at this juncture when curtailment in capital support over the plan periods (from 75 percent in the 5FYP to 23 percent in 8FYP) are practically making it imperative for IR to operate on commercial principles.

The primary underlying reason for developing an infrastructural utility or service in a country is the extended linkages this has with economic growth and development following the Schumpeterian innovation cycles and Kondratieff long waves. Infrastructure being an auxilliary to *development* process, has the capacity to induce qualitatively superior and diverse forms of economic activity that ensure development of downstream activities. The choice before the government is either to broaden and strengthen the economic base or to focus on downstream positions, both critical in determining the overall productive capacity in the economy. While both are necessary as complementarity can be noticed between the two positions, a certain sequencing of the investment decisions will ensure the continuous flow of services from one to the other. An obvious choice for developing countries like India in the face of capital scarcity is to first broaden the economic base with various infrastructural facilities so that it initiates a development process and takes the economy to the takeoff stage. Investment in transport infrastructure had been an important objective in colonised India and with independence it had also occupied a primary position in the initial Plans. Among the alternative modes of surface transport, railways in India hold a special importance as it is the fastest and most efficient form to improve communication linkages covering long internal distances. While the advantages of a railway system has been amply made clear in the White Paper,[15] a justification of IR as an infrastructure remains to be included. The thrust on IR as an infrastructural variable in the first two Plans was never repeated in the subsequent plans, diminishing the role of IR as an important development determinant. The spill-overs from developing a transport infrastructure like the railways into the Indian economy was strangulated by the lack of initiative to maintain a continuous flow of investment to this sector. Once the gestation period was over the downstream effects would have been more pronounced. What it requires is the acknowledgment on the part of the planners that the development of railway infrastructure can be continued along with investments on other infrastructural facilities. While it is an established fact from country experiences that alternative modes of transport can be most efficiently utilised if they run complementary to each other, a lot remains to be desired from the Indian experience. Controversies arising around the non-viability of railway projects and the viability of roadways are baseless if both the systems are allowed to operate in a noncompetitive manner and the development of one cannot be made at the expense of another.

The problem of funding railway infrastructure in India is a moot question in the Status Paper as well as in the White Paper. The philosophy of infrastructural investment has been that with uninterrupted flow of investments would, after a time lag, ensure a continuous flow of returns - both economic and social. While the public utility aspects, dealt with earlier, relates to the provision of transport infrastructure on noncommercial terms, satisfying 'wants' that merit to be provided for 'through the public budget', lack of budgetary support over continuous periods of time now demands the running of IR on commercial principles. The rationale behind public investment advanced in relation to railway infrastructure is based on the prevalence of investment that is lumpy, give low returns, are technically indivisible and incur high fixed capital costs - characteristics that are otherwise unappealing to private investors. In the presence of such non-profitable situations, apprehensions that privatised provision would lead to suboptimal supply and inadequacy of services cannot be ruled out. Although theoretically public provisions for infrastructure is the best means of fulfilling the social and economic objectives through capacity creation, history shows that government policies towards financing infrastructure have most often been responsible in impeding development in this sector, restricting the benefits of large scale economies in the long run. Fund flows, as is evident from the plan allocations, have been declining giving rise to delays in clearing backlogs and carrying over of present investments into the future. The lack of concern on the part of the Government over the last three FYPs precipitated the situation. As an infrastructure of great social importance IR had to operate under restrictive circumstances where primary social objectives were served through low-cost prioritised haulage at the expense of commercially preferable operations. Internal generation of resources were thus low and added to this was the decline in capital flow from the General Exchequer. This crunch eventually manifested itself in capacity constraints which in turn led to narrowing down of the total freight-mix comprising of socially-preferable

traffic and bulk traffic to other PSUs. In a bid to maintain only the assured traffic, IR shifted its focus in modernising transport capacity to handle the specific commoditities and thus the high valued traffic diverted to the fast growing roadways.

The phases of the emergence of the resource crunch thus had a direct effect on the patterns of IR plan investment, especially after the 3FYP, with the 'plateau' phase of IR operations being closely coincident with the investment slowdown between 1965 and 1980. Accumulation of a massive backlog of rolling stock and track replacement created a pressure on IR which eventually attempted to ease situation since the 6FYP with a planning shift towards bulk-freight and the BG network and an associated pickup in investment towards upgradation and modernisation of rolling stock to cater to bulk. As a result a substantial portion of the then existing MG capacity remained underutilised.

Many causes can be ascribed towards the resource crunch, primary among which is the high cost of technology induction on the BG network. Other issues relate to the shifting of plan focii from a largely infrastructural plan in 1FYP allowing the transportation sector to claim the highest percentage share of investments made, to a divergent policy of subscribing to direct participation of the state in economic activities leading to a proliferation of public sector units. Support to infrastructure took a backseat accordingly, partly also because of the inability of IR to raise revenues and internal generation of resources. Reliance on market borrowing in the later plans is a device to find solutions to the resource crunch, and an admission that substantial state funding is not likely to be forthcoming. The option that remains for IR is either to raise internal surpluses or to avail capital credit. While the former option is being thrust upon IR, the primary avenue to mobilise resources through increasing traffic is constricted by a shift to low-valued bulk only and nonavailability of additional capacity to accommodate increased traffic. Under these circumstances, the IR revised its rate schedule in quick succession under pressure to generate internal resources. As is evident the upward revision in rates only aggravated the situation since it failed to woo back any traffic from the roadways by way of lowered costs. Another stronger manifestation of catering to specialised freight has been the focus on only a few busy routes implying that many other lines would soon become unprofitable and the IR will be caught in a vicious circle from which there will be no escape.

The second option of market borrowing is an expensive proposition since loan capital will only generate more pressure on IR in the form of interest payments. Investment in infrastructure being characterised by 'lumpiness' and 'low returns' on capital requires a higher interest rate guarantee to attract capital in this sector, a fact that has been historically proven. Hence to compensate for the dwindling capital funding by the General Exchequer the IR is being caught in a debt trap and a careful evaluation of this option is becoming imperative.

8.4 IR: Scenarios for the Future

Restructuring of the railways is currently an important area in international economic debate. Through most of their history, the world's railways have operated either under direct control or close regulation by government. These operational modes relate as much to the history of railway construction as to the economics of public utilities and limited transport competition. Sinking of large amounts of capital on railway projects with long gestation required the active agency of the state. However, given the present state of affairs on IR, considerable debate has centred around reorganising IR. Before entering the debate centering around privatisation of Indian Railways, certain features are to be kept in mind. A layer of government policy that is neither micro nor macro is the attainment of social objectives that is best described as social policy. The government in such cases cannot remain a passive observer but needs to be an active participant in economic decision-making through interventions such as controls and regulations. Market failure in the case of provision of merit goods such as railway infrastructure compels government intervention and hence if privatisation is to be entertained, it needs to pass the test of fulfilling social objectives.

IR being a natural monopoly, public sector production is indicated. Thus it is difficult to leave it to private production. However, it has been advocated by many that induction of new technology have reduced the area of natural monopoly and that regulatory measures can reduce the scope of extortionist pricing. Recent experiences of privatisation measures in UK have shown that 'it is institutionally easier to regulate a private monopoly than it is manage a public monopoly, to serve the public interest tolerably well'. [16]

What exactly does railway privatisation mean in an Indian context? It can either mean that there would be complete change in ownership over IR, with outright sale of assets to private institutions and individuals or can mean joint management of IR by both public and private owners, with partial deregulation and reduction in government controls. In the case of the former, it should be borne in mind that IR is one of the world's largest monolithic organisations and it would be extremely difficult for a single private institution to purchase its huge assets along with its huge existing liabilities. In a situation like this, private ownership - if at all possible - cannot be socially efficient since all unremunerative railway operations would be shut down to make railway enterprise cost-efficient. In the case of the latter proposition, it is possible to hand over certain operations of IR to be managed by private institutions, as has been done in the UK by handing over British Rail operations to private sector, without impinging on the infrastructural and social objectives of running the railways.

However, with India being a country of subcontinental dimensions, with innumerable cross-country freight movements, it would be extremely hazardous to entrust the responsibilities of coordinating all traffic movements to a private institution. A third definition of railway privatisation would mean the outsourcing of certain railway services and utilities to private-sector organisations while the ownership of the railways continued to vest with the state. This is the only possible case for IR, where tertiary services like catering and the running of railway hotels could be left to private managements.

As the history of the Indian railways has portrayed, privatisation had failed to prove its worth in the early phases of railway development in India. Various forms of private-sector association with railway development in the country are seen during the prenationalisation period from 1849-1924, which may be subdivided further into three separate phases over the subperiods 1849-1869, 1869-1882, 1882-1924. In all such associations, private entrepreneurial capital only evinced interest as long as the returns from railway investment were attractive, and its interest did not extend into the long term. Hence, applying the lessons of the past to the present context, no assurance is gained that private execution and operation of infrastructure projects would in the long run prove more efficient than government involvement. Even if the lessons from history cannot be drawn into the present circumstances where IR is running an operating loss, one cannot deny the positive attributes of having a state-owned utility like railway infrastructure. Considering the public-utility character of railway transportation - although this was not overtly emphasised during colonial rule - the Indian state in its early FYP allocations had aimed at transforming the infrastructural base of the country in keeping with national and development interests. The problems of lumpiness in infrastructural investment and the disincentives of low capital returns thus made it imperative for the renewal of railway infrastructure in India to be funded by the state. However, the insurance against capital losses guaranteed by the steady flow of government equity also has the danger of injecting further complacency within the IR organisation. This can only be ruled out by assuring the efficiency of IR operations. An attempt has been made in the foregoing chapters to identify the operational weaknesses of IR and the capacity constraints that ensued. If alternatives like largescale privatisation and total deregulation need to be implemented, it is necessary to seek remedies or corrective measures within the alternatives in order to pose stronger arguments in their favour.

Traffic shares of the Indian Railways have been falling despite growth of tonnages and tonne-kilometres, because of the inability of the railway infrastructure to handle the existing level of traffic demand. The main reason for this is the inability of the Railways in the face of resource constraints and declining budgetary support, to meet the capital costs of new railway construction, maintenance of railway rolling stock and equipment, and technology upgradation. Privatisation is therefore often the mooted solution, following the recent examples of developed countries over the last two decades. The forms that privatisation has followed in these countries are varied and include divesture, contracting, concessionary/subsidised private operation, joint ventures, and deregulation. Privatisation is believed to improve efficiency, quality of services and the speed with which technological innovations are incorporated into railway systems, without compromising with the primary welfare objective of providing transport infrastructure to the people. However the present levels of Indian Railways infrastructure vis-a-vis available technology, and the degree of lumpy, long-gestation capital investment that will be required to bring its services on par with advanced railway systems, is still the principal disincentive to a privatisation effort.

Although Build, Operate & Transfer [BOT] concepts are already being contemplated for the highways and power sectors, prior experience of privatised railway development between 1849-1869 should alert policy-

makers to the need for building in a monitoring provision into the concessions granted, which would reward good performance and penalise bad.

In view of the foregoing, and in the interest of supporting overall economic policy in India, core railway services would have to be retained in the public sector, although ancillary and peripheral activities could be partially privatised, which could include terminal, handling and storage operations, container depots, telecommunication uplinks, captive power installations, and the marketing of freight services. Another important area where privatisation might be considered is the production of railway inputs, as also civil maintenance of railway colonies and stations. Privatisation of the Railways' production undertakings would have to proceed progressively, from their present form as departmental undertakings to their constitution as joint-sector commercial undertakings.

Even in the developed countries where railways have been privatised, entry of private enterprise has largely been confined to economically viable projects only, because of the trade-off between private profits and social objectives that takes place whenever a public utility is privatised. The scope for privatisation of railways depends on the operating environment within which they function. Hence the experience of privatisation in other countries can often prove a poor guide to the operational prospects of privatised railways in India. The factors governing railway deregulation and privatisation in the US and the UK were partly conditioned by a general trend towards privatisation of public industry. In India therefore, the objective of improving railway efficiency that underlies the privatisation debate might be achieved as effectively by the lesser step of reconstituting Indian Railways into a public-sector corporation with room for private sector participation in equity. Such a device would provide autonomy of investment and pricing policies, while simultaneously expanding the capital base.

Even in the theoretical literature deregulation is differentiated from privatisation. While, under the argument of the Theory of Property Rights that a privatised structure provides incentives towards optimisation, privatisation implies the actual transfer of ownership, deregulation implies the removal of state restrictions on entry and withdrawal, and in this light is the spirit that guides the present liberalisation ethos in India. Either measure is equally capable of improving productivity and efficiency since there is close association between the 'free market', and the 'contestable market' of deregulated industry where all firms access identical production methods and hence have identical cost functions. For an industry to be truly contestable, the process of entry of a contestant should involve no sunk costs, which would otherwise impede exit on account of irrevocable investments made. In the US, the contestability theory has been the main foundation for deregulation of railroads.

In Britain however, the effort to improve the efficiency and coverage of railway services has proceeded on the basis of transfer of ownership to create incentives for profit maximisation within an optimal industrial structure. Besides improving efficiency and technology, two external objectives which also guided the privatisation exercise were the augmentation of government resources through divesture of railway equity, and the disciplining of militant trade unionism. Even so, the principal motivation behind largescale privatisation of public sector undertakings in the UK was the sale of state assets to mobilise revenue for the exchequer.

Deregulation in the US and privatisation in the UK have succeeded by and large in those industries where the proportion of sunk costs are insignificant and cost contestability prevails. The roots of indifferent PSU performance in most countries lie not in inferior managerial ability but in the additional constraints that shackle managerial innovation and initiative. Applying the context to the railways, the additional constraints that operate pertain to the social welfare objectives of transport operation. Market allocation processes, such as those in the so-called free market, have to apportion both costs and benefits efficiently, bearing in mind that while costs are a supply variable affecting producers, benefits or utilities are a demand variable affecting consumers. The 'Conventional Wisdom' of welfare economics therefore holds public ownership to be most appropriate in those social contexts where although efficient apportionment of costs may ensure efficient supply, the market mechanism works inefficiently when it comes to distributing benefits. Thus across-the-board privatisation in such cases would hurt allocative efficiency, even while promoting productive efficiency, primarily because the viability of public sector investment and particularly of railway investment has to be assessed on social cost-benefit considerations rather than on the pure return to capital.

Granted then that privatisation involves both gains in productive efficiency and losses in allocative efficiency, privatisation might be advisable for PSUs where the former would more than outweigh the latter. In

infrastructural contexts however, the object of allocative efficiency acquires long-run developmental significance that is of far greater importance than short-term efficiency in supply. In the given situation, privatisation cannot be the best alternative for the Indian Railways, since its success in maintaining allocative efficiency is not attested to by the experiences of railway privatisation in other countries.

This does not detract however from the importance of improving efficiency of supply of railway services. The situation under which the Indian Railways have operated has assigned disproportionate importance to the social objective of achieving allocative efficiency, because the extent to which the Railways are publicly accountable for productive efficiency as a departmental undertaking is limited to realisation of dividends of 6.5 percent on total capital-at-charge to the General Revenues of the Government of India. The price of this limited accountability is limited autonomy since Railway investment programmes are determined by the Planning Commission and pricing policies by Parliament, leaving the Indian Railways no freedom in prioiritising investment or determine tariffs. Certain other technical factors also limit privatisation possibilities, including technical indivisibility of Railway assets, the scale and lumpiness of Railway-capacity investments that render these beyond the reach of private investors, the 'sunken' character of Railway costs, the vertical integration that distinguishes railway operations, and other features such as scheduling services, etc.

Therefore, to induct commercial principles into railway operations in order to improve productive efficiency, without sacrificing allocative efficiency, the halfway solution would be to reconstitute the Indian Railways as a autonomous public corporation empowered to take its own decisions and pricing an investment.[17] To augment capitalisation of Railways, and therefore to remove the major constraint that presently limits their expansion, the private sector could conceivably be persuaded to participate in the equity of this corporation.[18]

As is evident from the above privatisation of the Indian Railways is not desirable at this juncture, a move is needed to allow it the autonomy to function within broad policy parameters laid down by Government. Accordingly the manufacturing activities that are presently administered departmentally and are a part of the Indian Railways for historical reasons should be separated and constituted into independent PSUs. Ultimate privatisation of these allied activities would release considerable resources for railway development, while permitting the Indian Railways to concentrate on core business. Similar separation of railway construction activities might also be envisaged.

Whatever be the form of organisation, it is imperative that a huge capital investment is the necessity of the hour to give IR a new lease of life. This has been true for the SNCF too. Along with the investment, what is needed is a commercial strategy which can bring in aggressiveness in competition like the SNCF. For this, no reforms in the organisation is actually required. What is needed is the luring back of traffic from the roadways. Once IR can dominate the freighting scenario like the 1960s, the financial health of IR is going to revive automatically. To run IR commercially what is necessary is sufficient autonomy. Subsidisation of tariffs and fares to cater to certain sections of the economy, continuing operations of unprofitable lines, provision of mass transit are some of the social obligations that IR has to meet. Other goals which IR needs to serve is to support regional development and development of industries related directly to transport infrastructure like construction and heavy industries. While these goals need to be supported since they are inherent to any infrastructural development, it has become a burden for IR to generate resources from socially preferable operations. In addition, the dividend payment to the Exchequer is a burden that IR is compelled to bear inspite of other investment priorities. Such multiplicity of goals has created conflicts of priorities which have tended to slow down the decision-making process regarding projects and piecemeal adjustments of investment towards the projects have most often rendered them counterproductive. Thus while the multiplicity of goals retards the policy- and decision-making process, it is necessary to prioritise the goals once-and-for-all and earmark investments for the projects undertaken for future convenience. In this context, it is necessary for IR to have the autonomy to decide on its priorities and undertake its investments.

What the study has proven is that the revival of IR lies in its own hands. As has been rightly pointed out by NCAER [2002] and as seen from the study that the railways are vulnerable to cyclical fluctuations in the core sectors of the economy since the railways have concentrated on freighting bulk-commodities. Except for a few captive commodities like coal and iron & steel, even these commodities are registering a decline with IR revising its tariff more frequently than is desirable. This eventually leads to a cost cascade within the economy and forces a changeover from the railway mode of transportation to the roadways. To win back the freight already lost, IR has to gear up to provide 'reliable services at a competitive rate'. Following the footsteps of the SNCF, IR can improve on its acceptance of the smalls and piecemeal traffic which are very

often high-valued freight. Even the feeder networks need to be revived instead of writing them off. Concentration on the HDCs will not help in ensuring a continuous increase in traffic volume since extreme congestion and inadequate freighting capacity will deprive many freight offers. Thus, judicious investment in creating capacity ahead of demand - a golden rule in infrastructural investment - is the need of the hour, no matter who or what the source is. And this is the only way IR can benefit in the future because increasing freighting capacity is essential for the running of a transportation infrastructure. Keeping the implications of the role of infrastructure in mind, it is necessary for the Government to renew its thrust on IR development programmes and make provisions for a steady capital flow to the sector to rejuvenate the railway system. While the primary capital investment to clear the backlogs and add to capacity should be from the General Exchequer, the IR needs to devise its own policies to generate more resources than before. This is the only way by which both the social and commercial objectives of railway infrastructure can be preserved.

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