

MSRDC and Mumbai-Pune Expressway

A Sustainable Model for Privatising Construction of Physical Infrastructure?

This case study of the Mumbai-Pune Expressway points out that delivery of infrastructure like road and highways, especially mega projects, totally through the private sector is currently difficult. In the absence of such private sector capacity to take on this responsibility, the role has been creatively shouldered by the Maharashtra government by forming and supporting a road development corporation – carved out of its public works department in its primary mission, the building of essential projects in a timely fashion. The experience of the Mumbai-Pune Expressway indicates that the public sector, freed of political intervention and outdated organisational structure and given command and authority to innovate is able to deliver needed products efficiently.

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Involving the private sector in development planning efforts in India has emerged in the rhetoric and policies of government. The central government's privatisation policy of 1991 has been adapted to varying degrees by different Indian states. The shift to liberalise the economy has included attempts to incorporate the private sector in a variety of activities, ranging from formerly monopolised government sectors like television and insurance to those such as banking, telecommunication, hotels, and, engineering consultation services which operated in competition with the private sector. Significant in this has been the privatisation of physical infrastructure such as highways and ports. The definition of what constitutes privatisation, what elements of a sector are executed by private corporations and what is the role of the government, is evolving. Even a quick review of the literature reveals that there is a great deal that remains to be clarified in the term 'privatisation'

This paper does not attempt the formidable task of defining privatisation. It seeks rather to understand what can be learned

from the way privatisation has been implemented by the government of Maharashtra in the soon to be completed Mumbai-Pune Expressway with a view to delineate: what worked; the elements of success; the prognosis for replication; the caveats; and, what is implied for the role of the public sector, the private sector and their partnership in the efficient delivery of physical infrastructure. The intent is to critically examine the model for incorporating the private sector in physical infrastructure development that is emerging in the Mumbai-Pune Expressway, and make an assessment of benefits as well as concerns. This is useful as the expressway project is widely claimed to be a success, not just by the government agencies involved, but also by the popular media and, sections of the construction industry, and will be emulated. It is a significant project because it brings on-line an essential and long-overdue piece of physical infrastructure, the lack of which has acted as a bottleneck to the efficient functioning of a crucial corridor of industrial capacity and production in Maharashtra. As such, the project and the Maharashtra State Road Development

Corporation (MSRDC), the agency which has facilitated its construction, are being closely observed by other states and the central government. The critical analysis presented here describes the MSRDC approach and conceptualises it in an effort to inform those who wish to emulate the approach, those who want to understand how privatisation policy is being implemented, and those who have stakes in the debate on development in India.

Models of Privatisation of Infrastructure

The new economic policy of liberalisation evolved through the economic crisis of 1991 when the government sought private sector participation, including that of multinational corporations, in various sectors including those hereto reserved as a monopoly of the government.¹ The Disinvestment Commission² appointed in 1996 by the central government to recommend a strategy of privatisation of 43 public sector units (PSU) has suggested different methods for different organisations depending on the nature of the PSUs,

the areas of their operations, and, their present status. Recommendations have encompassed a range of actions for example as follows:

- (1) Sale of 100 per cent of government holding as in the case of Modern Food Industries, Pawan Hans Helicopters, Ranchi Ashok Bihar Hotel Corporation, and Utkal Ashok Hotel Corporation which are two hotels owned by India Tourism Development Corporation.
- (2) Partial disinvestment varying from 74 per cent in the case of Hindustan Prefab, 40 per cent in the case of Shipping Corporation of India and 25 per cent in the case of Indian Petro Chemical Corporation.
- (3) Infusion of Rs 1,000 crore as equity in Air India, followed by a strategic sale by way of new share issue to reduce government holding to 60 per cent, and, subsequent offer to sell 20 per cent of government holdings to domestic investors.
- (4) Discontinuation of operations immediately and sale of assets of companies as in the case of Electronics Trade and Technology Development Corporation.

In addition other measures have been recommended by government which are related to involving the private sector actively in infrastructure creation, maintenance and operations. In an overview paper on privatisation of municipal services Mehta and Mehta (1992) outline four distinct forms of privatisation – divestiture, contracting, financing and deregulation. Numerous ways to achieve these have been practised by government and include actions such as:

- (1) Allowing the entry of private sector firms and thus competition into sectors which are presently the monopoly of government, for instance as it has done in general insurance and telecommunications.
- (2) Retaining ownership of a public sector but outsourcing work to a greater extent to various private contractors or private sector companies in a variety of arrangements such as build own operate transfer (BOOT); build operate lease transfer; (BOLT); build operate transfer (BOT). These have been implemented in various port projects.
- (3) Creating new forms of public sector companies with the collaboration and participation of the private sector for example as in the Konkan Railway Corporation and MSRDC.

Mehta and Mehta suggest that in the initial stages of privatisation contracting

out of services and the construction of turnkey projects – the BOT arrangements might be most effective.

In the last few years privatisation has been significantly promoted in the area of physical infrastructure. The transportation sector in particular was identified as crucial in the transmission of economic development. Inadequate means of transportation was perceived as responsible for the concentration of economic activities in a few major cities with detrimental effect on the development of peripheral regions. The fast growing non-traditional, agricultural sector was also felt to be affected as it was unable to tap the growing demand in the domestic urban and world markets for its produce. Existing surface transportation such as railways and national and state highways were overloaded beyond their capacities.³ Some indication of this is apparent in aggregate data on roads. India has a road network of 33,00,000 km, the third largest in the world. National and state highways constitute a mere 1,80,000 km or 6 per cent of this total network and of these the national highways which constitute only 2 per cent of the total network carry 40 per cent of total traffic. Freight traffic on roads has increased from 6 million tons in 1951 to 400 million tons in 2000 while vehicle traffic has increased from 0.3 million vehicles to 27.5 million vehicles but the road network has not expanded to keep pace with this. A 10-year programme to widen the Indian National Highways was estimated to need funds of Rs 8,020 crore at 1996 prices.⁴ This National Highway Development Project, is therefore being implemented with funding from the World Bank⁵ which involves private contractors to build the roads, manage them, and, transfer them back to the government on a BOT basis. In 1995, in the state of Maharashtra, the estimated need for road development and maintenance was to the tune of Rs 14,000 crore while only Rs 1,400 crore were allocated in the budget.⁶ The inadequacy of resources for the transportation sector is noted in the Ninth Five Year Plan (1997-2001).⁷ Therefore a major imperative for a privatisation policy in road construction was to raise needed capital for both developing and maintaining roads.

Compounding the problem of under capacity in the physical infrastructure of transportation has been the perceived inability to finance, manage and create new infrastructure. In light of the growing

evidence of such shortcomings the transportation sector was declared a priority sector for privatisation. This was seen as the best strategy for addressing deficiencies and to:

- (1) Fill gaps between the needs and demands for expansion of physical infrastructure networks and the paucity of available resources of various kinds – investment capital, technological know-how and hardware, managerial and human capital, and streamlined administration.
- (2) Circumvent the bottlenecks that were created by bureaucratic delays by creating new and unorthodox communication links between government departments and to explore imaginative ways to manage projects so that they attain the stated goals within the stipulated time.
- (3) Harness the ability of the private sector to look at new, advanced and alternative technical solutions and to assimilate these into the delivery system, construction process and project planning.
- (4) Facilitate utilisation of large amount of funds available with banks as well as private sector finance companies and international funding agencies like Asian Development Bank and International Finance Corporation.

The call for privatisation is now firmly embedded in the rhetoric of planning bureaucracies throughout India. The highlights of the central government's measures were announced in 1994. They included declaring the road sector to be an industry (thus allowing it to raise bonds to raise resources), amending the National Highways Act to enable the levy of tolls by the private sector, and allowing the private sector to participate in infrastructure construction on a BOT basis. It has also allowed 100 per cent foreign equity participation and given the rights to the private sector to develop services and rest areas along the roads. Companies involved in BOT projects can avail of a 100 per cent tax holiday for five years and a 30 per cent tax holiday for another five years.

Private Sector Response to Government Policy

Although the policy change adopted by the government was welcomed by the private sector its participation in actual projects has not been enthusiastic. International infrastructure companies have not bid on infrastructure projects like the

Mumbai-Pune Expressway in spite of various incentives declared by the Indian government which have been publicised by foreign governments.⁸ In the port sector too which has been more attractive to the private sector, their presence is limited. The domestic private sector has also not responded with bids for infrastructure projects like roads and highways. Augmenting central government measures the Maharashtra government devised various incentives to boost privatisation. They included a guaranteed 20 per cent rate of return on capital, a promise of rapid and single window approval, tax incentives and reduced duties on imported equipment for all investments in industry, and, allowing up to 40 per cent government support to the project. Private sector entrepreneurs are allowed to recover their investments first, followed by the government. But as demonstrated in the lack of bids for the Mumbai-Pune Expressway the response from the private sector has been low.

The background for the Mumbai-Pune Expressway is as follows. In 1990 the state government commissioned a feasibility study for the expressway.⁹ The report submitted in 1994 recommended the construction of a new 10-lane expressway as a BOT to be financed and operated on a toll basis. These recommendations were accepted, tender documents for the expressway were prepared and bids invited by the Maharashtra public works department (PWD). Six corporations purchased the tender documents but only one, the Reliance Corporation, submitted a bid. Detailed information on exactly why Reliance was the only contractor to respond is not readily available. The Reliance bid was for Rs 3,600 crore, a sum more than twice the currently anticipated cost of the expressway and it was not accepted by the government. It is difficult to pin-point why the Reliance bid was so high. Factors that could have driven up the bid price can be speculated. Potential costs for hold-ups to the project by the environmental lobbies could be one. The unexpected decline in real estate demand leading to reduction of real estate values throughout the Mumbai-Pune belt, the cost of raising capital needed to acquire high end construction equipment, non-availability of government subsidies, the overall size and cost of the project and uncertainty that tolls would provide sufficient pay back in the stipulated time frame, could be other

factors that deterred private companies. The expressway is not an isolated case of low response to opportunities in infrastructure construction by private corporations. In another recent infrastructure development project in Mumbai, Tata Electricals has won a BOT contract to construct a port at Pir Pao in Mumbai at the cost of Rs 200 crore.¹⁰ The Mumbai Port Trust was able to sell eight documents in the globally invited tender. However only Tata Electric actually submitted a bid and was awarded the contract, presumably because the bid was within the range of the estimated cost of the project. These examples illustrate that at this juncture despite the desires of the centre and state governments, it is difficult to attract foreign direct investment or broad-based domestic participation in basic infrastructure projects. The Indian private sector is only now slowly positioning itself to handle the challenges of such mega projects.

It is apparent that capacity building in infrastructure construction is developing in Maharashtra and this is occurring with a particular model of indigenous privatisation put into place in projects such as the Konkan Railway Corporation and those developed by MSRDC. The speedy construction between 1991 to 1997 of some 760 km of the Konkan railway,¹¹ by the Konkan Railway Corporation was financed through public bonds and built by selected private firms through competitive tenders. Another mega project, that has been successful in delivering tangible physical products, involves large investments in the construction of fifty-five flyovers and bridges at critical junctions in the city of Mumbai's overloaded and congested road system. This has however not been without great controversy and challenges by civilians in the court system bringing to a halt work on critical bridges. The key catalyst in this project and in the Mumbai-Pune Expressway has been MSRDC, an institutional creation of the Maharashtra state government. MSRDC was formed with an equity capital of only Rs 5 crore. It was quickly able to raise Rs 2,121 crore for the two priority project from financial institutions through private placements and an additional Rs 600 crore were raised through tax-free infrastructure bonds.¹² Capital for the project was expeditiously raised and MSRDC could proceed with organising actual construction.

Since independence India relied heavily on the public sector for economic development funding its activities with budget allocations through national and state planning. Public sector companies were owned by the state and national governments. Thus the new policy to privatise represents a significant departure. It is a model of privatisation in which the role of government continues to be significant. It can be understood through the organisational structure of recent projects of MSRDC. In the conventional approach where the public, government sector was dominant, the government raised the capital needed for companies and their profits or losses were transferred to, and accounted for, in government budgets. The management of these companies was answerable only to the government. In contrast, the private sector was composed of companies, incorporated by individuals or group of individuals, who raised needed finance through the share market and were incorporated under the prevailing legal conditions. The new emerging sector which is being promoted by national or state government, is a public/private joint sector which has some or all of the following characteristics:

- The companies in this sector are formed and promoted through the initiative of government.
- The seed capital is provided by the government and key management personnel are selected from existing government organisations/ departments.
- Funds are raised through public bond issues, as and when required for specific projects, which are traded on the stock market. Investments are attracted from private financial institutions as well as the general public. Governments provide the necessary guarantees for such bond issues.
- The public corporation is entrusted with responsibility for overall management of the projects. Most of the functions related to construction, operation and maintenance are contracted out to large and small companies, which could be from private or public or even cooperative sector.
- These joint sector companies have some popular support, from consumers as well as investors. Involvement of people in the public companies can generate relatively greater accountability towards consumers as well as investors.
- These joint sector companies have relatively more independence, flexi-

bility, and dynamism than the conventional public sector. They are similar to private sector companies in their management approach and work in a networked relationship with other participating companies.

MSRDC's Mumbai-Pune Expressway: Some Background

MSRDC in its execution of the Mumbai-Pune Expressway provides an example of the workings and successes of a joint sector model. The example is analysed here to glean insights into the strengths, potentials and vulnerabilities of future initiatives in infrastructure creation with this approach.

The Mumbai-Pune Expressway had been a priority project for the Maharashtra state government for quite some time. In the last decade the Mumbai and Pune regions¹³ have grown and evolved into large urbanised areas, which are increasingly interrelated. In a 1994 article on industrial policy in Maharashtra, the concentration of the state's industrial activity in Mumbai and Pune was vividly highlighted by data which showed that the two cities and the corridor between them, the Mumbai-Thane-Pune urban belt as it is sometimes referred to, contained 72 per cent of factories, provided 77 per cent of industrial employment, controlled 88 per cent of working capital, and yielded 86 per cent of total state industrial output.¹⁴ More recently this link between Pune and Mumbai has become crucial for the development of the computer and information sector that is perceived to be a key element in facilitating globalisation and international business linkages. The route continues to be a corridor for substantial investments by both the private sector and the State Government. The traffic on the Mumbai-Pune section of National Highway 4 is expected to increase from 60,755 passenger car units per day in 1990 to a projection of 100,000 passenger car units per day by the year 2004. The distance between the two cities is some 180 km and it takes about four and a half to five hours to cover it under good traffic conditions. However increasingly, and particularly during the monsoon, the traffic on the Mumbai-Pune road gets frequently and unpredictably paralysed by accidents which block the narrow and winding curves of the two lane highway. Landslides in the ghats are a frequent occurrence due to the monsoon

rains. The resulting delays and traffic blockages turn a five-hour journey to one that would involve anywhere between 10 to 15 hours.¹⁵

The expressway is being constructed as a six-lane, divided, access controlled concrete road (with a provision of two extra lanes for future addition) with a variety of services and amenities. It is the first of its kind in India. The construction of an emergency telephone service, fire fighting equipment, hospitals with emergency facilities, rest areas, petrol pumps and frequent, closely spaced pedestrian and cart track crossings are included in the design of the expressway. All tunnels are provided with adequate artificial lighting and ventilation along with backup emergency supply. The completed road is planned with continuous fencing along its stretch to deter pedestrians and cattle and facilitate the movement of high-speed vehicles. A pipeline of sufficient diameter is laid along the road length for communication cables.

The managing director of MSRDC has observed that mega project like this involve the participation of different government departments. To facilitate this the government of Maharashtra constituted a high powered steering committee for co-ordination among the involved departments. Environmental clearances from relevant departments of the central government and from the forestry department were essential. MSRDC as a government organisation procured the permissions. Thus it managed that aspect of the work it had a comparative advantage for – getting all government departments to take speedy action on permissions and land acquisition. MSRDC acquired land 90 m wide for the carriage-way and for support facilities including requirements of construction like stone quarries, water sources, project offices, storage of materials and equipment. In total MSRDC acquired 646 ha of land for the right of way, 455 ha of land for quarry and dumping areas and 1,338 ha for real estate development, which is expected to generate surplus revenue.¹⁶

An additional sub committee to take policy decisions was constituted under the chairmanship of the state chief minister. The most important decision that of using rigid concrete pavement for the road, was taken by MSRDC during the conceptual phase of the project. Two options were considered; the first was to use flexible pavement, asphalt road as it is commonly

known, which represented a lower initial construction cost and used available construction technology in the country. The second one was to construct a rigid pavement concrete road. This required the introduction of new technology/equipment in the country and increased the project cost by 6 per cent (Rs 56 crore). This second option was found economical in the longer run when calculations were made based on a 30-year life cycle.¹⁷ MSRDC in adopting the second option accepted the short-term higher costs giving weight to the long-term gains rather than the short-term economies.

The actual road construction work was divided into four sections and tenders were invited from the private sector Project Management Companies (PMCs) for these sections and accepted by January 1998. Responsibility of each segment was given to one PMC. Construction of each segment of road was entrusted to one construction company. The private sector was thus involved through outsourcing of engineering services.

The choice of concrete technology and the large size of the project as well as the relatively short time in which the work was to be completed necessitated the use of highly automated, sophisticated equipment and high quality construction materials. Modern machinery used in the project includes high capacity cone crushers, sand-manufacturing machines, computer controlled automated batching plants¹⁸ and laser guided slipform pavers. The slipform paver is a piece of equipment which has a number of attachments such as: an automatic dowel bar and tie bar inserter which allows steel bars which reinforce concrete to be placed at pre-designed intervals; high-capacity vibrators which are essential to achieve the needed high compaction of concrete; and, elimination of voids to achieve specified concrete strength; auxiliating float which allows the forming of a uniform curvature and level of the road surface; and, a texturing machine which gives a texture to the smooth surface of concrete to increase friction with tyres. With the use of the slipform pavers it was possible to construct one kilometre of single lane pavement in a day. This level of quality and speed would be impossible without automation. Equipment costing Rs 300 crore was purchased for achieving this fast track construction.

Project planning and management of large modern infrastructure projects such

as the expressway is a complex task involving coordination of multiple activities, organising the division of labor and coordinating inter-related work. Achieving an efficient management strategy has become a significant factor in successful execution of such projects. Various organisation theories have evolved and prevailed in different periods. Morabito, Sack, Bhate (1999, p 18) describe these theories in terms of three 'schools of thought' as follows:

Classical theory, which typically represents the culture of the Industrial Age. Its tenets are normally associated with the view of the owner and the underlying premise is that the organisation should be operated as a machine. In contrast to this neo-classical theory advances the position of the employee. This is the so-called 'humanistic school', which emphasises motivation and employee involvement. Whereas classical and neo-classical theories are framed in terms of division of labour, the advent of new technology of information has ushered in new information theory which encompasses a variety of models that depict organisation and decision-making in terms of information flows.

The organisational structure and management strategy of MSRDC appears to be like modern autonomous business corporations, which can be understood by new information theories. A dynamic approach to collection, transmission and free flow of information within the organisation are key aspects of such management practices and noted as innovations in MSRDC. In this model many activities of a project are started simultaneously. In the case of the Mumbai-Pune Expressway, the land survey was entrusted to a separate private agency, to ensure its completion before the start of the monsoon rains while that of selecting PMCs was concurrently undertaken. Thus, as soon as the PMCs were appointed, the survey data was ready and could be provided to them. Similarly, each PMC and contractor could plan the construction of various sections of the expressway independently, in co-ordination with other agencies, as well as keeping with the overall framework. The adoption of parallel information processing, networking and decentralised decision-making strategies coupled with transparency characterises the construction of this project and exemplifies the intent of the state government.¹⁹ All units involved

in the project such as the PMCs, contractor's site and main offices and MSRDC offices were connected with a networked computerised system. In such networks, any decision by any unit is immediately made available to all other parties. Actions related to, or dependant on, such decisions are also immediately obvious to all agencies involved as well as to MSRDC and any adverse effects on overall goals can be identified and discussed immediately. Inter-related processes such as material inventory, ordering, store control, manpower and machinery requirements, measurement and certification of completed work, accounting, billing and cash flow management are linked in this network. Any information regarding delays, shortages of material, manpower or resources can be tracked continuously and corrective measures can be taken immediately. This model helps to optimise use of available resources including time and space and eliminate redundancies. Well defined and clearly communicated evaluation criterion for selection of contractors, regular billing and payment cycles and other procedures followed in this project have increased transparency and helped to build the confidence of contractors.²⁰

Benefits from Mumbai-Pune Expressway

(1) Essential Infrastructure is created which has popular support

The expressway is extremely important for the long-term viability of Mumbai to remain an industrial and economic power in the country. State government actions have been resolute not just in building the expressway but in budget allocations and land reservations for establishing a chain of industrial development parks which are to be strung along its length. The overall benefit to accrue to the Mumbai-Pune region is clear.

The commuter public on this route generally stands to benefit from a reduction in delays, increased speed of journey, and greater safety achieved through better design. A higher level of security ensured by an intensive system of policing and electronic surveillance has been announced for the highway. The design of this expressway with clear sightlines and more intense security systems promises to benefit commuters. The amenities that are planned along the expressway such as rest rooms,

petrol pumps, restaurants and hospitals will also benefit commuters. The recreational facilities and theme parks that are proposed will offer facilities for the affluent commuters able to afford them.

The expressway also makes it possible to segregate fast moving light motor vehicles from slower goods carriers. Large and heavy container trailers carrying goods from the southern part of India to the new Jawaharlal Nehru port in Uran as well as to the Mumbai port are presently prohibited on the existing Mumbai-Pune road. They are diverted through the Kasara ghat, which is a much longer route, and adversely affect traffic on the Mumbai-Agra road, and the Nasik-Pune road. The new expressway will help ease the traffic load on these roads. Transport service companies are going to benefit despite the toll they will pay as the new highway reduces commuting time and distance. About 40 per cent of the traffic on the existing Mumbai-Pune National Highway 4 is anticipated to divert to the new Expressway. The option of the toll-free existing national highway will still be available for the lower end traveller who is willing to forgo the amenities of the expressway. Traffic on the old road should also be lower and probably less dangerous as truck traffic will by and large shift to the expressway. Thus by and large the general perception is that the public stands to gain with this project.

Although the private corporate sector did not invest in the expressway its completion is going to benefit the industries situated in this important corridor. Large and small industrial enterprises around Pune, Mumbai and Thane are interdependent in many ways in that finance, manufacturing, computer and information industry, technical services, entertainment and transportation services are shared by them. The new expressway will help bring these cities closer in time and space. On the whole the fact that this project has popular support is evident in quite positive press coverage.

(2) Indigenous capacity has been built in construction sector

A large number of small and medium scale companies in the construction industry have benefited from their involvement in the Expressway project, not just in terms of profit but more importantly in terms of experience and enhanced productivity. PMCs are new and important entrants in

this project. PMCs have been made responsible for all aspects of planning, design, estimation, tendering, selection of contractors and, actual management of project construction. They have taken up the role formerly played by the Public Works Department. These companies are engaged by MSRDC, with contractual obligation to achieve time bound completion of the project. Some of these companies have collaborations with experienced international organisations.²¹ As a result new technology and management practices used internationally have been introduced in the project. The expert advice and inputs from these PMC companies has facilitated innovative technical decisions taken by MSRDC.

(3) Sophisticated construction equipment and technology has been utilised

MSRDC has helped contractors to procure needed machinery by giving them tax exemption and advances and it has borne the additional cost of currency fluctuations. As observed in the India-2000 Infrastructure seminar,²² 95 per cent of construction contractors are small scale and face resource constraints which render them unable to invest in expensive construction equipment. Since a higher level of investment in machinery can help to increase quality and/or lower construction costs, small contractors are often not competitive to participate in large construction projects. To assist them MSRDC has provided advances to the tune of 90 per cent of the cost of new machinery. To assist in the purchase of very expensive machinery such as slip form pavers, batching plants and stone crushing plants. MSRDC has also made provisions to reimburse contractors up to a limit of \$ 0.7 million to pay for customs duties and foreign exchange fluctuations. The concept of an equipment bank that makes needed machinery available to contractors was an innovation that was instituted in this project illustrating the creative approach of private sector in developing solutions to common problems.²³

(4) Improvements in domestic delivery of quality concrete construction

Although most of the sophisticated machinery was imported all other construction materials including chemical products and cement were procured from local manufacturers. The current availability of domestic cement in the country

was an essential factor in the decision.²⁴ Large-scale manufacture of fine aggregate was successfully instituted in this project to provide replacement or partial replacement for river sand. Experts assert that crushed fine aggregate (sand) with correct physical characteristics, contributes to a lower voids content, surface area and water demand in cement, resulting in higher strengths and improved workability due to lower internal resistance.²⁵ The introduction of various construction innovations in the building of the Mumbai-Pune Expressway offered a rare opportunity for the domestic construction industry to closely study, under actual field conditions, the performance of different technical solutions particularly in the area of production of aggregates and crushed sand.

Construction contractors have used different crushing systems and helped in assessing their comparative performance. Concrete batching plants and ready mix concrete was not used by the Indian construction industry until the last decade.²⁶ In the Mumbai-Pune Expressway project their use has become the accepted standard. The availability of large quantities of quality concrete was essential for high speed construction.

(5) Improved quality control and speed of construction

The speed and quality of work achieved in the expressway would have been impossible without advanced technology and sophisticated equipment. This along with systems to produce standardised quality

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materials allowed better planning of the project by reducing the uncertainties associated with traditional methods which require the deployment of a large labour force. Advanced technology also requires skilled operators to achieve productivity gains. In construction of the Konkan Railway productivity was increased through the use of advanced tunnel boring machinery. This machinery and the skill of operating it was readily available and used in the Mumbai-Pune Expressway project. Similarly, the use of other technologies new to India are expected to raise the standards of future road construction in the country.²⁷

Another major innovation was an improvement in the quality of construction through the institution of quality assurance and quality control procedures.²⁸ Quality checks were introduced throughout the process from the testing of materials, to sampling, preparation, reporting, and documentation by way of day-to-day quality control of operations and sequence of testing procedures. Continuous quality checks assured that timely corrective action could be undertaken. An insistence on quality construction is an important factor in avoiding wastage during construction and in reducing maintenance costs. The type of maintenance that might be required for the pavement is dependent on a variety of factors and therefore periodic surveys for timely action will be necessary and are proposed to be carried out by the PMCs till such a time as stipulated in the contract. However, it is not yet clear from the available resources how the road is going to be maintained in the long term and by whom.

The speed with which the expressway project was constructed is widely appreciated. A bonus and fine clause to assure timely delivery was built into the construction contracts. This practice is quite common in private sector projects. Introducing the clause into this joint sector project served to put the burden of accountability for making timely decisions on the PMCs as well as MSRDC as the promoters of the project. Delays in decisions can result in contractors claiming additional payments for idle labour or equipment. Thus all parties to the contract are made responsible for timely action. For contractors involved in traditional government projects, delays in decisions, billing approvals and payments on the part of the government are a constant concern and fuel cor-

rupt practices. The institution in this project of time bound billing procedures, accountability in the process of settling claims, and, in certifying and making payments have won the trust of the involved contractors.

(6) Upgradation of construction skills and capacity

The many small innovations that take place in the implementation and construction of projects like the expressway are often not reported. People involved in such projects at unskilled, skilled or managerial levels move into a development mode hardly realising the changes they are internalising. Voluntarily and involuntarily the human resource is upgraded at all levels, which is difficult to measure in economic terms benefits individuals, the construction industry and the project. It is noteworthy that the large-scale shortages reported in this project were not of materials or equipment but of the right kind of trained manpower at all levels. It is a paradox that despite having a large pool of technically trained people in India, it is here that shortages are likely to affect infrastructure construction in the future, a concern reiterated recently at the National Road Congress in New Delhi in November 2000.

PMC companies that specialise in construction management and construction technology as well as engineering design are rather new in the Indian construction industry. To train needed people in construction management the National Institute of Construction Management and Research (NICMAR), a private institute, was started in the last decade in Pune and Mumbai by an association of construction industry companies. The decision to appoint four different PMC companies for the four segments of the expressway was related to the available capacities of such private companies.²⁹ To a large extent the conventional construction machine manufacturing industry too was readily able to contribute to the expressway project. Many traditionally skilled and semi-skilled labour and trained technicians were employed thereby increasing their confidence to deliver at this scale.

(7) Public support and opposition

In the 1950s when the Indian government embarked on the task of developing the public sector there was a dearth of indigenous private finance for development projects. By the 1990s this constraint

was overcome as capacity to elicit and promote savings and investments was built up in the financial sector. Large amounts of funds were available in the form of savings in banks and financial institutions, which could be readily deployed in financing projects such as the Mumbai-Pune Expressway. In addition this new model of a public private joint sector has been successful in eliciting support from the investing public at large. This support was initially evident in the success of the bonds floated for the Konkan Railway. Similarly MSRDC was able to raise Rs 600 crore from its tax-free bonds. One might construe this as wide-scale public support either for the projects or for the financial instruments which are considered 'safe' as they are guaranteed by the state government, or for both.

That is not to say that there is no public dissent and opposition. Public sector employees, labour unions and environmental activists have all expressed various concerns. Consumers have challenged the policy of toll collection on roads in the courts but the policy has been upheld. Consumers are now realising that the days of providing free public infrastructure to consumers are over and that user fees such as tolls are viewed as a necessary measure to enable provision of benefits in the long term.

The expressway has been opposed by environmental groups such as the Bombay Environmental Action Group (BEAG) who have objected to the fact that reserve forest lands through which the road is being built are being adversely impacted. They have pointed out instances of violations such as rubble being dumped in forestlands and colonies of construction labour being set up in forestlands with negative consequences for the forest preserve. They have also questioned whether a new road was really the best answer to the admitted need for improving the effectiveness of the road. They lobbied instead for continued up gradation and widening of the existing National Highway 4 claiming that this solution would be less destructive to the environment and cheaper to build. Their efforts to stop the project and elicit broad public support have not met with great success although in one case the expressway was rerouted to avoid a confrontation with an environmental group that claimed that the habitat of a particular squirrel was endangered.

MSRDC Structure and Characteristics

The Maharashtra state government's decision to carve out MSRDC from the PWD when the private sector failed to respond with acceptable bids for construction of the expressway has proved to be an essential and bold step. MSRDC has made rapid progress in constructing 55 flyovers and the Mumbai-Pune Expressway. Some of this success can be attributed to the structure and culture of operation which has been adopted by the department. For one MSRDC administration moved to make its projects successful by streamlining government regulations and delegating certain powers to the private sector so as to decentralise decision making. Nitin Gadkari, ex-minister for PWD estimates that the government eliminated some 70 or more regulations, that were obsolete or represented undue tape.

MSRDC also moved to improve the interface between itself and the private sector construction companies who would actually construct the expressway by appointing four PMCs with a proven track record in managing engineering design and construction projects. This was an important decision. The relationship of MSRDC to the PMCs can be described as that of a consumer with service providers. MSRDC as the consumer and owner of the product, the Mumbai-Pune Expressway was able to demand efficient services and quality products from the PMCs. As owner of the product it retains and exercises the right to choose private sector construction companies at an acceptable but differential price for each company, depending upon the organisational structure and the type of services they provide. At the same time MSRDC itself is answerable to a larger public which has provided funds for the project. It is responsible for delivering an acceptable and efficient road.

MSRDC has encouraged private participation in the execution of the various mega projects that are listed as its 10 priority projects. However it has concluded that transport infrastructure projects are not financially viable based exclusively on toll/fare receipts. It has explored other innovative sources of financing to raise resources. Some of the financial incentives used to encourage private sector participation or to raise finance for these projects include: (a) Tapping the value-added to

real estate in the windfall benefit some of the transport project. (b) Imposing tax on petrol and diesel fuel for raising needed capital. (c) Raising a cess on the wage bill of corporations in the beneficiary zone, and (d) Developing real estate along the transport corridor. In addition to these methods which have been tried elsewhere in India, MSRDC has also made a strategic move to lay telecommunications ducts along various roads and bridges including the expressway. These can be leased to private telecommunications agencies. It is anticipated that the rent from these will be quite substantial.

One might argue in Hirshman's terms³⁰ that there is a vindication of the privatisation model that one is observing evolve in Maharashtra state. The rapid completion of the Konkan Railway Project that was financed by a very successful effort to float state backed bonds resulted in the Konkan Railway Corporation acquiring and using high-end tunnel boring machinery. The experience with the machinery has made the company highly competitive in tunnel construction. The capacity to apply this technology is now available for other projects and has proven to be most successful in the construction of the five tunnels that are part of the Mumbai-Pune Expressway. This seems to be a healthy, development oriented gain. In addition it has created a climate in which the government is embracing the application of advanced construction technology in the concrete work of the expressway. The result is quality construction of a roadway that promises to last longer than the one or two-year life of the improvements the PWD traditionally made on the old national highway. Expansion plans of east-west road connecting Silchar in Assam to Podichari in Gujrat and north-south roads connecting Shrinagar in Jammu and Kashmir to Kanyakumari in Tamil Nadu of some 7,300 kms and an ambitious rural road development project have been designed to build on the experiences of the Mumbai-Pune Expressway.³¹

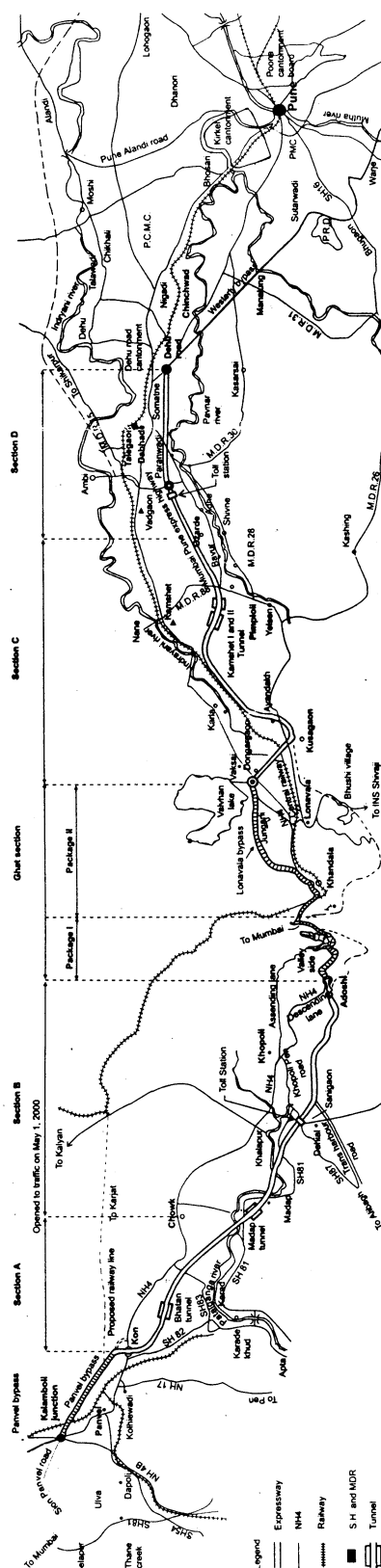
Sustainability of Joint Sector Model

The success of MSRDC in building badly needed infrastructure deserves, and has received, widespread acclaim. However it is wise to temper the euphoria about this and reflect on the sustainability and replicability of the public/private joint

sector approach that is represented by MSRDC and compare it to previous efforts by government to create innovative corporate structures within itself. Many public sector corporations, periodically created since independence, have shared similar success stories in their early stages. Public sector enterprises promoted by the central government such as Air India, Hotel Corporation of India, Modern Food Industries (India), Indian Tourism Development Corporation and those promoted by the state governments, such as Maharashtra State Electricity Board (MSEB), Maharashtra State Transport Corporation initially achieved delegated targets in a timely way. This success was achieved using new, contemporary technology and independent management which was similar to that of forward thinking private sector corporations of that time. These public sector corporations expanded rapidly in scale, taking on additional responsibilities and obtaining funds and incentives from the government. The employment in public corporations grew rapidly in this period. In the process they became powerful organisations and attracted the attention of the political ruling class. However subsequent political interventions in such corporations as well as the vested interests of bureaucracy emerged over time reducing their efficiency and enterprise. The dead weight of these public sector corporations started surfacing as a drag on government budgets. As Sane aptly observes this is a process in which "the loss incurring bureaucracy replaces the profiteering capitalist class in the name of socialist planning".³²

A current example of public sector decline in the state is that of MSEB which at one time was considered one of the best organisation of its kind in India engaged in efficient generation, transmission and distribution of electricity. In fact it might be said that MSEB's efficiency enabled Maharashtra state to achieve significant industrial growth and economic expansion. Maharashtra rarely faced the severe power shortage which were experienced by other states in India. Today MSEB is facing its worst crisis and is one of the most maligned and politicised organisation in Maharashtra. In 1999-2000 it suffered losses to the tune of 34 per cent of its production whereas as recently as 1997-98 it had made a profit of Rs 342 crore. In 1997-98 the list of ailing state public sector units in Maharashtra included Maharashtra

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State Road Transport Corporation (Rs 309 crore), Maharashtra State Textile Corporation (Rs 140 crore), Maharashtra State Handloom Corporation (Rs 31 crore), Maharashtra State Farming Corporation (Rs 20 crore), Maharashtra Electronics Corporation (Rs 21 crore). In that year, out of 60 state government corporations only 27 recorded a gross profit of Rs 501 crore while the top four loss-making undertakings incurred total losses of Rs 613 crore.

Air India, the flagships air carrier of India, which initially was recognised for the quality of its service and its competitive management has incurred losses for the last six consecutive years. It is now on the top of the list of units that the central government wishes to privatise. The ratio of 750 employees per aircraft of Air India compares poorly with the average of air carriers around the world which range between 150 to 300 employees per aircraft.³³ There is a similar example of decline in the banking sector. After banks were nationalised in 1969 public sector banks successfully expanded their operations so as to serve a large number of villages and towns which had never been served before. Many individuals and small entrepreneurs were able to avail of banking services. The expansion rescued a large number of poor people from the clutches of private moneylenders. However, bureaucratisation has taken hold. Although the performance of these banks is not uniform, the employees enjoy uniform salary benefits, which are not related to their productivity or efficiency. Attempts at reforming this important sector and to introduce merit and performance criterion are challenged by the powerful employee organisations and privatisation is now being considered as a remedy. The urgent need to make changes in this sector is well understood by economic planners.³⁴

Reflecting on such examples serves to cast a shadow of concern despite the current successes of MSRDC. Examining some of the underpinnings of MSRDC's success raises questions about the potential for long-term sustainability. Even though MSRDC has successfully raised capital through private placement from financial institutions, the funds have been made available with the help of counter guarantees from the state government.³⁵ There appears to be no mechanism built into the organisational structure to protect it from government or political intervention. Currently MSRDC has been able to

avoid the problem of redundant government employment internal to itself by outsourcing services. However, there is nothing in the structure of MSRDC that addresses the issue of redundancies created in PWD as a result of activities that are now assumed by MSRDC. On the one hand governments are trying to privatise activities which are currently the responsibilities of existing public sector organisations and attempting to diminish the role of the public sector in the economy. On the other hand new corporations like MSRDC are being created without any guarantees of their continued profitability and success and without commensurate cuts in other arms of the government, such as in the PWD.

An overarching objective, central in learning organisations, is to sustain the flexible and independent management of units such as MSRDC which is key to their success. The need for entrepreneurial innovation is essential in enabling the organisation to absorb new technology, adopt more responsive management structures and practices and facilitate enterprise and innovation of creative individuals in the organisation.³⁶ Although these concerns are not confined to only public/private joint sector organisations such as MSRDC but endemic concerns for organisations broadly, the bureaucratic weight of government and the historical assumption of entitlements that is a legacy of the post-independence period calls for particular vigilance.

Summary and Conclusion

This case study of the Mumbai-Pune Expressway points out that delivery of infrastructure like roads and highways totally through the private sector is presently difficult. Foreign construction companies have not shown a direct interest and involvement by responding to potential contract opportunities with competitive bids. Domestic private sector companies too appear unable or unwilling to submit bids that have comfortable but acceptable profit margins that indicate a genuine interest in these projects as good business ventures. Mega projects of the scale of the Mumbai-Pune Expressway (Rs 1,600 crore) currently appear to be beyond the capacity of the Indian private sector to assume as one integral project.³⁷ In the absence of such private sector capacity to take on the responsibility of delivering needed physi-

cal infrastructure the role has been creatively shouldered by the Maharashtra government by forming and supporting MSRDC in its primary mission – build essential projects in a timely fashion. The experience of Mumbai-Pune Expressway clearly indicates that the public sector freed of political intervention and outdated organisational structure and given command and authority to innovate, is able to deliver needed products efficiently by outsourcing to the private sector not only construction but also coordination and oversight functions. Not only has needed infrastructure been created, but according to statements made by some of the participating private sector companies, they have obtained incentives to upgrade their productivity and skills.

A cooperative and synergetic relationship between public and private sectors has found receptive ground to flourish. The general public has supported these ventures as is reflected in its enthusiastic vesting the bond issues offered by MSRDC as well as by the Konkan Railway Corporation. The new form of public/private joint sector effort which has evolved appears to be dynamic, flexible and open in its approach. MSRDC appears to have developed a lean, efficient, contemporary organisational structure, acquired the necessary technical skills and developed the necessary enterprising spirit, capable of and supporting decentralised decision making. MSRDC has also demonstrated an ability and readiness to cooperate and coordinate with the contemporary private sector constructively and in a way that is responsive to its concerns. The public-private joint sector model of liaisons is proving to be effective and appears to be able to successfully deliver the necessary infrastructure. The reservations and caveats about this approach centre around the question of whether this organisational structure is able to withstand the forces of bureaucratisation, maintain financial viability, and is replicable and sustainable financially and institutionally over the long term. [EW]

Notes

- 1 Swaminathan S Anklesaria Aiyar in his paper 'India's Economic Prospects: The Promise of Services' CASI paper no 9, April 1999 University of Pennsylvania, observes "For four decades, politicians used the holy name of socialism to cater to their private agenda. They used ever-rising public investment to

- build patronage networks and obtain kickbacks. And since this made them unpopular, they favoured ever-rising subsidies to mollify irate voters. This made them doubly anxious to accelerate public spending, which was financed increasingly by borrowing. Since the borrowings were poorly used, the rising debt burden eventually led to a fiscal crisis, which spilled over into a balance of payments crisis". For details see <http://www.sas.upenn.edu/casi/reports/Aiyerpaper042299.doc>
- 2 The five-member disinvestment commission was appointed by central government on August 23, 1996 and has submitted 8 reports to the government of India, the last in August 1998. The detailed reports and summary are available at the web site: http://www.crisil.com/DCIndia/disinvestment_dcindia_1.html
- 3 *Ninth Five-Year Plan Report*, Volume 2 on transportation notes that the aggregate length of roads, which was 0.4 million kms in 1950-51, has increased eight-fold to 3.32 million kms in 1995-96 but the number of passenger buses has gone up 13-fold from 0.34 lakh to 4.5 lakh and goods vehicle fleet 22-fold from 0.82 lakh to 17.85 lakh in the corresponding period. Out of the total road length constructed during the Eighth Plan, 66 per cent were constructed under Jawahar Rozgar Yojana. These roads are of limited value from the point of view of movement of heavy traffic. Further, only 20 per cent of the surfaced roads are estimated to be in good condition, which compares unfavourably with other countries. The national highway network, which carries about 40 per cent of the road traffic, and over 20 per cent of the national highway network is single lane.
- 4 The government of India had constituted an expert group under the chairmanship of Rakesh Mohan, Director General, National Council of Applied Economic Research to give suggestions on Commercialisation of Infrastructure Projects (including road projects). The group submitted its report in June 1996 and listed the deficiencies in road network and estimated the funds needed for national highways.
- 5 The World Bank Report on south Asia dated June 9, 2000 notes that funds amounting to \$516 million are provided with variable spread and rate single-currency loan with a grace period of five years and 20 years to maturity. The document available at <http://wb1n1018.worldbank.org/sar/sa.nsf/6062ad876fb8c066852567d7005d648a/827d4f201192c35b852568f900617499?OpenDocument>
- 6 As reported by V Shankar Aiyar, *India Today* June 9, 1999.
- 7 Government of India, *Ninth Five-Year Plan Report*, Volume 2 indicates that total need of finance for highways in the plan years was Rs 40,000 crore, while that of the transport sector overall was estimated to be Rs 2,00,000 crore. However budget provisions in the plan

period for transport sector was Rs 39,461 crore (Annexure III)

- 8 Trade Development, International Trade Administration, US Department of Commerce, Basic Industries has given India's transportation overview at its web site. <http://www.ita.doc.gov/td/transport/id-oview.html>
- 9 RITES in association with Scott Wilson Krikpatrick of UK were appointed to complete the feasibility studies for the new expressway to be operated on a toll basis. RITES estimated that the division of traffic to the new expressway would be of the order of 40-45 of the total corridor traffic. They recommended that the subsidy that was needed might come from income through property development on the land in the vicinity of the expressway. Based on the recommendation the government of Maharashtra decided to construct the expressway as a toll road with a part of the finance coming from property development on land to be acquired and leased by the government.
- 10 Private participation in Indian ports is listed at Indian ports site at <http://www.indiaport.com/ipa/privB.htm#consideration%20>.
- 11 Triumph over terrain web site of Konkan railway <http://www.konkanrailway.com/ehtml/eindex.htm>.
- 12 For details see P L Bongirwar and S S Momin's article in 'From Concept to Commissioning', *Indian Concrete Journal (ICJ)*. Private placement involves sale of bonds to commercial banks or private financial institutions like ICICI, without permission from the Stock Exchange Regulatory Authority as the guarantee from the governments is considered sufficient.
- 13 The Mumbai region comprises of Mumbai, Navi Mumbai, Thane, Kalyan, Ambernath municipal corporations while Pune comprises of Pune, Pimpri Chinchwad Corporation and surrounding villages which are recently been incorporated in Pune municipal area.
- 14 S B Sakhalkar, then executive director of Maharashtra Economic Development Council, Mumbai, states in the article titled 'New Industrial Policy of Maharashtra – A Critical Appraisal', *Southern Economist*, Vol, 32, No 19, February 1, 1994, pp 23-28 that the then new industrial policy while making needed changes in rules, procedures, and accelerating the state's competitive edge does little in its location policy to achieve the effect balancing industrial activity in the state and decentralising it. The priority given to the construction of the Mumbai-Pune Expressway seems to confirm this observation.
- 15 For a typical description of such traffic logjams see <http://www.timesofindia.com/171199/17mbom13.html>.
- 16 P L Bongirwar and S S Momin in their article in ICJ titled 'From concept to commissioning'.
- 17 A A Erande and Shrikant Limaye of SOWEL

consultants, in their article in *ICJ*: 'Optimising mix design for concrete pavement' in section D.

- 18 A batching plant is a concrete making plant where ingredients of concrete like cement, sand and stone aggregate (khadi) of required size, in required proportion and of required quality are tested and then mixed dry in controlled conditions. Correct quantity of tested and approved water is then added before the mixture is transported to site. This allows for the close control of the quality of concrete.
- 19 For additional details of Maharashtra state government policy regarding infrastructure see <http://www.maharashtra.gov.in/english/invest/invest.html>.
- 20 P V Kamat, director of Frischmann Prabhu (India). Has reported many such procedures followed in this project in his article, tender documents and fixing of agencies for main civil work, in *ICJ* special issue.
- 21 Examples of such collaborations are Stup Consultants with Hyder, Inter Continental Consultant and Technocrats (India), Frischman Prabhu (India) and Sir Owen Williams Investment.
- 22 The seminar was organised by Gremach Commerce in October 1999 at Mumbai. The proceedings are reported in January 2000 issue of *Construction Material Purchase* at web site <http://indianpurchase.com/construction/200001/article2.html>.
- 23 For details see report by *Construction Online* at <http://indianpurchase.com/construction/2000/article2.html>.
- 24 Cement manufacturing has increased steadily in India in the last 15 years. See for example data available at <http://www.the-hindu.com/1999/08/23/stories/06230002.htm>.
- 25 See article by Ajit Pradhan and Sandeep Bhattacharjee in *ICJ* 'Aggregate Crushing Systems: Salient Features of Operation and Performance'.
- 26 In 1999 only 2 per cent cement was consumed by ready mix concrete plants which is expected to grow to 5 per cent in the year 2000 as reported by L and T at its web site <http://www.lntecc.com/concrete/confaqgeneral.asp#one>.
- 27 *The Indian Concrete Journal*, June 2000 is a special issue highlighting the Mumbai-Pune Expressway. In it the editorial notes that "the construction industry in India will certainly benefit from the spin-offs of the frontline-line technologies adopted on the Mumbai-Pune Expressway" and suggests that the MSRDC model will prove to be of great value in guiding actions of other states.
- 28 A description and details of these procedures as instituted in the Expressway project see Shirish Pandit's article in *ICJ* in which he defines the terms quality assurance and quality control and makes the case that since the construction process is an output of plants, equipment, materials and manpower, all the inputs involved must meet the standards of a quality system.
- 29 P V Kamat director Frischman Prabhu, one

of the PMC observes in article in *ICJ*, 'Considering the magnitude of work, a very short time limit and the present level of availability of contractor's and consultants capabilities, MSRDC decided to split up the work into four sections both for appointing consultants and construction agencies. The estimated cost of each sections ranged between 130 crores to 200 crores'.

- 30 *In Development Projects Observed*, The Brookings Institution: 1967, Albert O Hirschman argues for that the capacity building effects of messy large-scale projects that involve innovation and indigenous problem solving may in fact be major contribution that large projects make to the development enterprise of a country. The problem solving capacity that is generated translates to an enhanced ability by the country to undertake new and more ambitious projects.
- 31 A rural road development corporation was launched by Atal Behari Vajpai in December 2000. As reported at <http://www.maharashtratimes.com/20001227/arth.htm> the cost of project is 6,000 crores and is headed by Nitin Gadkari.
- 32 Rajeev Sane in his Marathi book *Yugantar* has argued that individual responsibility for ones own actions is neglected in the present system of governance leading to great inefficiencies and costs of such inefficiencies are much higher than the profits made by the efficient private sector. The consumer is therefore the victim.
- 33 News item in India information dated November 14, 2000, <http://news.indiainfo.com/business/2000/11/14/selloff.html>.
- 34 'Reforming India's Financial Sector: An

Overview' by Montek S Ahluwalia dated August 27, 1999.

<http://planningcommission.nic.in/rif.htm>

- 35 Banks and financial Institutes consider the government guarantees as safe securities, and purchase bond issues of PSUs. However as a source in ICICI has pointed out many times prudential norms are violated. Funds are advanced without confirming the viability of the projects.
- 36 J A Schumpeter (1934) in his book *Theory of Economic Development* has listed several ways in which innovation can occur: Introduction of a new good, a new method of production, conquest of new source of supply of raw material or manufactured good, carrying out of a new organisation of any industry like creation or breaking up of a monopoly position.
- 37 In case of port privatisation, most projects range between Rs 200 to Rs 300 crore. There are 10 such projects at various stages of privatisation. In case of Mumbai-Pune Expressway cost of each section is less than Rs 200 crore.

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