CHAPTER 15
FINANCING OPTIONS

15.1 BACKGROUND

Rail based mass transit systems are highly capital intensive projects with low financial rate of return but high Economic Internal Rate Return. Given the high scale of investment costs, the relative independence of cost and benefits, and commonly found tendency to set fares at less than economic levels, it is difficult for metros to recover costs. Only a few metros such as those in Singapore, Santiago de Chile, and Hong Kong cover the direct operating costs plus depreciation. Given substantial difference in accounting for depreciation and financial costs between metros in different countries, it is meaningful to compare direct operating costs only. The **Table 15.1** below shows that some metros are able to cover operating costs, excluding depreciation of assets.

Table 15.1
Financial Performance of Some Metro Systems

City	System length (kms)	Pop. (m)	Pax/km (m)	Rev/pass ($US)	Cost/ pass ($US)	Op cost /km (US$ m)	Rev/op cost
Santiago	37.6	4.9	4.92	0.35	0.19	37.8	1.84
Singapore	83.0	4.0	4.67	0.57	0.34	71.9	1.67
Hong Kong	82.0	7.1	9.36	0.96	0.61	65.2	1.56
B.Aires	47.4	12.6	5.46	0.59	0.43	78.8	1.39
São Paulo	49.2	17.8	9.32	0.62	0.61	65.4	1.02
Seoul	286.9	12.5	6.56	0.38	0.44	64.6	0.87
Pusan	54.2	4.0	4.43	0.39	0.46	103.2	0.83
México	191.2	18.1	6.66	0.15	0.28	41.9	0.53
Calcutta	16.45	12.9	4.86	0.11	0.23	47.6	0.42

Source*:* Data from Annual Reports of companies for year 2000. (as collected by World Bank)

The proposed Phase 1 of Bangalore metro consists of two corridors, one in the North to South and the other in the East to West directions, the total length being 33 kilometers comprising at grade, elevated and underground sections. The total project is likely to cost Rs. 4495 crores with the completion period of 5 years. It is also proposed that Central and the State Governments between themselves should defray 40 percent of the project cost, in a staggered manner over a five year period. The issue is what is the appropriate funding mechanism for the balance 60 percent of the project cost and what should be the suggested institutional mechanism to make the project happen on fast track. While undertaking this exercise it has to be assumed that the traffic building will be incremental in nature and fare box revenue will not be in a position to absorb much of the debt servicing cost and depreciation requirement of the capital expenditure. It is also understood that the present alignment does not have high potential for value capture from real estate.

15.2 INSTITUTIONAL & FUNDING ALTERNATIVES

It is understood that Karnataka Government already has a State owned Bangalore Mass Transit Ltd (BMRTL) which, since 1995-when the LRTS project was mooted- has been collecting a city cess amounting to Rs. 55 crores per annum and accumulated amount is likely to be Rs. 400 crores by the end of this financial year (Rs 325 crores till March, 2002). To that extent Bangalore already have a rudimentary institutional structure and an edge over other metropolises grappling with the urban transport problem. The proposed 20 percent state government contribution towards equity will be primarily met from the accumulated and future cess collection

15.2.1 Dynamics of Metro Rail Cost Behavior and emerging scenario

A recent study conducted by UK Transport Research Laboratory of actual construction cost data for 13 newly built metro rails in the developing countries has come out with the following matrix of the cost and the risk factors associated after conception and during construction of the Metro Rails

1 Comparative Metro System Capital Costs

Total Cost per route km	***US$ at 1998 prices***
At grade	10-40 million
Elevated	30-80 million
Underground	70-220 million

Factors influencing cost	***Impact on unit Cost***
❑ Ground conditions	Very Large (spread up to 50%)
❑ System features	Small/Moderate (spread of 5% to 10%)
❑ Urban constraints (Utilities diversions, proximity to buildings, ability to divert traffic, environmental constraints)	Large (up to 30%)
❑ Land Cost	Moderate (up to 10%)
❑ Labour Cost	Moderate (up to 10%)
❑ Taxes and duties	Small (up to 5%)
❑ Competition in Construction and Equipment supply market	Moderate (up to 10%)

❑ Finance costs	Very Large (spread up to 35%)
❑ Quality of project management	Moderate / Large (10% to 15%)

Source: U.K Transport Research Laboratory, a report by Phil Fouracre and David Maunder (2000)

It is instructive to note, based on reality of the 13 newly constructed metro rails that associated with financing cost (spread upto 35 percent), ground conditions (spread upto 50 percent) and Urban constraints of identification and relocation of utilities (spread upto 30 percent). Following further empirical evidence from 13 newly constructed metros is very pertinent while fixing the financing alternatives:

- Out of 13 only three were completed as scheduled, six over ran the construction time upto 50% (typically between six months to two years) and the remaining four overran by between 50% and 500% (typically two to five years, but some very much more)
- Out of 13, three were completed within budget, four experienced cost overruns of between 10% and 50% while six had cost over run between 50% and 500%.
- As regards forecasts of patronage as the basis on which the metros were financially and economically justified, out of the nine new metro's for which this data is available only one achieved its expected ridership levels, while three achieved only half and the five had patronage that was between 50% and 90% lower. This has put a major risk on financial viability of these projects
- Many among the 13 have experienced severe financing and debt repayment problems if debt was a very high component of the project cost. This issue has been more pronounced and has got exasperated for those cases where debt was raised in hard foreign currencies that have unexpectedly appreciated against the local currency. The three of the numerous examples of this phenomenon are Mexico City, Pusan and Manila.

15.3 The main lesson for Bangalore Metro funding strategy from above that financing structure has to be conservative to ensure that after meeting the direct operating cost and perhaps depreciation on equipment, loan repayment burden is minimal. Income from associated property development may prove some long term support, based on present indication (but cannot be substantial) and may be a little bit of capital costs, if developers can be persuaded to contribute to joint station/ office development, but its contribution can not be large and dependence on that may add to the initial risk of the project. The following institutional and funding alternatives are discussed in the aforesaid context:

15.3.1 Government Only Approach in " PSU Format" Domestic Capital Market Debt Funding

This approach in the partnership mode has been successful in case of Konkan Railway in the country. Under this scheme the project could be completed in record time and debt funding (both domestic, external and sale and lease back) could be secured at an average cost of less than 11 percent, a near miracle in the then prevailing high interest regime in the country. The equity structure was 51% from the central government and 49% from the beneficiary state government. However, main lesson from the financing structure point of view is that the gearing at which the project was completed (debt-equity ratio) was unsustainable in view of the lumpy upfront investment and build up time for the traffic. This option still remains a credible option even at 40 percent equity and 60 percent debt (debt-equity ratio 1.5:1). However if this route is found acceptable it is not advisable to have a debt equity ratio of more that 1:1 that means between central and state governments an additional Rs. 400 crores equity, staggered over a five-year period. If this approach finds favor then the suggested debt mechanism is direct tapping of domestic capital market with long-term bond in structured obligation format. However, the structured obligation support in terms of " committed Letter of Comfort san government guarantee" from Ministry of Urban Development can get the finer rate and a longer-term duration, beyond ten years. The structured obligation of the state government will result in 100 basis point extra interest rate and will be more restrictive on the tenure of the debt paper, particularly due to the trend of down-ward revision of credit rating of state governments guaranteed PSUs debt papers in the country.

The debt market is driven by the simple paradigm of risk vs return, with higher risk translating into higher returns required by the investors. This means that a green field project, which is typically a high-risk project, would end up raising resources at very high costs. Further the large quantum of fund requirement and the long maturity would also limit the options available to the project company for tying such debt. Typically, such funds would be available with financial institutions like HUDCO, insurance companies and pension funds.

It is important to understand the cost of such funds would be dependent on the parameter of risk and tenor.

Experience from both within the country and other parts of the World indicate that despite the lacuna of " Government only" approach, even this system can be made to deliver if the metro is started now, when longer portion can be at grade and elevated than later when bulk of the metro will need to be underground (the dilemma of Mumbai today), if politically and administratively commitment is available through the complete period at arms length, if right leadership at CEO's level is ensured and if the time overrun and cost over run are minimized through strong project management, already perfected in Konkan Railway, Delhi Metro and the National Highway Programme in the country. Continued support of Bangalore cess after the capital contribution of State Government is given, some innovation in fare box pricing and part value capture from real estate and airspace to supplement fare box revenue can still keep the enterprise in black. This will be more akin to Singapore model (where

value capture from real estate has relatively played a less important role) rather than Hong Kong model (where land scarcity has enabled METRO to piggy back value capture from real estate in a big way).

This remains a credible option as in the Indian context the domestic private enterprise will necessarily have risk aversion for sharing the funding and other related risks at the given point of time. However, this option suffers from two clear weaknesses. The general track record of Government only approach in the country has been far from spectacular and secondly it fails to take advantage of the increasing interest of international rail sector private players. This interest was evident in India ITES Fair, 2003 from firms of the developed world (like Bombardier of Canada and Siemens of Germany) and from Asia including China.

15.3.2 Government Only Approach in PSU format with Bilateral Funding

This is the present pattern of Delhi Metro Rail Corporation, where both central and state government have made equity contribution in 50:50 ratio. The institutional structure is of a PSU and bulk of the funding of Phase I is through a soft loan from Japan. This structure has the benefit of a real long repayment window of 20 years and a long period of moratorium (Ten years) and the nominal rate of interest is low at approximately 2 percent per annum. If the institutional structure is right and the bilateral funding can be arranged, even this remains a viable option. Karnataka has been a front line reforming state and bilateral funding will be a relatively easy thing for the State given the existing comfort level of multilateral and bilateral agencies in the State apparatus. The Japanese have so far been the most active bilateral funding agency for railroad-based mass transit in Asia with almost more than Y 300 billion loans already disbursed. How ever, this arrangement has two lacunae- First the soft loan is not really soft if the foreign exchange fluctuation over a 20-year window is factored. By any calculation in real terms it has the potential of being at least as costly, if not more, as the domestic source. Second, it takes away the advantage of truly harnessing the potential of competitive domestic and international construction and equipment vendors market, because except DFID, there is no bilateral aid, which is not tied up to the export from the donor country. It is estimated that hidden cost of being tied up to the donor country's equipment vendors and construction companies takes away whatever interest differential advantage is available. However, even this option is a better option than postponement of the metro rail to a later stage when the at grade and elevated options will get obliterated. Both Japan and Germany look promising options for bilateral funding and United States Agency for International Development (USAID) and Department for International Development (DFID) for tied aid.

15.3.3 Government only in PSU format with part domestic funding and part multilateral funding.

This will be a variant of the first two options with the difference that the residual debt fund is raised domestically (to the extent the cash flow can support) but with the bulk of the debt fund is to be negotiated with bilateral agencies like World Bank and Asian Development Bank. With ADB committing almost US $ 6 billion window for India now and with Karnataka's over all rating in the eyes of multilateral agencies being favourable, this becomes a credible and doable option. This is more preferable for the bilateral aid because it has the twin advantage of being the longest tenure debt available and beyond process transparency and international bidding it is not specifically tied to products and services from a particular country. Even World Bank remains an option, but the caveat is that World Bank's greater focus is intervention in poverty related issues and in the case of Urban Transport World Bank is generally more supportive of bus-based system. In the particular case of Bangalore with international hype and standing of the city, there remains a good chance of the World Bank support, after bank already committing substantial funding for suburban rail at Mumbai in 2002, under MUTP-II. The lacunae in both world bank and ADB funding is that of long term exchange rate fluctuation and the time span needed for both to approve a project, which can be any thing between one to two years. However, if the State Government gives its accumulated Rs. 400 crores cess in one go with a matching grant from the Center, there is sufficient window to complete the negotiation process and to take care of the lead-time needed for the World Bank and ADB loan.

15.3.4 Concessionaire Model:

The Concessions are not new to the world of railways with a large portion of global railroad completed in the nineteenth century on this principle. But the Concessionaire model for new age Metro is a relatively new phenomenon. The following real case study of metro rail created through concession best explains this phenomenon:

" Bangkok Transit System Corporation (BTSC) metro rail " Sky Train" system, which began official operation in December 1999 is the biggest success story in a developing country. It is a fully privately funded Metro rail on 30 years BOT turn-key limited recourse concession contract with a fixed price, delivery date and guaranteed performance. The project is a 24 km electrified metro system having 23 elevated stations with North-South and East-West intersecting lines running over two of the most heavily traveled and densely developed business corridors of the city. Originally conceived as a light rail system BTSC has evolved into a full-fledged metro system with capacity similar to Singapore's MRTA but, unlike Singapore, opened with three-car trains. The project started in 1994 was completed in 1999 (original target 1997) and at an estimated cost of US $ 1.7 billion, which includes pre-operating expenses and finance charges during the construction period.

BTSC's debt financing include $ 548 million from local Thai Banks, an initial $ 50 million loan from International Financial corporation, the private sector arm

of the World Bank (plus a second IFC equity investment of $ 20 million), $ 424 million from the German Government's KfW and $ 676 million from the equity investors. Tanayong real estate had 69.3 percent of the equity stake, Italian-Thai Corporation, the large Thai civil Contractor held 8.7 percent, other shareholders included T-Yong subsidiary Treasure Pool Investment at 2.1%, Land and Houses at 2.9%, Siam Commercial Bank with approx 1.3%, IFC and Siemens. Construction was by the consortium, which included Siemens and ITD. A key element in the project's financial feasibility was BTSC's indexed fare schedule which gives the corporation the right to raise fare 7 percent for each 5 percent increase in the inflation rate."

The above project on BOT is already a success story as the first mass transit rail system in recent time in a developing country done by the private sector with the limited recourse financing and has become an important demonstration project for the emerging market transportation infrastructure. This is a clear pointer that concessioining is a doable option and that the whole thing can be completed in a nine-month schedule in a transparent process through competitive international bidding. One can easily identify at least three strands of potential bidders- one Indo German Consortium (with active Kfw assistance), another Indo-Japanese consortium (backed by Japanese funding and already active in the country); third Indo-US consortium (backed by USAID) and many more consortium can emerge. Financial risk of the concessionaire gets partly ameliorated by 40 percent capital grant which can be structured in such a fashion that it is released milestone based during the construction period in five equal or staggered instalments. The two Government's contribution can be further brought down if either on the lines of Hong Kong Model or on the lines of Joint Development options in US Rail-based transit, few pockets of land parcels even away from Metro rail alignment are given for development to the Concessionaire. This sweetener was provided in the Bangkok case too, in place of Government cash support both in the Sky Rail Project and in now process Hopewell Project or BERTs.

When Konkan railway was conceived or even when Delhi metro was planned, the options like one above had not emerged either in other developing countries or in Indian context. It is recommended to create a suitable structure in which a turnkey, fixed price, fixed date and guaranteed performance Concession with 40 percent initial grant and no operating subsidy. It is doable and can be structured. It is advisable to try this route which can be frozen in six month time and in parallel work on the fall back option of Government only option with bulk debt from multilateral bodies, bilateral debt backed rolling stock and residual domestic debt with combined cost share of central and state government being limited to 40% of the total cost of the project.

15.3.5 Additional Options

Apart from above, there are additional options in terms of Leasing of Rolling Stock (both domestic and cross border) and joint development options of certain stations and depot areas on the lines of Hong Kong and now again

reactivated in US Mass Transit Systems after a gap of fifteen years. However, the country does not have yet a vibrant railroad equipment leasing market, as traditionally in India, manufacturer, buyer and user of rolling stock has been one entity. The taxing issues if any can be straightened through proper amendments of the statutes. There are few more innovative financing options emerging in US mass transit arena like Certificates of participation transaction (in place of traditional pay as you go purchase agreement), Joint Development (involving a partnership between a transit agency and private development to develop certain assets), Cross Border Leases of Transit Vehicles (Two most successful Colorado Cross border Lease of 11 Metro vehicles manufactured by Siemens Duewag Corporation, New York metropolitan Transportation, Fare box revenue bonds (Like New York Metropolitan Transportation authority Transit Facility Revenue Series 1998 C for US $ 400 million) which can be separately analyzed and replicated in a suitable structure within the Indian provisions at the project structuring stage.

Another interesting variant on turnkey has emerged from Puerto Rico's first mass transit being completed now with the name Tren Urbano and completed in a complete turn key arrangement with Siemen's Germany Transit Team on design build and operate contract with funding as a combination of FTA Capital program, USDOT formula funds and bonds. The 17.6 km line with 16 stations is being built on a turn key basis by Siemens including provision of 74 vehicles, the traction system, the train control system, an operating control system, the communication system, elevators and escalators, fare collection systems, 16 stations, as well as track construction, workshops, depots and equipment.

Another innovative option is *Carbon Funding*. Growing economic activity has resulted in higher levels of energy being consumed every day. This has contributed to higher emission levels resulting in adverse climate changes being observed in recent past. Global scientific community has concluded that the most dangerous components of these emissions are the carbon based gases and identified the need to put in place a mechanism whereby various nations worldwide would make commitment to reduce their emission level by a significant amount. This has led to formulation of Kyoto Protocol wherein developed countries took legally binding commitment to reduce their emissions to a level 5% below their 1990 levels, by the year 2010. As there is substantial cost associated with reducing emission levels e.g. cleaner technology, more equipment downstream of process etc., Kyoto Protocol also identified several means to achieve these commitments. While the plain vanilla option would be to reduce the level in their respective countries, the Protocol also highlighted the importance of doing the same through developing and under developed countries to take advantage of lower costs. The mechanism, referred to as Clean Development Mechanism (CDM) involved sale of credits generated out of projects set-up to reduce emission levels. As at present, developing and under developed countries do not have emission reduction targets, these credits have no value for these countries as such. Moreover the sale of these credit results in funds inflow to these countries which can be used to upgrade technology as well as general improvement in their development level. The main attractiveness of

CDM is its applicability to projects pertaining to any industry. India, because of its size and industrial growth, is increasingly becoming a big market for these emissions reduction projects.

The sale of emission reduction credit involves specialized efforts and thus significant inputs in terms of cost and time. The project needs to be appraised and approved by recognized agencies. However, trading of carbon credits is not fully operational and while the project should be appraised for the same, it should be kept as reserve.

15.4 The Delhi Metro Financing Plan

Delhi Metro Rail Corporation is the only metro that has been taken up recently with joint participation of the Central and State governments. The salient features of the financing plan for the Delhi Metro are as under:

- Debt equity ratio of 2:1;
- Annual contributions towards equity (at current prices) and interest free subordinate debt towards the cost of land annually by the Government of India and Government of National Capital Territory of Delhi;
- Long-term soft debt from Japan Bank for International Cooperation at an interest rate of 1.8% p.a. Being a socially-oriented project, the debt is raised by the Government of India and transferred to the DMRC Ltd. at the same rate of interest; the loan is on a 10 year moratorium and 20 year repayment period.
- Raising the balance of project cost over and above the equity and debt finance by way of revenue from property development
- Exemption from payment of customs and excise duty (as approved by the Group of Ministers)
- the exchange rate fluctuation risk and the operational losses, if any, being shared between the Government of National Capital Territory of Delhi and the Government of India in proportion of their share holding;
- DMRC will not be required to pay any dividend on government equity till the senior debt is fully repaid.
- The subordinate debt, which shall be interest-free, shall be repaid by DMRC Ltd. after the senior debt has been fully repaid.
- The Corporation will be exempted from the payment of property tax and electricity tax by GOI/GNCTD in accordance with the Central Government Departments.

It is important to note that in case of DMRC project, the government absorbed a major part of cost associated with debt repayment. The debt for the DMRC project was raised in Yen from the JBIC. DMRC only provided for interest component of the loan at the rate of 1.8%. All the cost of exchange rates fluctuation and guarantee commission cost is born by the government. It is a known fact that the depreciation in Yen was much higher than the interest cost paid by the DMRC. The Bangalore metro project can be made viable only by the contribution of interest subsidy by the Government.

It is proposed that debt for the Bangalore Metro project should be taken from the indigenous long-term debt providers. . On the lines of Delhi Metro Project, it is suggested that the Bangalore metro project development entity should bear only 2% of the interest cost. The interest subsidy should be shared equally between the center and the state Governments.

15.5 Recommendation

After examining the various options for funding the phase-I of Bangalore Metro Project, DMRC recommends the following:-

i. As the time needed for tying up multi-lateral and bi-lateral funding would take atleast 18 to 24 months and identifying and tying with a Concessionaire will also take considerable time, if the project is to be started immediately, the best option would be to follow the SPV approach. We feel the debt portion of the project should also be raised internally within the country as the amount involved is not much and it may be possible to tie up with institutions like HUDCO for lending the amount with a long tenure and with a moratorium during the construction period.

If this approach is to be followed it is recommend that 40% of the project cost is covered through equity equally by the two Governments, the land and rehabilitation cost is also covered by the two Governments with an interest free subordinate loan and the balance amount raised from the market internally. This would ensure that the cost of borrowing is the lowest and the total cost of the Project is easily manageable.

A higher equity participation in the case of Bangalore Metro has been suggested compared to Delhi Project for the reason that the cost per lakh passenger kilometre in Delhi is less than that in Bangalore and therefore a higher equity support is necessary to make the Project viable. The land cost is to be covered exactly on the same pattern as in Delhi.

Again in the case of Delhi Metro the exchange fluctuation liability is taken by the two Governments equally. Since the loan will be raised within the country we would suggest that the difference in the interest rate between 2% and 10.5% should also be taken by the two Governments and given as an interest subsidy to the SPV till such time the loan is repaid.

1) The key implementation indicators have been firmed up as follows:
   a) The total project cost of the projects is estimated at Rs 4379 cr.
   b) The construction period of the project is 5 years: year 2003 to year 2007 and the payment period is 6 yrs. (2003 to 2008)

2) The project of the nature of Bangalore Metro can only be taken-up with the Government support. It is expected that the Government would contribute to the project in the form of (Also refer **Table 15.2**)

   a) Equity: Rs 1798 cr. to be shared equally by the Centre and State Governments and to be drawn in six equal instalments by each government

   b) Interest free Subordinate Debt: Rs 360 cr. to be shared equally by the Centre and State governments and to be drawn at 40%, 40% and 20% p.a. in the initial three years.

   c) Interest Subsidy : Rs 494 cr. During construction period and Rs 2932 cr. during operation period.

3) The project entity will bear only 2% interest cost related to the debt, the remaining cost should be borne by the government.

4) It is recommended that the Government support the project by using both conventional and non-conventional sources of finance.

Table 15.2
Government Contribution to Bangalore Metro

Nature Of Support	Contribution	Years	Source
Equity	Rs. 1798 cr.	First 6 years in equal tranch	Equally shared between the state and central government
Subordinated Debt	Rs. 360 cr.	First 3 years with a ratio of 40, 40, 20 respectively.	This would be in the form of land. The state would be responsible for provision of land without encroachment & litigations
Interest Subsidy	Rs. 494 cr. Rs 2932 cr	During the construction period During the operational period	This is based on the DMRC model, where the company meets only partial interest cost. The rest of the cost would be born by the government. In Bangalore metro case it is expected that only 2% p.a. interest cost would be borne by the project entity.

The contribution from the government can be categorized under three broad heads:

- Capital support of Rs 2652 cr comprising equity of Rs 1798 cr, subordinated debt for land cost of Rs 360 crore and interest subsidy during construction of Rs 494 cr.
- Revenue support of Rs 2932 cr being the interest subsidy during operations. The peak interest subsidy is about Rs 200 cr per annum.
- Replacement capital expenditure support of Rs 708 cr in the year 2011 and 2021

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