more efficient use of labor, and revenues from the recycling of reusables. In all cases the desire for profits is seen as a key element in reducing costs. The loss of tax revenues if the public owns and operates the system must also be taken into account in comparing costs.

The question of whether costs are lower under either municipal or private operation should be evaluated by each community.

Advantages and Disadvantages

Public (Municipal) Operations

Ownership and operation of the residential collection service by the local government is a common practice. A recent survey by the International City Management Association of cities over 10,000 population indicated that 61 percent of the cities operated a residential collection system. However, only a little over half of these municipal systems collected all of the city's residential solid waste.

The advantages of this alternative include the nonprofit tax-exempt status of public operations which can result in reduced costs or additional service. Municipalities, especially the larger cities that have centralized their purchasing operations, can also reduce costs by buying equipment, gasoline, and other supplies in large quantities.

In addition to potential cost savings, public collection systems have management and policies which are continuous over a long period. This makes it possible to profit from long experience and training, and develop long-range plans. Continuous records may be kept over a long time, and these can be a valuable resource. Also, administrative control of the collection system by a public agency is often necessary for the implementation of collection policies which require systemwide compliance to be effective. Examples of such policies include mandatory collection requirements and the implementation of separate collection of newsprint and other materials for resource recovery.

The disadvantages of public ownership and operation of the collection system include the monopolistic nature of such operations which can result in a lack of stimulus toward efficiency. In establishing labor policies such as crew size and daily work tasks, administrators of public systems may be constrained by labor-union pressures and stated or unstated policies of job support. Labor pressures for higher pay, less work, and greater job security limit the flexibility of many public systems to implement labor-saving techniques. Also, labor strikes causing discontinuities in service are more prevalent in the public sector than in private collection firms.

In the area of financing, the solid waste system may be affected by the low priority it is given in many city budgets. This situation can inhibit innovation, and efficiency may be reduced due to inadequate equipment replacement policies.

Private Firms under Contract

The potential advantage of having private firms perform solid waste collection is that the competition between the various firms should keep costs down. Where contracts are awarded under a competitive bidding system, the community can retain control of collection policies and derive the efficiencies of a competitive, profit-motivated collection system.

The disadvantage of this alternative centers upon the need for active regulation by a public agency. Contracts should be awarded on a bid basis with specifications featuring positive incentives for contractor firms to maintain and improve efficiency. The absence of these controls may result in excessive collection costs.

Private Firms in Open Competition

While competition may keep prices low, a situation with no administrative control over solid waste collection can degenerate into cutthroat competition and severe price cutting, leading to a high rate of business failure and interruptions in service. There is also the danger that the collectors will informally agree to honor each other's territories, thus removing the competitive element and resulting in higher prices. This

alternative results in the duplication of resources and inefficient use of fuel.

Private Firms with Exclusive Franchises

The purpose in limiting the number of collectors that operate in a given area is to counteract the negative aspects of excessive competition (business failures, discontinuities in service). Having several collectors operating in the same area also leads to overlapping routes and inefficient use of fuels. The exclusive franchise, on the other hand, creates a monopolistic situation without administrative control by the city. Without such control the collectors holding the franchise may take advantage of the situation by charging excessive rates and lowering service.

Other Considerations

If a community's present collection system is unsatisfactory, a change in the institutional organization of the system may be one means of alleviating the problem. The risks in such a change include high initial costs involved in instituting a new organizational structure and the possibility of dramatic social and economic impacts in terms of losses or gains in the number of jobs. Without redesign or reorganization, however, it may be very difficult to change inefficient practices, traditions, and policies, bring in better management, or increase reliability and productivity of the labor force.

The institutional arrangement chosen by a particular community depends on many conditions. Some community situations suggest the preferability of public operation, while others suggest private operation as being more appropriate.

Conditions favoring public ownership and operation would include:

- Public predisposition is toward government operation of public services.
- Quality of service provided is valued more highly than economics.
- Past history of contractual operations for public service is unsatisfactory.

Conditions favoring private ownership and operation would include:

- Public predisposition is toward private-sector involvement in public services.
- Flexibility is needed to make shifts in operation which would produce savings in labor costs and other expenses.
- Local government wants to avoid administrative details in operation of collection system.
- Population growth is outpacing ability of community to provide public services.
- Qualified private collectors are available.

If contracting with a private firm is decided upon, it becomes the job of the local government to administer the bidding process and to monitor and enforce the terms of the contract.

The tools of enforcement consist of the government's ability to withhold payments and ultimately cancel the contract if the firm does not meet minimum performance standards. Besides these drastic measures, positive incentives in the contract for firms to maintain and improve efficiency can have a major effect on their performance. The design of the contract specifications is a crucial factor in assuring that a reputable collection firm is chosen in the bidding process.

The contract specifications must be sufficiently general to attract a reasonable number of bidders, but at the same time restrictive enough to discourage bidding by incompetent or disreputable collection firms. A large number of bidders is important to minimize possible collusion in the bidding process. If there are very few bidders for the contract areas, there is always the potential that competitors will fix their bids so everyone gets a share.

One way to encourage a larger number of bids is to allow sufficient time between awarding of the contract and start of the contract period, so that small firms can obtain the additional resources that may be required should they have the winning bid.

To discourage bidding by disreputable firms, governments frequently require a performance bond from each prospective bidder. Such a bond makes the issuing financial institution liable, up to the amount of the face value of the bond, in the event that the bond-

ed contractor fails to abide by the terms of the contract.

Other key issues to be considered in contracting with private firms are: the number of subareas into which a given jurisdiction should be divided; whether or not contracts on all areas should be let simultaneously or staggered over time; the maximum number of subareas any one contractor should be allowed to service; and the length of the contract period.

The greater the number of subareas into which the jurisdiction is divided, the greater the number of collectors the jurisdiction can support, and the greater the number of collectors who must be available for bidding. Care must be taken in dividing the jurisdiction so that each subarea is in fact large enough to support a collector. In addition, it is desirable to stagger the bidding for the various subareas so that the competition for each is more intense.

The number of simultaneous contracts one firm can hold should be restricted to maintain an adequate number of bidders in the area. If one firm holds a large number of contracts, the total number of collection firms the area will support is reduced, and there will be a smaller number of available bidders. However, the limit on the number of contracts one firm can hold should not be too severe, or the competitive spirit will be diminished among the firms holding current contracts. The length of the contract period can also affect the success of the bidding process. A contract period that is too long can reduce the collector's incentive to maintain high quality service, but the contract should be long enough to allow amortization of the collection equipment. EPA recommends a contract period of 3 to 5 years.

Another problem that must be anticipated in contracting with private collectors is the possibility of requests for midterm rate adjustments of a contract. The need to adjust a contract may arise from underbidding by the collector, either deliberately or through inaccurate calculations or unforeseen circumstances such as severe inflation or changes in collection procedures. If such midterm adjustments are relatively easy to obtain, there will be little incentive for accurate bidding and efficient operation over the life of the contract. For this reason, any procedure for permitting midterm adjustments should be rigorous.

To aid cities in designing a contract, EPA and the National Solid Waste Management Association (NSWMA) have developed a model contract. A copy can be obtained from EPA's Office of Solid Waste Management Programs.

Another form of control over private collectors under contract is complaints. A responsive complaint procedure that includes inspection and followup must be an integral part of administering a contract system.

Collection of Commercial Wastes

Collection from commercial establishments (including apartment buildings) is handled primarily by private collectors in open competition. However, the survey conducted by the International City Management Association indicated that approximately 40 percent of the cities surveyed provided some commercial/industrial solid waste collection. In many cases municipal involvement in commercial collection is limited to those stops where residential collection vehicles can be used. Establishments which generate large volumes of waste and require daily collection service are usually served by private haulers.

CONCLUSIONS

In examining whether public or private personnel, equipment, and facilities should be used for solid waste collection, the following issues should be considered: the relative economics and efficiencies of public or private ownership or operation; the ability of the governmental agency to manage a public system and/or contracts; possible legal constraints on the powers of the governmental unit to enter into contracts for services; and the attitudes of the public.

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III FINANCIAL AND ECONOMIC ASPECTS

III FINANCIAL AND ECONOMIC ASPECTS

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Economics is by and large a science of choice. When an economic project is to be carried out, there are normally a number of alternative ways of accomplishing it. One (or more) of these alternatives will, however, be more desirable than others from the standpoint of some criterion, and it is the essence of the optimization problem to choose, on the basis of that specified criterion, the best alternative available.

Alpha C. Chan *Fundamental Methods of Mathematical Economics*, 1984, p.232

1. Outline View

The subsequent sections elaborate the analytical deliverables of the study which took place intermittently during the two years of 1994 and 1995 as follows. Immediately following the introductory outline view of the Part III, section 2 introduces the background economic framework at national and regional levels where public sector investments and the public-private sector partnership in the sanitation sector concerned take place. Fund flows from the central to local governments and the sector policy under REPELITAs are also described. This would facilitate to articulate the economic context in which the proposed project(s) take(s) place in the years to come. In addition, estimation of the affordable fund specifically for the technical and institutional schemes envisaged under the study will be undertaken. The projection will delineate the two alternatives of funding which include the "with" and "without" large scale private/public-joint-sector participation. Further, discussion on private sector contribution will be made with due recognition of "willingness to pay". Section 3 discusses the "micro" aspect of the project with the double-folded meaning as follows. The pricing issue (tariff) with a bearing on the prospective urban sanitation services will be discussed in the context of microeconomic "marginal cost pricing" and the state-of-the-art currently in use to approximate marginal costs. Against this microeconomics background, the tariff structure (ratesetting) will be indicatively presented with a bearing on the principle of full cost recovery, inter alia, depreciation, operation and maintenance costs, and the house connection cost. Section 4 elucidates the financial analysis of the project(s) followed by the economic analysis in the sequential order of the section with a little description of analytical methodologies being spelled out.

Health effect possibly attributable to the Project will also be considered in this section while taking the recent works carried out by the World Bank into account.

2. Macroeconomic Framework

2.1. Macrocconomy

2.1.1 Aggregate supply

The year Nineteen Ninety Four (1994) proved to be another year of steady progress for Indonesia. On the macroeconomic front, the country kept in shape with an estimated annual real growth rate of GDP standing at about 7 per cent rising from 6.5 per cent growth during 1993. The gross domestic product (GDP) at current price amounted up to $144.6 billion at the end of 1993/94, and the gross national product (GNP) per capita increased to $720 with the total population of 192.7 million. This growth in aggregate supply was largely due to an accelerated effort in the substantial structural reforms aiming at building strong foundations for the Indonesian economy. The foreign investment liberalization package encouraged the wide range of activities open to foreign private sector participation. The reduction in corporate tax rates further enhanced the fiscal incentives granted to the private sector business undertakings in Indonesia. In an anticipation of higher agricultural production and continued strong performance of non-oil manufacturing, construction and utilities, the economic outlook for 1995 will be generally viewed favorably.

Key Socio-Economic Indicators (1)

Population (1994, estimate)	192.7 million
GDP (1993, current price)	$ 144.6 billion
GNP (1993, current price)	$ 136.4 billion
GNP per capita (1993, current price)	$ 720.0
Annual Real Growth Rate of GDP (1993)	6.5 %

Source: Indonesian Central Bureau of Statistics

2.1.2 Price, external sector, distribution

On the other side, the Indonesian economy also had to bear full blunt of adverse effects of the recent higher growth, vis-à-vis, persistence of price pressure, deterioration in the balance of payments, increased fiscal deficits, rising domestic and external borrowings, and exchange rate volatility against the yen. Rapid expansion of demand (largely attributable to the growth of domestic consumption at 18 percent followed by fixed capital formation at 15.3 percent and exports at 14.8

percent) together with supply constraints particularly low rice production resulted in the higher inflation rate standing at 10.2 percent in 1993. Severe shortages of cement and paper which have taken place since late last year also contributed to the hike in consumer price index[1].

Largely due to a bulk of goods and services import associated with a growing export, the external sector performance as borne out by current account has been deteriorated with a projected deficit of $3.6 billion in 1994. Non-oil exports, which now account for 70 percent of total exports, grew 15.6 percent in 1993 to a little less than $27.2 billion while its growth was merely 6.7 per cent first six months of the year. This sluggishness in non-oil exports was largely due to increasing foreign competition, lower world commodity prices and Indonesia's relatively high-cost economy. While it is not for sure yet whether trend is structural or cyclical, further drop of growth in non-oil export associated with Indonesia's large foreign debt could undermine the central government involvement in development financing during the period of REPELITA VI.

External debt outstanding reached $86 billion in 1994, of which 28 percent emanates from the private sector commercial banks[2]. While the rupiah was depreciated against the US dollar by 4 percent in 1994, the currency value deteriorated against the yen by about 14 percent over the same period. It is estimated by the Asian Development Bank (ADB) that the yen appreciation against the dollar (from 128 yen down to 108 yen per dollar) during 1993 had added incremental $300-400 million to Indonesia's debt service flows. With further yen appreciation which took place during early 1995, external debts could increase the record level of $100 billion by the end of the fiscal year 1995. Largely due to yen appreciation and a large chunk of debt service payments to the two international lending institutions, net inflows of official capital to Indonesia will decrease in 1994 to a projected $317 million from $1.1 billion in the previous year. Debt service ratio which measures amortization payments as percentage of total goods and services is projected to be 30.4 percent in 1994 slightly down from 31.6 percent in the previous year.

The real effective exchange rate (REER), an estimated macroeconomic indicator of

[1] In early 1995, the price of long fiber pulp rose to US$935 per ton from $450 in early 1994 while that of short fiber pulp increased by 107 percent arising from $400 to $885 over the same period. As well, the prices of old-newspaper (ONP) and computer print-out (CPO) jumped from $110 to $250 and from $270 to $550 per tons, respectively. (Source: *Indonesia Business Weekly*, Vol.III, No. 23, 22 May 1995, p.5)

[2] By estimate of the World Bank, external debt was $90 billion at the end of the fiscal year 1993.

international competitiveness of the currency[3], continued the gradual depreciating trend since 1986 with the index of about 30 percent in 1994 as per 1985 level, or about 12.6 percent of depreciation in average per annum. This implies that the nominal rupiah depreciation of 4 percent in 1994 against the dollar was to some extent lower given the economic fundamentals of Indonesia and other major trade counterpart countries. Deteriorating REER also suggests a shift towards an import-biased economy which inevitably imposes unfavorable impact on export industries with an overvalued rupiah against foreign exchange.

Meanwhile, there has been an improvement to a certain extent on the welfare front of the economy since 1993. Combined with 10 percent hike in salaries and pensions of civil servants and members of the Armed Forces in the new budget, the proposed increase in minimum wages for most provinces will be envisaged to meet 107 percent of the minimum physical needs consumption basket (KFM) by 1995[4]. In the wake of past effort, the national incidence of poverty declined to about 14 percent of the total population downsizing from 60 percent in 1970. In absolute term, the number of the poor in the country stands at 27 million with 18 million rural poor outnumbering 9 million urban poor.[5] By ministerial decree, minimum wage was increased in 1995 to Rp.4,600 per day in Jakarta and West Java, followed by other provinces all over Indonesia with regional adjustments ranging from 19 to 45 percent[6]. With Rp.3,100 per day, minimum wage level in Ujung Pandang is around two third of that in Jakarta. It is anticipated that stricter enforcement of minimum wages for workers would take place with an increased momentum in the years to come.

Little progress has been made to create new productive job opportunities in the society since 1990, where the 2.5 million new entrants set foot in labor markets each year. The unemployment rate has shifted from 2.5 percent in 1990 to 2.82 percent in 1993 whereas the under-employment rate slightly decreased from 39.1 percent to 37.9 percent during the same period.

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[3]Real Effective Exchange Rate index translates nominal exchange rate changes against a trade weighted basket of currencies of major trade partners adjusted by relative inflation differentials. (Ref: WB *Operational Manual Statement* No.1.11 Annex A2, 1988

[4]The poverty line designated by the Central Bureau of Statistics is the expenditure level needed to satisfy a daily intake of 2,100 cal plus certain nonfood necessities.

[5]The official poverty line is still austere such that the numbers of the overall, urban and rural poor alter by another set of poverty lines. See World Bank *Poverty In Indonesia: Official Poverty Estimates and Poverty Measurement Issues*, 1993

[6]Sources: Asian Development Bank and *Cipta Karya*, June 1995.

2.1.3 Public finance

Largely due to the fairly realistic and conservative fiscal stance which the government adopted as part of a stabilization program, the approved 1994/95 state budget income and expenditure (APBN) was Rp.69.7 trillion increased only by 2.5 percent in real terms from the previous year. Of this, oil and gas revenue accounted for 18.4 percent while the tax revenue reached 57.5 percent with Income tax, Value-added Tax and Land and property tax combining to a total of 84 percent of tax revenue as a whole. Income tax revenue increased by an average of 24 percent over the preceding three years reaching at Rp.18.8 trillion in 1994. While the tax reforms which took effect on January 1995 aimed at improving coverage and strengthening the administrative power of tax administration, the projected effect of tax reforms in near-term is low largely due to the weak tax administration and the cut in tax rates[7].

In addition to the ever declining crude oil price, the combination of stagnant oil production and the rising domestic consumption curbed proceeds from domestic petroleum product sales to the state, thereby worsening the fiscal and the current account positions in 1993. The deficits in central government operations and current account were Rp.1.3 trillion and $2.9 billion, or 0.4 percent and 2.0 percent of GDP, respectively. Based on the assumption of $16.5 per barrel of crude oil, and the current deficits would be likely to increase to $4.1 billion, or roughly 2.3 percent of GDP.

Key Economic Indicators (2)

State Budget (1994)	Rp.69,749 billion
Central Gov Fiscal Deficit as per GDP (1993)	0.4 %
Current Account Balance as per GDP (1993)	-2.0 %
Annual Rate of Inflation (1993)	10.2%
External Debt Outstanding (1993)	$ 83.3 billion
Debt Service Ratio (1993)	31.6 %
Minimum Wage Rate in Ujung Pandang (1995)	Rp.3,100/day
Minimum Wage Rate, Jakarta (1995)	Rp.4,600/day

Sources: Asian Development Bank *Asian Development Outlook 1994, Cipta Karya,* 1995

[7] The land and property tax (PBB), for example, is levied only on the 20 percent worth of the land and property value evaluated by the Fiscal Office. Public employees are also exempted from PBB duty.

2.2 Regional Economy

2.1.1 South sulawesi province

South Sulawesi is one of the 27 provinces in Indonesia with 64,482.5 square kilometers of land that accounts for about 4.2 percent of the country. The province is administratively divided into 23 regencies, two of which are granted the status of "Kotamadya", an autonomous region. Further, these regencies are subdivided into 178 precincts, or "Kecamatan", with a number of smaller administrative units therein ("Desa" or "Kelurahan") combining to a total of 1,405[8]. At the neighborhood level, groups of 30-50 families are headed by a neighborhood chief, or RT (Rukun Tetangga) or RK (Rukun Keluarga); 5-15 of these report to a RW (Rukun Warga). This community system has been extremely important for the delivery of family-scale water, sanitation and other services and facilities.[9]

The eastern part of Indonesia is essentially a peripheral economic zone, vis-à-vis, the western major islands of Java and Sumatra. Its share in the national economy is quite small and its industries by and large specialize in the production and supply of the primary sector commodities and raw materials. The flow of goods between regions indicates that the eastern island region is clearly characterized by a typical peripheral region-type economy where primary products/services with low value-added are sold to obtain higher value-added consumer and industrial goods from outside.

The nominal Gross Regional Product (GRP) of South Sulawesi Province was Rp.6,071 billion in 1992. Of this aggregate supply, the large part emanated from the agricultural sector with 43.5 percent followed by other major sectors, vis-à-vis, the commercial (trade), restaurant and hotel sector, the manufacturing sector, the public service and defense sector, the transport and communication sector, the mining sector and the construction sector accounting for 18.4 percent, 8.8 percent, 8.4 percent, 7.3 percent, 4.2 percent, and 3.4 percent, in that order. With the total population of a little more than 7.2 million, the nominal Gross Regional Product (GRP) per capita of South Sulawesi Province was about Rp. 840 thousand (equivalent to $391 as per 1992 foreign exchange quotation) which stands at 51 percent of the country's per capita. GNP. With this, productivity of human

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[8] All over Indonesia, there are 27 provinces, 243 regencies (*kabupatens*), 60 municipalities (*Kotamadya*), 3,839 districts (*kechamatan*) and 65,554 villages (*kelurahans* in urban areas and *desas* in rural areas) UNDP-WB *Water Supply and Sanitation Sector Review, Strategy, and Action Plan Preparation* (draft), 1995, p.5

[9] Ref: UNDP-WB *Ibid.*, 1995, p.7

resources, as borne out by the GRP per capita, in South Sulawesi was placed well below the national average with the twenty-first place out of the total twenty seven provinces in Indonesia[10].

The average annual population growth in South Sulawesi was 1.1 percent during the period of 1985/86 to 1990/91 as compared with 1.8 percent for all Indonesia. On account of lower population growth in Sulawesi, the GRP, which is well behind the national average, indicates the seriousness of the poorer economic status and industrial structure of the region. The share of the poor out of the total population is extremely high in Sulawesi. A comparison of the regional distribution of the poor in Indonesia to the distribution of total population indicates that 20.3% of the poor in Indonesia is in Sulawesi whereas the total population share is only 7.0%. This low end economic profile is mainly due to the low-productive agro-based industrial structure.

The central government affirms, in the statement of REPELITA VI, its support for regional cooperation which addresses internal disparities within the country by linking slower growing areas to more dynamic economic activities, among others, in Java. With this, the Sulawesi economy could show a visible and measurable progress in the recent years to come with further public investment in the urban infrastructure sectors and possible private sector participation in the tourism, urban development and manufacturing sectors.

Key Economic Indicators of South Sulawesi

Population (1993)	7.2 million
GRP (1992, current price, Rp. 2150/$)	$ 2,823.8 million
GRP per capita (1992, current price))	$ 390.7
Regional Income per capita (1992, current price)	$ 357.3
Annual Real Growth Rate of GDP (1992)	7.5 %
Annual Rate of Inflation (Ujung Pandang, 1993)	5.9 %

Source: South Sulawesi Statistical Office *Sulawesi Selatan Dalam Angka*, 1993

2.2.2 Ujung Pandang

The city of Ujung Pandang, the gateway to eastern Indonesia and the capital of South Sulawesi Province, is 175.8 square kilometers with the population of slightly above one million (1,019,948) in 1993[11]. About 40 percent of the city is

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[10] Source: Ministry of Home Affairs *Kota Keuangan 1992/93*

urbanized with the remaining 60 percent essentially the rural area comprising fish ponds, swamps, tree plantation, gardens and rice fields. Administratively, Ujung Pandang has full city status (kotamadya) with the mayor reporting directly to the governor.

On the macroeconomic front, Ujung Pandang has made a steady and substantial progress during the period 1988/89 - 93/94 as borne out by several economic indicators. The nominal Gross Regional Product (GRP) in 1993 was Rp. 1,338.9 billion (about $622.7 million) rising from Rp. 683.02 billion in 1988 with the average annual growth rate of 14.3 percent. In real term, the aggregate supply of the region was Rp. 1,044.6 billion ($485.9 million) in 1993 as per 1988 price increased by 9.0 percent annually in average since 1990. The GRP per capita and the regional income per capita in 1993 were Rp. 1.31 million ($610.5) and Rp. 1.122 million ($521.9)

which outnumber those of South Sulawesi by 56.1 percent and 45.8 percent, respectively.

Key Economic Indicators of Ujung Pandang (1)

Population (1993)	1.02 million
GRP (1993*, current price, Rp. 2,150/$)	$ 622.7 million
GRP per capita (1993, current price)	$ 610.5
Regional Income per capita (1992, current price)	$ 521.9
Annual Real Growth Rate of GRP (1993)	9.1 %
Annual Rate of Inflation (1993)	5.9 %

Source: BAPPEDA II *Produk Domestik Regional Bruto Per Kecamatan KMUP*, 1993

Key Economic Indicators of Ujung Pandang (2), current prices

	1989	1990	1991	1992	1993
GRP (Rp. Billion)	794.2	921.3	1,029.1	1,171.1	1,338.9
Depreciation	104.8	119.7	139.0	157.6	178.5
Net Indirect Tax	34.4	36.8	46.3	54.5	59.9
Regional Income (Rp. Bil)	654.9	764.7	843.7	958.9	1,100.3
Regional Income pc (Rp.'000)	720.6	817.6	886.7	997.7	1,122.9

Source: BAPPEDA II *Produk Domestik Regional Bruto Per Kecamatan KMUP*, 1993

[11] Source: Kantor Statistik KMUP *KMUP Dalam Angka 1993*, May 1994

In respect of the industrial structure, the tertial (service) sector accounts for about 80% of the aggregate supply of the Region. A large part of GRP emanates from the commercial (trade) hotel and restaurant sector with 41.2 percent of share in 1993 followed by the transport and communication sector (19.3%), manufacturing (15.07%), construction (4.9%), public administration/defense (4.5%), finance (3.8%), agriculture (3.6%) and others. Of these, the manufacturing sector made a remarkable growth of 19.3% in real term since the previous year in 1992. In the subsequent year, the construction and the energy (electricity, gas and water) sectors marked above 12 percent real growth while other sectors merely posted the modest annual growth of around 5 to 7 percent. The expansion of the construction and the energy sectors also can be seen from the increasing contribution of investments in Ujung Pandang that reached 13.0 percent in 1993[12].

Gross Regional Products by Sector, Ujung Pandang FY1988-1992, Current Price (Rp. million)

Industrial Origin	1988	1989	1990	1991	1992
1. Agriculture	29,223.52	34,232.38	38,504.69	46,122.45	46,776.40
2. Mining & Quarrying	254.14	284.49	300.23	353.67	364.13
3. Manufacturing	82,655.35	96,163.58	124,990.86	138,439.27	172,620.17
4. Electricity, Gas & Water	25,955.09	30,016.91	33,994.50	40,342.32	45,119.25
5. Construction	31,661.56	39,481.42	45,812.66	52,426.23	58,987.86
6. Commercial, Restaurant & Hotel	278,715.62	324,124.36	364,681.82	412,650.04	474,790.60
7. Transportation & Communication	126,534.40	145,589.11	171,222.30	196,595.35	223,322.66
8. Banking & Financial Institution	39,750.14	50,265.14	58,365.64	50,417.51	50,678.81
9. Ownership of Dwelling	23,198.37	24,936.57	27,108.77	29,547.96	30,695.06
10. Public Administration & Defense	36,107.35	39,149.19	45,462.69	49,759.47	53,805.57
11. Services	8,963.31	9,996.75	10,922.87	12,432.13	13,964.34
GRP	683,018.8	794,239.9	921,367.1	1,029,086.4	1,171,124.8

Source: Source: *Produk Domestik Regional Bruto Per Kecamatan KMUP*, 1992

2.2.3 Public finance

Generally, the financial position of local government is weak on account of volatile tax base in the region and the central government regulations which constrain self-efforts to raise funds through financial markets. While South Sulawesi and Ujung

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[12] Source: Kantor Statistik Sulawesi Selatan *Dalam Angka 1993*, May 1994 , p.319

Pandang governments well manage the economy to date, the current financial position confined government activities to a limited extent. Government interventions in market economy, as measured by the share of public consumption out of aggregate demand, remain very low with 2.3 percent and 4.5 percent for South Sulawesi and Ujung Pandang, respectively.

(1) South Sulawesi Government

While weakening financial base of provincial governments and subsequent imbalanced regional growth become a growing concern for the government, macroeconomic management of the South Sulawesi provincial government has been rather sound with its balance budget policy in view. The provincial budget (APBD I) was Rp.149.0 billion in 1993 rising from Rp. 51.6 billion in 1987. Own revenue (PAD) in 1993 was Rp.31.8 billion which grew by 10.1 percent per annum over the period of 1989 through 1993. The indirect borrowings from foreign sources are negligible so far and are said to be amortized by the central government[13]. The budget balance at the end of each fiscal year (UKP) has been carried forward as an opening balance for the following year.[14] In 1993, UKP was Rp.8.6 billion accounting for 5.7 percent of the total provincial budget.

Nonetheless, the provincial budget has heavily depended on central government transfers. In 1993, PAD only accounted for 21 percent out of the total APBD.

Financial Position of South Sulawesi Province, 1989/90 - 1993/94 (Rp. billion)

	1989	1990	1991	1992	1993
Total Provincial Budget	75.3	103.3	130.1	137.6	149.0
Routine Budget/	37.8	45.6	53.0	61.5	69.6
Development Budget	37.5	57.7	77.1	76.1	79.4
of which Own Revenue	21.6	31.1	40.3	34.4	31.7

Source: *BAPPEDA Tk. I*

(2) Ujung Pandang City Government

The local government financial system is on a cash accounting basis which records income and costs only when cash is received and dispensed from the city safe. There is a macroeconomic equilibrium policy for the city budget to redress balance

[13] Source: BAPPEDA I, Provincial government
[14] UKP is incorporated into routine budget of the following year.

between revenue and expenditure. No forecast on annual surplus or deficit is made at the outset of the fiscal year. The budget balances at the end of fiscal year are carried forward as opening balances of the following year.

The Ujung Pandang city budget (APBD II) inclusive of all the sources of internal and external funds grew by 15.9 percent per annum rising from Rp.36.6 billion in 1990 to Rp.66.0 billion in 1994[15]. Besides the development of regional economy, the potential of Ujung Pandang could be demonstrated in the growth of PAD (own revenue). The 1994 RIAP (Revenue Improvement Action Plan) Study Report under the Integrated Urban Infrastructure Development Program (IUIDP) under the finance of the World Bank[16] shows that out of the nine major cities in the Sulawesi island, Ujung Pandang had the largest PAD amounting to Rp.15.9 billion in 1993, followed by Manado (Rp.7.7 billion), Palopo, Bone, Kendari, Golontalo, Bitung and Pale-Pale, in this order. During 1989 through 1994, PAD grew by 16.4% per annum for Ujung Pandang. At the completion of REPELITA V, the realization of PAD was high above the targeted amount of Rp.12.5 billion. Furthermore, the RIAP study projects that during REPELITA VI (1994-98) the revenue attributable to the city's higher income generating capacity would increase from Rp.12.5 billion in 1994 to around Rp. 23.5 billion.

Notwithstanding, the City has been heavily dependent on external funds in the forms of central/provincial grants and loan for the bulk of its revenue. In 1990, subsidy to autonomous regions (Subsidi Daerah Otonomi, SDO), development grants (Presidential Instruction (INURES) or Instruksi Presiden, and sectoral development expenditures (DIP) or Dafter Isian Proyek), and loan covered almost three quarters (72.5 %) of the local budget, with SDO, INURES (general, II), APBD I and loans accounting for 41.5 percent, 18.8 percent, 2.1 percent and 8.6 percent, respectively. Disaggregating the FY1993 annual budget of Dinas Kebersihan, a large chunk of 60 percent of the budget emanated from external fund sources inclusive of APBN, INURES II and World Bank loan.[17]

Further concern over the city's sound financial management would be the City's financial obligation to cover the debt services which amounted to Rp. 3,422.1

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[15] Penetapan Sisa Perhitungan Anggaran Pendaoatan Dan Belanja Daera KMUP

[16] In tandem with the implementation of the Local Institutional Development Action Plan (LIDAP) study, RIAP was originally included in the Physical Urban (Development Plan (PJM) to supplement a physical plan therein.

[17] Regarding the financing mechanism, refer to II. 4.1 in this chapter.

million, or one-third of PAD and about 5% of the 1994 local budget[18]. Volatility in sector growth would depend on this factor outside the control of the city government and would place greater pressure on its financial maneuverability in the years to come.

Financial Position of the City Government (1), 1990/91-95/96 (Rp. million)

	1991	1992	1993	1994	1995
Revenue	38,362	46,707	60,439	66,044	80,890
Expenditure	38,265	46,622	60,370	65,419	80,265
Debt Service	3,494	3,963	3,640	2,424	4,812

Source: *BAPPEDA Tk. II*, Hasanuddin University, 1995

2.3. Economic Growth Projection

In pursuance of the government's firm decision to set forth the national development objectives under REPELITA VI (1994/95-1998/99) - Growth, Equity, and Stability - at an accelerated speed, further integrated effort for the government to manage macroeconomy and the sector development policies are called for. As noted previously in 3.2, the Indonesian economy could be, in principle, robust backed up by the upturn of domestic demand, recent improvement in oil price, a buoyant export sector, spurring recovery in industrial supply, and resultant growth in GDP. Policy dialogues between the government and international lending organizations/bi-lateral aid agencies and associated external support in various forms will further assist the government in promoting policies which aim at fostering the creation of a competitive and efficient economy.

In the light of the past and the current economic performance while keeping the necessary condition for the Indonesian economy to absorb its growing labor force at higher levels of productivity and income in view, the World Bank macroeconomic model (Revised Minimum Standard Model - RMSM) projected the consistent GDP growth path of 5.8 percent and 6.2 percent for the periods of 1990-2000 and 2000-2010, respectively[19]. In compliance with this projection, subject to an external balance and a domestic savings constraints, the economic sizes of the country and the regions concerned in the years of 2005 and 2015 would be as follows

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[18] *Pendopatan Asli Daera, Public Saving dan Angsur an Pinjaman/Hutang dan Bunga, 1989-94*

[19] WB: *Indonesia Environment and Development: Challenges for the Future*, 1994, p. 239

Basic Economic Projection: GDP, GRPs in 2005 and 2015 (Rp. billion)

	1990	1992	1993	2000	2005	2015
GDP	197,721.0	224,260.1	302,018	448,159	605,417	1,1048,841
GRP, S. Sulawesi	4,241.0	4,810.2	6,071	9,008	12,169	22,207
GRP, KMUP	902.0	1,023.1	1,339	1,987	2,684	4,898

Source: *Biro Statistik Pusat, Sulsel, KMUP, 1993*

2.4 Public Sector in the Sanitation Sector

2.4.1 Source and flow of funds for local governments

In support of local government efforts for pro yvision of public services concerned, various external funding sources available will be overviewed. In pursuance of meeting region's urgent needs for sound human environment, local governments receives (i) foreign loans/grants, (ii) central/local government (state budget for revenue and expenditure-APBN transfers through sectoral development budgets-DIPs, Presidential Instruction-INURES, provincial budget-APBD I) to their development accounts, and another central government transfer, vis-à-vis, subsidy to autonomous regions, or Subsidi Daerah Otonomi-SDO and assigned revenue (land and property tax, or Pajak Bumi dan Bangunan-PBB) to routine accounts.[20]

The Sectoral DIPs are sectoral expenditures allocated to central government technical ministries out of APBN. This sectoral grant does not go through APBD (I), being under the full control of the ministries from which it emanates. Physical outcomes of projects are consequently transferred to local governments as grants-in-kinds. Most of the urban infrastructure investments derives from DIPs, of which large bulk from the Ministry of Public Works (MOPW). During 1986-91, 54.7 percent of Indonesia's urban investment program came from DIPs with MOPW accounting for 96 percent.[21]

INURES grants are central-local transfers authorized under presidential instruction, which comprises six categories, vis-à-vis, backward villages, villages, regencies (kabupaten), provinces, primary schools and public health centers.[22]. The general purpose of INURES (villages, regencies, provinces), which is fully under the

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[20]Ref: John Taylor *MFEI Eligible Expenditures Monitoring System*, USAID, 1993, Chap 2

[21]Ref: MOPW *IUIDP Sulawesi Part III*, 1990, pp. 3.2.1-5

[22]INURES had been divided into eight categories by the end of REPELITA V. Due to contractionary new budget in 1994 and development budget restructuring, total budget of INURES was slightly declined from Rp. 5361.5 million to Rp. 5340.5 million.

control of the recipient governments, are quasi-block grants and allocated per population of 5,000. During 1986-1991, INURES accounted for 11 percent of Indonesia's urban investment program.

With agreements of the Ministers for Finance and Home Affairs, loan agreement (RDA, SLA) between provincial/local government and the central government can be effectuated. Largely due to a surge in foreign loans in combination with government new policy to channel 40 percent, in general, of foreign loan proceeds to local government as subsidiary loans, the number of loan agreement in this kind has grown since 1986.[23] Of the total urban infrastructure investment during 1986-91, loans accounted for 5.3 percent.

In addition, the Subsidi Daera Otonomi (SDOs) and the land and property tax (PBB) play in support of annual routine budget of local governments. SDOs are central government routine grants primarily for local government officials and centrally recruited local government employees' wages and salaries. As for the provincial government of South Sulawesi, around 40 percent of personnel costs is believed to be supported by SDO (1994). Unlike many other countries where the property tax is administered by local governments, PBB is levied by the central government while previously 65 percent of the total revenue was transferred back to the local government where it originated.

In the 1994 budget, the central government revised the distribution of the land and property tax (PBB) with a view to strengthening the revenue base, thereby enhancing financial autonomy and institutional capabilities of provincial and local governments. While the previously earmarked 10 percent of the proceeds for the central government is written-off, all proceeds above the collection fee (9 percent of the total PBB revenue) are transferred to provincial and local level governments.

Besides those fiscal transfers noted above, own-source revenues (PAD) constitute a little part of total local government revenue. This comprises local taxes, user charges, profits from regional enterprises and other miscellaneous income. It is estimated that in 1990 about 24 percent of routine revenue of provinces and 6 percent of those of local governments were met by locally generated revenues. In 1993, own revenues accounted for 35.6 percent of the total income of provincial governments (Rp.7,979 billion)[24]. Of these, in average, about 80 percent of local

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[23] In principle, the residual 30% is transferred to regional governments/special law entities as grant funds. As a matter of course, this allocative figure varies depending on given factors.

[24] Source: Ministry of Finance, Asian Development Bank, 1995

government taxes come from six taxes out of nine categorical taxes, inter alia, hotel and restaurant, street lighting, entertainment, advertisement, business registration, and slaughterhouse taxes.[25]

Fund flows for the urban sanitation sector in Indonesia is illustrated as attachment in the last page of the chapter.[26]

2.4.2 Role of public and private sectors

(1) Central and Local Line Agencies Involved

As previously noted in this Report, key agencies responsible for the formation and implementation of the urban and rural infrastructure development policies and programs are the National Development Planning Agency (BAPPENAS) and the Ministries of Public Works, Home Affairs and Finance. These central line agencies are represented in both the National Coordinating Team for Urban Development (TKPP) and the IUIDP Implementation Management Group with the responsibilities of policy/program formulation and guiding specific project implementation being attached to the former and the latter, respectively. Under the Ministry of Public Works, the Directorate General of Human Settlements (Cipta Karya) primarily oversights formulation, implementation, monitoring and supervision of city/regional planning, water supply, urban drainage, sanitation and sewerage, solid waste management, kampung improvement programs (KIP), and market improvement programs (MIP). Cipta Karya also assists provincial and local governments in the construction and maintenance of housing and sanitation facilities.

Besides aforementioned central government agencies and other administrative bodies at provincial, local and village levels, government-supported organizations with the functions and role in community development (Village Community Self-Reliance Organization, the LKMD)contribute to a great extent at the village level. Concerning the development of sanitation and water supply, three sections of LMKD are relevant, namely, Infrastructural and Environmental Development, Health, Population and Family Planning, and Family Welfare Promotion (Pembinaan Kesejahteraan Keluarga, PKK). Of the ten PKK programs, the government extensively assists 3 projects including provision and maintenance of

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[25] Ref: B. Suselo, J. L. Taylor and E. *Wegelin Indonesia's Urban Infrastructure Development Experience: Critical Lessons of Good Practice*, UNCHS, 1995, pp. 56-71

[26] Source: J. L. Taylor *MFEI Eligible Expenditures Monitoring System*, USAID, 1993, p.12

individual Family toilet (Jamban Keluarga) and communal toilet and bath facility (MCK), and clean water supply.

(2) Private Sector Participation

Delineation of roles and functions of the public and the private sectors would be in need provided that sanitation services with appropriate technology at adequate costs be provided to the residents in society. In this context, the major findings of the Survey of Private Sector Participation in Selected Cities in Indonesia conducted in 8 medium and large cities would present a good deal of policy implications as follows[27].

The reasons of private sector participation: (i) Particularly where rapid urban growth in terms of demographic and geographical expansion takes place, the need for infrastructure and services exceeds government's supply capability, (ii) By default, on-site sanitation in residential, commercial and industrial areas, solid waste collection and disposal would be likely to go to the private sector, (iii) large scale BOO/BOT projects and/or off-site sanitation projects would rely on the private sector investment, (iv) local governments are in short of budget or human resources to fully supply street sweeping, solid waste transport to final disposal sites, collection of utility bills (Jakarta, Bandung), and (v) local governments have not sought to provide solid waste composting, de-sludging of septic tanks, and collection and recycling of solid waste (a recycling center at a sanitary landfill site in Surabaya, septic tank de-sludging in Surabaya, Sumarang and Yogyakarta).

Policy implications: (i) Regulatory framework should be should be spelled out to invite the private sector participation, particularly at the local government level, for timely desludging, control over final disposal[28], and (ii) methods and facilities should be provided to prevent aggravation of environment at solid waste final disposal sites.

While a good deal of discussions on the issue of private sector participation have taken place to date, solid waste, and sewerage management in particular, may not be a type of public sanitation service subsectors with upside, large-scale

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[27] UNDP-WB *op. cit.*, 1995, pp. 48-50. The cities selected in this Study were Bekasi, Surabaya, Semarang, Yogyakarta, Ujung Pandang, Bandung, Medan and Pontianak.

[28] The legal and regulatory framework is one of the bottom-line discussions having been addressed by the USAID since its involvement in the private sector participation issue in Indonesia. Refer to, for example, *Description of Existing Private Sector Participation Projects and Public private Partnership Projects in Indonesia* USAID PURSE Project, 1993

privatization potentials. Neither is as likely to attract international capital and market experience or will meet as fully the government objectives in ownership distribution, capital market development or early success. In view of this, the issue of private sector participation in the sewerage and solid waste subsectors in Ujung Pandang in the days to come would be considered reasonable and pragmatic to approach from the view point of expenditure reduction, not revenue generation, in the operations of the proposed public service undertakings.

2.4.3 Sector policy and investment

(1) Sector Policy and Strategy

With due recognition of the government strategy in the past which emphasized physical infrastructure targets and not policy and institutional frameworks with which the overall policy objective of sustainable urban/rural environment management be achieved, the government issued in 1987 a National Policy Statement for Urban Development representing a consolidated view of development in the sector.[29] While the principal objectives being incorporated in REPELITA V (1989/90-93/94), the Statement outlines the sector policy as follows: (i) strengthening local governments to assume the lead role in developing, operating and maintaining local services on a sustainable basis over the long term, (ii) improving the planning and programming of urban infrastructure investments, (iii) mobilizing local revenues and optimizing their use, (iv) implementing a coordinated financing system for the development and administration of local services, and (v) strengthening the consultative process at the different levels of government with emphasis on local participation. The following Integrated Urban Infrastructure Development Program (IUIDP) was the tool for the government to set these policy objectives into operation.

The problems and issues left unsolved during REPELITA V were as follows: (i) large infrastructure deficiencies and operation and maintenance (O&M) backlogs, (ii) lack of coordination in integrating infrastructure investments with land management and transport objectives, (iii) weak management of water/solid waste service undertakings and municipalities, as evidenced by deficient accounting practices, the lack of adequate cost recovery, revenue generation, and little use of credit as well as poor management information systems (MIS), (iv) inefficient programming of the design and construction cycles, often compressed into single

[29] By the mid-1980s the experiences of the government and donor-assisted projects led to a shifts in approaches to the urban sector.

fiscal years, (v) hierarchical administrative system and complicated division of responsibility among central, provincial local agencies and, public service undertakings for project preparation, implementation, monitoring and O&M, shortage of trained and experienced managerial and technical personnel at all levels, and (vi) limited role and involvement of the private sector in urban service provision.

Faced with the "sustaining" problems and issues as noted above, REPELITA VI, while maintaining the major premises of REPELITA V, put emphasis on the "sustainable urban development" through improvement in the quality of the living environment, support for economic growth, reduction in regional imbalances and poverty alleviation. The Integrated Urban Development Program (IUDO), a broader approach in the wake of IUIDP, has been launched which embraces (i) a larger number of smaller cities and towns, (ii) broader spatial planning and urban planning, in addition to public works infrastructure development plans, expanding the scope to cover low income and rental housing, infrastructure provision for low-income areas and urban renewal, (iv) involving the private sector and communities to a greater extent, and (v) strengthening environmental sustainability.

(2) Sector Investment

The government investments in urban infrastructure have not been adequately met with the needs. By the end of REPELITA V, less than 5 per cent of urban residents are served by operating sewer systems which are confined to Jakarta, Banding, Semarang, Medan, Cirebon, Tangerang and Yogyakarta. There are on-site systems in 337 cities where around 35-40 percent of urban residents use septic tanks, drainage fields and leaching pits. In Jakarta, only one percent of about 200,000 cubic meter of daily septage discharge was treated by the City system, and the rest was discharged directly into canals and rivers. Similarly, some form of garbage collection have been provided to about 40 percent of urban residents. Facilities had been introduced or improved in 292 urban areas and about 55 percent of total solid waste was handled through some kind of formal system. Nonetheless, access of solid waste collection and disposal is very much unevenly distributed in the area. In some well-managed cities in Java, such as Semarang, up to 80 per cent of the households have municipal waste collection whereas around 20 per cent of the households being served in Kalimantan[30]. What's worse, only

[30]Ref: UNDP-WB *Water Supply and Sanitation Sector Review, Strategy, and Action Plan Preparation* (draft), Oct 94, p.55

19 percent of the urban poor largely living in congested Jakarta kampung communities are provided with garbage collection service.

In comparison to other Asian countries, Indonesia has as little as 40 per cent of population accessible to proper sanitation, which is the lowest percentage among Asian countries. Of which, Thailand and the Philippines have made sanitation services available to respectively 84 and 94 percent of population while Korea, Japan and Taipei China attained to the highest shares of 100 percent, according to the World Health Organization (WHO)[31]. Viewed in this light, the government of Indonesia will have to find ways of working around the current and future pitfalls in physical urban sanitation structures.

While statistical data on the sanitation sector investments in the past are difficult to compile largely due to discrepancies in the subcategorical division of sectors among a number of data sources and a number of numerical omissions and conflicts therein, the indicative investment outlays over the past REPELITA periods will be shown herewith in fine.

Urban Infrastructure Investment

During the five years of REPELITA I, Rp. 69 billion was spent on various urban subsectoral development projects followed by Rp.237 billion, and Rp.513 billion for REPELITA II and III, respectively. For the preceding REPELITA V, the total investment outlay

The Water Supply and Sanitation Sector

Under REPELITA V, the water supply and sanitation sector investments[32] have increased to a certain extent with the government intention to narrow the economic and welfare gap between urban and rural regions. The budget expenditures for the water supply and sanitation sector during REPELITA V was 6.1 percent of the total , up from 3.4 percent in the previous plan. In currency term, the total disbursement for the sanitation sector was US$939.52 million rising from US$542.21 million under REPELITA IV, increased by 73.3 percent. Disaggregating the resource allocation to the water supply and sanitation sector, the outlay emanates largely from community development, water supply and drainage/flood control with each

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[31] World Bank, *Indonesia Urban Public Infrastructure Services*, 1993

[32] The urban sector comprises the following subsectors: Community Development, Water Supply, Drainage/Flood Control, Water/Sanitation, Water Resources, Sanitation, Solid waste, Drainage/Sewerage, and Others. (UNDP *Water Supply and Sanitation Sector Review*, 1995)

subsector accounting for 60.9 percent, 17.4 percent and 11. percent, combining to a total of 89.9 percent.

During REPELITA IV and V, the government received US$1,466.6 million equivalent of external assistance for the urban sector. Of this amount, the largest recipients were community development, water supply and drainage/flood control in this order, and together received 91.6 percent of the total.

The Sewerage and Solid Waste Subsectors

As noted above, the solid waste and sewerage subsectors have been particularly under-funded to meet urgent needs of urban and rural residents, particularly those in densely populated areas, for the minimum level of community services. While public health and human settlement-related sectors[33] was given priority with expenditures amounted to Rp. 9.3 trillion (equivalent to $ 4.4 billion), representing about 10 percent of the total outlay under REPELITA IV, the solid waste, sanitation, and sewerage/drainage subsectors together with received a marginal 3 percent share of the total outlays with only $ 3.96 million (0.42%), $ 15.77 million (1.68%), and as low as "negligible" (0%), respectively. The subsectors concerned were again the smallest recipients under REPELITA V, with even a smaller chunk of 2.35 percent of the total,

with only $ 3.98 million (0.33%), $ 29.69 million (2.0%), and $ 0.322 million (0.02%), for the solid waste, sanitation and sewerage subsectors, respectively.

In the meantime, aside from the public sector investment, much of the expenditures on sanitation in all over Indonesia were met by individual families. By the World Bank estimate, the total investment made by households so far in Jakarta amounts to Rp.360 billion (some US 180 million) with 900,000 on-site human waste facilities and per installation cost of Rp.400,000 (indicative cost of a twin-pit latrine) as given.[34]

(3) Revised REPELITA VI Investment Plan (SARLITA)

In June 1995, Cipta Karya submitted the revised Memorandum Program REPELITA VI, Sektor Perumahan dan Permukiman, or SARLITA (a Yearly Development Budget) to BAPPENAS. The overall budget for the environmental

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[33]Specifically, Public Health/Social Welfare, Housing and Human settlements, and Natural Resources/Human Environment sectors are included.
[34]WB, *op. cit.*, 1993, pp. 70-72

sanitation (PLP) which pertains to the sewerage, the solid waste and the drainage subsectors during REPELITA VI stands at Rp.1,295.7 billion, assuming about 22.6 percent of the total budget allocation to Cipta Karya (Rp.5,740.6 billion), and a marginal share of 0.7 percent of the total development outlays which was initially set at Rp.175,967.7 billion (around US$ 83.8 billion).[35] This figure further declines to Rp.881.8 billion, or 0.5 percent, provided that the allocation confines to sewerage and solid waste subsectors with 0.29 percent and 0.21 percent, respectively. From the view point of national economy, the subject subsectors together account for 0.06 percent of GDP (Rp.310,890 billion) as per 1994 price given that the subject subsectoral expenditures be spread evenly over the five-year period.

In the meantime, of the total PLP allocation, Rp.41,925 million, or 3.2 percent, goes to South Sulawesi Province.

According to BAPPENAS, the fiscal crunch on the sanitation sector during REPELITA VI is largely attributable to (i) an anticipated sluggishness of non-oil exports in a short-run, (ii) a downward trend of government revenue due to curving oil price currently assumed at $16.5 per barrel[36] and the weak tax administration and the tax cuts in place since the beginning of 1995 (see chapter 1.3 above), and (iii) an urgent needs for large-scale capital projects to enhance and further foster the environment for potential domestic and foreign resources be fully mobilized in the Indonesian economy.

The initial REPELITA investment targets identified by Cipta Karya for sanitation improvements were as follows.[37]

Wastewater: 256 urban areas including 7 metropolitans (population more than one million), 51 large (500,000-one million), 49 medium (100,000-500,000), and 149 small cities (20,000-100,000) are prioritized. For the medium and large cities the target is 75 percent of the population to be served, whereas the small cities 70 percent. Among the prioritized medium cities, some will be served in part with centralized systems and interceptors. On-site wastewater treatment systems using simple technology will be installed in each city. In rural area, the target rate of

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[35] *OECF Research Quarterly*, No. 80, 1994, *JICA Expert Report on Solid Waste Management in Indonesia* (Japanese, 1994) cites the figure as 1.6%.

[36] It is anticipated by *BAPPENAS* that with a drop of $1.00 at oil price, Rp. 660 billion of government revenue will be lost, which accounts for 5 percent of the development budget.

[37] Ref: UNDP-WB *op. cit.*, (first draft), 1994, pp.44-45

service is set at 60 percent.

Solid Waste: Solid waste management and construction of facilities willl be undertaken in approximately 220 cities to a service level 60-80 percent. Priority will be accorded to (i) areas where population density exceeds 50 persons per hectare, (ii) commercial, industrial areas, and (iii) areas under development.

(4) Cipta Karya Technical Memorandum on the Waste Water Subsector

In June 1995, Cipta Karya drafted the subject paper which is set against the current background of technical deficiencies and investment backlogs in the subsector concerned[38]. The overall policy objective is to supply sufficient sanitation facilities in urban and rural areas thereby improving community health and also promoting an increased effort for environment conservation. The Paper is currently under circulation in Cipta Karya and other line agencies involved sanitation and environment protection programs. With comments from these agencies, the draft is expected to be finalized by the end of the fiscal year 1995.

Meanwhile, it is noteworthy that Ujung Pandang has designated as one of the 9 metropolitan/large cities where off-site sanitation systems will be encouraged to be installed upon the clearance of the following conditions: (i) population density of more than 300 persons per hectare, (ii) service area of more than 200 hectare, (iii) water consumption of 150 litter per consumer per day, and (iv)operation and maintenance costs be fully covered. The technical specification of the off-site sewerage system proposed in the Paper is as follows: (i) network/channel drainage and interceptor, (ii) house connection units, (iii) piping network with pumping station units, housing facilities, manholes and ventilation, and waste water treatment (IPAL).[39]

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[38]Cipta Karya *Technical Memorandum Pembuangan Air Limbah Manusia Dalam REPELITA VI*, (Bahasa Indonesia), 1995

[39]Other cities designated in the Memorandum include Medan, Jakarta, Bandung, Cirebon, Semarang, Surakarta, Yogyakarta, and Surabaya.

Revised Budget Allocation for the Human Settlement Sector during REPELITA VI

(Rp. billion)

	Regional Planning	KIP/MIP Improvement	Environment Sanitation, PLP	Water Supply	City Improvement	Total
Indonesia	630.8	471.6	1,295.7	3,043.4	299.1	5,740.6
South Sulawesi	12.1	7.6	40.3	108.9	-	168.9
Ujung Pandang	10.8	6.3	20.2	80.0	-	117.3

Source: *Cipta Karya* Memorandum Program REPELITA VI, *Sektor Perumahan dan Permukiman*, 1995

Revised Budget Allocation for Sewerage and Solid Waste Subsectors during REPELITA VI

(Rp. Billion)

	Sewerage	Solid Waste	Drainage	Total
Indonesia	512.8	369.1	413.8	1,295.7
South Sulawesi	14.3	12.4	13.6	40.3
Ujung Pandang	0	8.9	11.3	20.2

Source: *Cipta Karya Ibid.*, 1995

Revised Budget Allocation for Sewerage and Solid Waste Subsectors, 1994-98

(Rp. Billion)

	1994	1995	1996	1997	1998	Total
Sewerage	77.3	104.4	107.3	110.3	113.5	512.8
Solid Waste	59.8	67.1	73.8	80.8	87.6	369.1
Drainage	62.7	71.3	81.6	92.1	106.1	413.8
Total	199.8	242.8	262.7	283.2	307.2	1,295.7

: *Cipta Karya Ibid.*, 1995

While the government affirms its commitment to curb the regional disparities and to promote industrial redeployment all over the country, the regional distribution of total public environmental sanitation sector investments seems to be inbalanced in relation to provincial population and GRP. In South Sulawesi, where the provincial population accounted for 3.7 percent of the total population in 1993 gained a proportionately less share of budget allocation of 3.2 percent and only 2.9 percent subsectors over the 5 years of REPELITA VI for all of the environmental sanitation subsectors and the sewerage and solid waste subsectors, respectively.

(5) Bird's Eye View of the Past REPELITA Investments

Herewith, each of the past REPELITA investments will be briefly viewed to highlight the major deliverables in the wake of a series of public sector financing to the sector concerned.

REPELITA I/II (1969/70-1978/79)

In the earlier days of the first Long-Term Development Program (JPJ I, FY1969-1993), the sanitation sector in urban area received little attention from the Government. Prior to the third Mid-Term Development Program (REPELITA III, 1979-83), most government efforts in sewerage, drainage and solid/human waste management had been confined to studies which stressed the need for a national sanitation policy and integrated subsectoral approach.

REPELITA III (1979/80-1983/84)

With due recognition of the important role of the Government in the initial stage of sanitation development, particularly in low-income area, Cipta Karya had assisted the development of solid waste management services in 11 cities and towns in all over Indonesia during REPELITA III. At the completion of the Program, sewerage had been provided to high-density central areas of four cities, namely DKI Jakarta, Kotamadya Bandung, Kotamadya Cirebon and Kotamadya Tangerang.

REPELITA IV (1984/85-1988/89)

In tandem with poverty alleviation and sound environment protection in urban and rural area, the sanitation sector targets had been consolidated by Cipta Karya into an Environmental Sanitation Program under REPELITA IV. Special attention was given to the improvement of sanitation facilities (solid waste collection and disposal, sewerage and drainage systems and so forth) to enhance public health of the urban and rural poor. Specifically, the target was set to improve the citywide solid waste manage system in 200 cities and to provide garbage management equipment and facilities in 400 towns in kampungs. Sewerage was to be provided to 10 cities.

At the completion of REPELITA IV, accessibility to private septic tanks in urban area increased from 29 percent in 1980 to 38 percent in 1985, and 44 percent in 1990. Sewerage had been provided to high-density areas of 39 cities. In respect of rural sanitation, little reliable information available. It is estimated that about 90 million rural residents still remain unserved or underserved by basic sanitation and water services during REPELITA IV. Confined to the major seven provinces, data from a household health survey of 1988 indicated only a quarter of rural population was accessible to sanitation whereas 30 percent to safe water supply available. A majority of the rural population does not have hygienic facilities for the disposal of human excrement.

REPELITA V (1989/90-1993/94)

The targets for solid waste management were set as follows: (i) increasing service coverage to 80 percent in 450 cities (5 metro, 6 large, 25 medium, and 414 small cities), (ii) 100 percent coverage of commercial institutions and public areas, and (iii) 70 percent of residential areas with population density of over 100 persons per ha). By the end of REPELITA V, less than five percent of urban residents are served by operating sewer systems which are confined to Jakarta, Banding, Semarang, Medan, Cirebon, Tangerang and Yogyakarta. There are on-site systems in 337 cities where around 35-40 percent of urban residents use septic tanks, drainage fields and leaching pits. In Jakarta, only 1 percent of about 200,000 cubic meter of daily septage discharge was treated by the City system, and the rest was discharged directly into canals and rivers.

Similarly, some form of garbage collection have been provided to about 40 percent of urban residents. Facilities had been introduced or improved in 292 urban areas and about 55 percent of total solid waste was handled through some kind of formal system. Nonetheless, access of solid waste collection and disposal is very much unevenly distributed in the area. Only 19 percent of the urban poor largely living in congested Jakarta kampung communities were provided with garbage collection service. In the light of the foregoing, it is summarized that during the first Long-Term Development Program (PJP I), the provision of solid waste and sanitation services had been well behind the target levels and below standards of comparable cities.

2.4.4 Integrated urban infrastructure development program (IUIDP/P3KT)

(1) IUIDP Investment

As part of ample effort ever made by the government of Indonesia to address the sector issues of infrastructure deficiencies and investment backlogs, IUIDP, an operational tool to achieve the sector objectives, has been introduced since 1980's, as briefly described in this section with a bearing on financial aspect.

Initiated by the World Bank since 1983, the Government of Indonesia commissioned the Integrated Urban Infrastructure Development Program (IUIDP), a nationwide multi-component urban development program in 1987. IUIDP is an integrated approach to urban infrastructure development managed by the central, provincial and local governments. In the processing of the whole IUIDP procedure, it was intended to integrate three concepts vis-à-vis decentralization, de-

concentration and co-administration. Of these, decentralization was a core concept shifting greater responsibility to the municipal government for planning, financing, implementing, operating and maintaining urban infrastructure and services.

Following the IUIDP Sulawesi Projects 1, 2A which had taken place during 1986-1989, a physical urban development plan (PJM) supported by financing plans for FY1991 through 1995[40] was prepared under the Project 2B in 1990. The major objective of the Plan was to: (i) expand basic, low-cost urban infrastructure and services in a planned and coordinated manner, (ii) decentralize planning and implementation of project to local governments and strengthen the higher level of governments to enable them to provide advisory/supervisory and training services, and (iii) stimulate to increase local revenues to help finance the proposed projects and improve operation and maintenance of the existing facilities, thereby improving the living conditions of the rapidly increasing urban population. With a view to supporting the technical plan, an estimate of the resource requirements (Revenue Improvement Action Plan-RIAP) and future plans for the institutional strengthening requirements (Local Institutional Development Action Plan-LIDAP) have been supplementary included in PJM[41].

In 1992, PJM was revised taking into account the implementation delay of the proposed projects therein. The revised IUIDP (FY1992-95) focuses on five urban subsectors, namely, roads, drainage, solid waste management, sanitation, and kampung improvement (KIP). The total investment cost amounts to Rp.78.098 billion [42]. Of the total, O/M costs account for 15.1 percent declining from 27.8 percent in 1990 PJM. The drainage, roads, and solid waste subsectors have been allocated the major portion of the planned budget with 46.3 percent, 27.9 percent and 15.1 percent, inclusive of O/M costs, respectively. The sanitation subsector covers as low as 1.4 percent. While sanitation and KIP could be expanded in the years to come, water supply which is under the responsibility of PDAM is not included in the Mid-Term plan.

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[40] While the original *PJM* (Multi-year Investment Program) was prepared for FY1991-1994, it was extended by one year to FY1995 due to delay in implementation. The revised *PJM* is now under processing. (Ref: LIDAP Report, Sep 1994)

[41] The final Rep//orts of RIAP and LIDAP were submitted in September, 1994.

[42] The total cost of the 1990 investment plan was Rp. 50.9 billion in current price and Rp. 35.5 billion in 1990 constant price.

IUIDP Investment by Subsector (1992-1995, Rp. Bil) 1992-1994: Actual, 1995/96: Allocated

	1992 1/	1993/94	1994/95	1995/96	TOTAL
I. Total Investment Costs	15.82	19.18	20.65	22.45	78.10
Urban Road	9.79	9.19	8.45	8.42	35.85
Drainage	1.83	4.79	7.40	7.97	21.99
Solid Waste	2.52	2.19	2.96	4.22	11.89
Sanitation	0.07	0.36	0.32	0.37	1.12
KIP	1.61	2.65	1.52	1.47	7.25
II. Of which O/M Costs	3.80	2.86	2.47	2.73	11.86

Source: Project Memorandum 1992/93 - 1995/96, Cipta Karya
1/ 1992 figures contain the capital costs in 1991 and O/M costs in 1991/92

WB Loan Proceeds Committed to Ujung Pandang, 1992/93 - 1995/96 (Rp. billion)

	1992/93	1993/94	1994/95	1995/96	Total
Kodya Ujung Pandang					
Urban Road	6.03	3.12	2.47	1.78	13.41
Drainage	0.91	3.38	5.04	5.13	14.46
Solid Waste	0.06	0	0	0	0.06
Sanitation	0	0	0	0	0
KIP	0.92	2.07	1.09	0.76	4.84
Total	7.92	8.57	8.60	7.67	32.76

Source: Project Memorandum 1992/93 - 1995/96, Cipta Karya
Quotation as per US$: Rp.2,075(1992), Rp.2,150(1993), Rp. 2,180(1994), Rp. 2,260(1995/96)

(2) IUIDP Funding Sources

The various kinds of funding sources have been utilized in Indonesia for the implementation of urban infrastructure projects under IUIDP. Of the total investment costs of Rp.78.098 billion, Rp.42.869 billion, or 61.2 percent was financed by the external source funds. Foreign loan proceeds passed as (i) the sectoral grants out of central government development budget (APBN/DIP), (ii) the routine grant (SPABP/Ganjaran), and (iii) loan facilities in the Ministry of Finance (Pinjaman) to local level governments account for 18.9 percent, 60.2 percent and 20.9 percent respectively. The balance, or 38.8 percent, supplied by the domestically-sourced GOI funds have been contributed by (i) INPRES grants (general/sectoral), central-local transfers authorized under presidential instruction, (ii) own revenues (PAD), (iii) sectoral DIP, and (iv) development grants (SDO) with each share of 46.3 percent, 29.7 percent, 15.3 percent, and 8.7 percent, respectively.

2.5 Affordability Analysis

2.5.1 Affordable fund for the project, revisited

(1) Willingness to Pay

1) Findings

The most complex problems could arise from in the estimation of willingness to pay of public service consumers in the new markets partly due to the nature of the urban sanitation services as quasi-public goods and the lack of substitute services (which means there is no "apparent market" for particular services). Unlike water supply projects where households' willingnwss to pay could be alternatively estimated by an analyses of the sales of bottled water, consumers (beneficiaries) of sewerage and solid waste mangement service could be "free riders" enjoying those urban public services without paying for costs accrued to the supplier. Likewise, people could dump their wastes (human/solid and waste water) at public places freely as a substitute mean for regular public services. No incentives for consumers to reveal their willingness to pay which would result in their actual expenditure as tariff.

A field survey which aimed at determining the financial implication of the rospective urban sanitation project in the City on the cashlays of beneficiaries was undertaken by the JICA team in the two consecutive years of 1994 and 1995. In 1994, households, public service and private business entities (institutions) in the city combining to a total of 300 had been quested by questionnaires with a bearing of their current sanitation conditions and fanancial position. In the following year, each community leader (kelurahan lurah) in the city boundaries totalling 142 was interviewed with almost the same questions in category, but to a deeper extent. As for the economic aspect, the survey outcomes revealed the regional income levels and a kind of "bid prices" rendered by the prospective beneficiaries for the subsectoral sanitation services in prospect as a proxy measure for the residents' willingness to pay. In this context, a modest disparitiy in household income level has been identified in the survey outcomes. This imparity may be largely attributable to psychological perception of the interviewees and the different survey methodologies with direct interview to the residents and institution representatives and address to Lurahs, the administrative representatives.

Against the background data obtained, the weighted average annual incomes for

households and institutions have been estimated at Rp.3,034,000[43], or equivqlent to about $1,300 with 5.5 family members per household being assumed, and Rp.118,671,000, or about $52,740 as per 1995 price[44]. It would be noteworthy that a household with 2 workers at the minimum wage level in Ujung Pandang could earn Rp.1,934,400, or about two thirds of average households, per year with Rp.3,100 per day. In Jakarta, minimum wage is Rp.4,600 per day, or a little less than 50 percent higher than that in Ujung Pandang.[45]

Perception of Rulahs on the weighted average household income in their kechamatan was 7.9 percent lower than that of the residents with the estimate standing at Rp.2,811,000 as per 1995 price.

The maximum amount of willingness to pay for the public solid waste management service has been revealed in terms of the percentage of their income as such that 59 percent of households would pay for the tariff with not more than 2 percent of their household income. Among the institution intterviewees, a majority share of a half of the stastical population (cohort) responded "as regulated by the goverment" irrespective of the amount they are charged while other 20 percent responded with "less than one percent".

As for the sewerage service, the outcome was somewhat obscure with no statistical significance having been confirmed. Nonetheless, 55 percent of households and 31 percent of institutions revealed their preference for enjoying the public sector service concerned in exchange of less than 2 percent of incomes.

The details of the survey outcome is presented in the folowing subsection.

2) Details of JICA Interview Survey

Detailed breakdowns of Income level, "bid" prices for solid waste and "bid"prices for eswerage bu households and institutions under the survey are presented as follows.

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[43] This estimate of household income seems to be reasonable given that the 1993 regional income per capita amounts up to Rp.1.1 million in Ujung Pandan, of which around 50-60 percent is a share of personal income.

[44] Average incomes for households and institutions are weighted by income levels and institution categories, respectively.

[45] Formula of thius calcuration is as follows: Rp.3,100 x 2 workers x 26 days x 12 months [46] This estimate would be high given the difference between "household income" and "household disposable income" being considered. (Ref: BAPPENAS *Institutionalization of Integrated Urban Development* (Draft), 1994

Income Level, 1994

(A) Households

Percentage share of households interviewed	Annual income
37.0 percent (higher income)	more than Rp. 1,000,000
40.4 percent (medium income)	between Rp. 200,000 - 1,000,000
22.6 percent (lower income)	below Rp. 200,000

(B) Institutions

Institutions interviewed	Annual income
Hospitals (4)	Rp. 101,500,000
Restaurants (10)	Rp. 30,100,000
Markets (4)	Rp. 3,100,000
Factories (4)	Rp. 186,700,000
Offices (10)	Rp. 280,000,000
Hotels (10)	Rp. 71,800,000

Distribution of Household Income by Kechamatan, 1995

Kechamatan	Population (†000)	Rp.180 (%)	Rp..280 (%)	Rp.380 (%)	Rp.480 (%)	Rp..580 (%)	Rp.1,000 (%)	Weight Av Income (Rp.1000)	Population Weighte Ave Income
Mariso	62,833	49.4	18.8	14.4	8.6	5.8	3.0	267.6	15.4
Mamajano	75,269	46.3	19.4	16.1	10.4	5.2	2.4	249.2	17.2
Makassar	101,412	53.8	21.6	13.4	6.3	3.0	1.3	238.6	22.2
U.Pandang	43,385	19.7	20.8	18.5	12.0	13.5	16.5	224.3	8.9
Wajo	50,142	13.7	18.0	19.2	15.0	15.0	19.2	219.9	10.1
Bontoala	72,729	40.8	17.8	10.0	12.7	10.8	7.8	222.2	14.8
Tallo	116,490	49.08	24.0	13.0	9.0	3.0	1.0	248.6	26.6
U.Tana	54,230	56.6	21.6	11.6	5.3	3.2	1.7	232.2	11.6
Panakkukang	188,744	57.0	23.6	9.0	3.8	6.0	0.6	221.1	38.3
Tamalate	226,821	50.7	22.3	13.2	7.5	4.1	1.8	239.4	49.8
Biringkanaya	97,945	66.4	13.0	9.2	5.0	4.4	2.0	214.9	19.3
Kotamadya	1,090,000	46.6	20.5	13.4	8.2	6.6	4.8	231.6	234.2
								yearly =	Rp.2.8 11*

* Average income of Kotamadya is weighted by population of each Kechamatan, where average income of each of the Kechamatan is weighted by the number of households at each income group, .

As noted in Figure 3.1 as attached, distribution of income in Ujung Pandang is highly deveiated from the normal standard deviation curve with its skewness at 1.82, where the statistical definition is as follows.

$$\text{Skew} = \frac{n}{(n-1)(n-2)} \sum_{j} \left\{ \frac{(xj - x)}{s} \right\}^3$$

where s = standard deviation of sample population.

"Bid prices" for Solid Waste Management

(A) Households

Percentage share of households interviewed	Maximum "bid price" as per % share of income
45 percent	less than 1 percent
35 percent	As regulated by the government
14 percent	between 1-2 percent
6 percent	between 2-3 percent

(B) Institutions

Percentage share of households in favor of cost-bearing	Maximum "bid price" as per % share of income
20 percent	less than 1 percent
54 percent	As regulated by the government
11 percent	between 1-2 percent
14 percent	no comments

"Bid prices" for Wastewater Treatment

(A) Households

Percentage share of households in favor of cost-bearing	Maximum "bid price" as per % share of income
41 percent	less than 1 percent
19 percent	more than 5 percent
14 percent	between 1-2 percent
6 percent	between 2-3 percent
2 percent	between 3-4 percent

(B) Institutions

Percentage share of households in favor of cost-bearing	Maximum "bid price" as per % share of income
27.59 percent	less than 1 percent
10.34 percent	between 1-2 percent
3.4 percent	more than 5 percent
5.5 percent	others

3) Estimated Willingness to Pay

In theory, the above "bid prices" preferably revealed by the individuals, households or business entities in the City reveal their maximum amount to pay for the services concerned, with an assumption that people make decisions on how much they allocate their scarce resource under their specific constraints and preference. Provided that the weighted average of income levels of household and institutions are profoundly believed at about Rp.3 million and Rp.120million, respectively, and further, the willingness to pay parameter for sewerage and solid waste together stands at 2.5 percent for each of the category of beneficiaries, the maximum likeliness of residents to willingly pay for the public sanitation services at their required quality and quantity will be Rp.75,000 per annum, or Rp.6,250 per month, and Rp.3,000,000 per annum, or Rp.250,000 per month for households and entities, respectively. It should be noted that the Project proposed in the Study will create the environment where the city residents could be better off with the new facilities and management, thereby leading to an upward shift in people's utility level (satisfaction) and their "bidding" price for the indremental benefits and value to the maximum extent posible at somewhere aroud 4.0 percent of their income, inter alia, Rp.120,000 per annum, or Rp.10,000 per month and Rp.4,800,000 per annum, or Rp.400,000 per month for households and entities, respectively.

2.5.2 Estimation of affordable funds

(1) Methodology

As previously noted in 2.4 concerning the sector policy and investment, Indonesia faces a serious resource crunch with the sanitation subsectors concerned in particular. At issue in this financial position is that how much of funds be possibly mobilized from the public and the private sectors during the target period up to 2015 in preparation of the prospective urban subsector projects. At the outset, it may be instructive to point out that the focus on the methodological issue herein is

initially confined to the "micro" approach pertaining to the disaggregated funding sources by possible donors, vis-à-vis, the central government, external assistance, the provincial government, the local government and the beneficiaries of the prospective projects. The current expenditures by the central government and beneficiaries in the service catchment areas are the basis of the estimates on which the anticipated grants and contributions emanated from these subcategorical fund sources are extrapolated in line with the hypothetical benchmarks and parameters as shown in 4. and further summated to reach the total available fund for the Project. It would be noted that the latter part of the estimation herein is in economics sense a "macro" approach such that the fund projection is linked to the intuitive macroeconomic parameters, inter alia, growth of national/regional value added, city population, and benchmarked fund allocation targets to the sectors. This involves making explicit assumption regarding unit supply elasticity of funds available for the sanitation subsectors in the City with regard to these indicators.

The underlying value judgment of this approach is that the provision of (quasi) public service operations such as solid waste management/sanitation services should be considered not only as a concern of municipality level but that of national basis. In the light of this, the financial support of the central and provincial governments, and the private sector including direct beneficiaries in the region should be pledged as partners for regional efforts to eventually achieve the self-reliant, financially sustainable sanitation sector development.

Alternatively, a number of other macroeconomic techniques like econometric approach, trend analysis had been considered to rigorously estimate the funds most likely allocated to the subsectors concerned. Of these, a simple macro econometric model relating annual growth of funds available to GDP (at the margin) had been considered appropriate in connection with analogy to the electricity demand forecasting. Nonetheless, the estimates of GDP elasticity of supply of public/private funds for the public services concerned did not fall on the upward sloping linear nor curvilinear supply schedule, and hence, no clear quantitative correlation between the variables have been confirmed. Other hypothetically relevant independent, or explanatory variables such as income level or economic prices of alternative services could not be confirmed given the problems arising from the scarce availability of and non-consistency in data.

(2) Assumptions and model configuration

1) Basic assumptions and model configuration

The following financial framework readily presents the possible fund raised for the City of Ujung Pandang for which the lack of affordable credit is considered to be one of the serious constraints to upgrade the urban sanitation services. A summarized financial assumptions and model configurations are forwarded as follows:

(i) Key Socio-Economic Indicators

Real GDP/GRP growth per annum	5.5 percent in average
City Economy	0.4 percent and 22.1 percent of the respectively
Weighted Average Household income	Rp.3,034,000 per annum
Annual Population growth	3.56 percent in average

(ii) Elasticity

Unit elasticity of fund supply with regard to real GDP growth

(iii) Sources of Funds

The two interrelated sectors in economy are considered such that the public sector denotes funds from any governmental bodies (APBN, INPRES, DIPs, APBD I and II) and the private sector funds from beneficiaries in the service areas (Willingness to Pay, Beneficiaries' contribution and Capital works charge). Foreign aid funds are implicitly included in the state fund in the form of sub-loan, equity investment and grant to the local government/prospective executing agencies. Presumably, no external private funds in conjunction with any private sector partnership projects are in sight for the analysis.

(iv) Investment Outlays

The investment outlays in the sanitation subsectors concerned commence in 1996 with benefits attributable to the preceding activities in the following year. Meanwhile, the investment in the off-site sewerage system may set forth later years.

(v) Private Sector Participation

As partly noted in (iii) above, a kind of surcharge, namely, *beneficiaries contribution* and *capital works charge* are requested to the direct beneficiaries of the Project in support of self-reliant and financially sound management of the sewerage service undertaking in the city.

2) Model Configuration

Considering the analytical framework in large, the following model configuration is set out to draw the possible size of funds available for capital investment and recurrent works with the subsequent assumptive parameters.

i. **Sources of fund**: Largely two categorical fund sources are assumed, namely, the public and the private sectors. Of those, the State, the Provincial and the City governments constitute the public sector whereas the latter comprises willingness to pay (WTP), beneficiaries' contribution and the capital works charge. Funds from foreign aid sources are implicitly included in the state fund flows in the form of SLAs, equity investments, grants and so forth;

ii. **Fiscal transfer from the State to the City**: Of the planned sector investment outlays in REPELITA VI, a marked-up funds will be transferred to the City in line with regional outputs. Subsequently, the state development budgets during the following REPELITA periods will increase in proportion to the growth of national output;

iii. **Fiscal transfer from South Sulawesi to the City**: It is envisaged that in proportion to the regional outputs, a ear-marked funds out of the annual sector investment outlays be transferred to the City government;

iv. **Mark-up sectoral investments of the City to the sanitation subsectors**: Subsequent to the current investment expenditures during REPELITA VI, the City budget will be annually pegged at a mark-up point against the regional gross outputs (GRP). As previously defined, relative growth in sectoral outlay is complied with unit elasticity of funds supply in terms of GRP growth;

v. **Change in financial position of the city government**: Large part of growth in net revenue of the city government will emanate from growth in GDP (the unit elasticity of funds supply in terms of GDP growth) and the potential of the city revenue-hike which stands at eight percent per annum as borne out by the RIAP report under IUIDP;

vi. **Growth in the available city funds to the subsectors concerned:** The car-marked city budget allocation for the sanitation subsectors will be increased at the same proportion to GRP growth;

vii. **Project fund:** Of the total available city budget allocated to the Sanitation subsectors concerned, partial funds will be available to the prospective Project(s) to come;

viii. **Growth in regional income:** Household income of the City will increase in proportion to GDP growth. In other word, the unit elasticity of funds supply in terms of GDP growth is assumed;

ix. **Willingness to Pay (WTP, Users Charge):** The maximum extent people are willing to pay for the urban sewerage service without undue hardship will be estimated in proportion to the annual growth of income and revenue of households and institutions.

x. **Beneficiaries' Contribution to the sewerage service:** In pursuance of self-reliant and financially sustainable management of public sewerage service, the households/business entities in the service area requested, upon the completion of the installment of public sewerage system, to participate in monetary compensation to the city sanitation authority for their potential benefit. It is assumed that every 10 percent of the eligible beneficiaries are to contribute this community charge in a year with 15 percent of the total population be included in the catchment area in the year 2005.

xi. **Capital Works Charge:** Provided that the city authority extends the sewerage system connection services in place of privately funded physical works, the lump-sum capital works charge will be levied on the newly constructed high-rise buildings in the service area upon the completion of the sewerage pipe-connections;

xii. **Growth in number of households:** In association with the growth in population, the number of households in the city will be increased in the same proportion; and

xiii. **Sound Management of Public Finance of the City:** Debt Service Ratio (total debt services inclusive of principal repayments and interest payments over APBD II) will be a bench-mark index to represent the soundness of city finance.

3) Assumptive Parameters

Further, the following parameters to indicatively configure the model will be specified:

i. **Real GDP/GRP growth rate:** 5.5 percent of the average real GDP and GRP growth per annum will be assumed during the target period, thereby no contractionary pressure on development budgets in sight;

ii. **Population growth rate:** 3.56 percent per annum is assumed;

iii. **Mark-up sectoral investments of the State to the sanitation subsectors:** During REPELITA VI, the planned investment outlays in compliance with the recent SARLITA (yeary budget plan) will be assumed. The mark-up State budgets for the subsectors concerned will be 0.08 percent of GDP up to the year 2005 and 0.1 percent onwards;

iv. **Mark-up sectoral investments of the Province to the sanitation subsectors:** The mark-up provincial budgets for the subsectors concerned will be 0.1 percent of GRP;

v. **Fiscal transfer from the State and Provincial Governments to the City:** 0.4 percent and 22.1 percent of the planned sectoral outlays will be transferred to the City in compliance with the economic shares of the city in the national and the regional economies;

vi. **Mark-up sectoral investments of the City to the sanitation subsectors:** The mark-up City budgets for the subsectors concerned will be one percent up to the year 2005 and 2 percent onwards;

vii. **Share of the City non-committal funds:** 77.3 percent of the City funds allocated to the sanitation subsectors will be debt-service free non-committal funds;

viii. **Available fund to the concerned Project(s):** 50 percent of the total City funds available to the sanitation subsectors will be spared to the project(s) proposed under the Study;

ix. **Contingent value of the sanitation services (WTP, users' charge):** The maximum extent people are willing to pay for the sewerage and solid waste management services will be set at 1.5 percent[46] of their household and

[46] This estimate would be high given the difference between "household income" and "household disposable

entity's incomes, with the estimates of Rp.45,000 per annum or Rp.3,750 per month, and Rp.1,800,000 per year or Rp.150,000, respectively.

x. **Beneficiaries' contribution for the sewerage service:** In recognition of the estimate of private investment in the on-site system in Jakarta at Rp.300,000 per unit, and Ujung Pandang's economic size in terms of Jakarta, Rp.100,000 per household/institution (Rp.1,000 x 100 sq. meter in average) entity for the available sewerage service will be transferred to the city upon the completion of the physical component.

xi. **Capital Works Charge:** Rp. 10,000 per sq. meter to the year 2005 and Rp. 50,000 per sq. meter onwards. Various kinds of high-rise (with more than 5 stories being assumed) commercial/public building combining to a total of 10,000 sq meters per annum will be constructed in the city;

xii. **Business entities in the city:** The number of business entities in the City is currently assumed to be 300, and will increase partially in compliance with growth in regional aggregate supply, and

xiii **Debt Service Ratio:** Less than 20 percent will be a bench-mark point with a bearing on a sound condition for public finance.

3) Available fund

In line with the model configuration and indicative parameters as articulated above, the total funds available for the sanitation subsectors in Ujung Pandang, Within the time-slicecof 20 years, will be Rp.237.7 billion (equivalent to $105.6 million as per 1995 price) up to the year 2005, of which about 65 percent of funds (62.8%) emanates from the public sector. In addition, Rp. 663.5 billion ($308.6 million) from the year 2006 up to the year 2015 would arise from the both of the public and the private sectors, totaling the funds Rp. 728.6 billion ($323.8 million) at maximum (*Table 3.1*). With the variation of the change in real GDP growth in the years to come, the estimated funds for the medium-term and long-term planning would be modified as simulated in the table below.

Available fund possible for the Project in connection with the change in real GDP grow, $ mil

	4.0 %	5.0 %	5.5 %	6.0 %	6.5 %	7.0 %	8.0 %	9.0 %	10.0 %
1995/96-2005/06	98.9	103.3	105.6	108.0	110.5	113.1	118.5	124.3	130.5

Our likelihood of estimate

income" being considered. (Ref: BAPPENAS *Institutionalization of Integrated Urban Development* (Draft), 1994

4) Affordable fund and Indicative Financing Plan

In anticipation of the City Government's further commitment to urban environmental management at a higher level, the need for external financing at an early point in time is pressing. In carrying out a further analysis to give hands with whatever the city administration might require to commission the preparation of the prospective urban sanitation Project(s) in 1996, fund affordable for the city government and the Project as well is estimated in lieu of the available funds above. In view of nature of the fund estimated in due course of analysis, the subsequent financing model and the estimate will present an indicative measurement of loan credibility and budget for the prospective project(s) confining to the limited size, design and procurement. In facilitating the perusal of the analysis herein, the estimates are categorized in a two by two (2 x 2) matrix with the variables of (i) with/without grant, and (ii) loan fund from multi/bi lateral agency. The model configuration and assumptions will be set out to draw the indicative funds affordable for the Project as follows:

Model Configuration, Tool and Parameters

Loan credibility (how much you can borrow now for your future income?) and the prospective budget size of the Project will be estimated with the available funds accruable to capital contribution from the public and the private sectors involved over the 10-year period of project implementation.

Assumptions

Financial Terms

Loans from international lending institutions assume 20 years of repayment including 5 years of grace period, at the Banks' standard variable interest rate. As for ADB, the current variable interest rate from OCR is set at 6.59%. Japan's financial aide agency assumes 30 years of repayment inclusive of 10 years of grace at the interest rate 2.6%. For both of the agencies, annuity payments will be made twice a year, at the end of the second and fourth quarter. Interest will be payable on the diminishing balance of the outstanding principal. Consequently, interest costs will decrease propoitionately as principal is amortized.

Government loan facilities such as Subsidiary Loan Agreement (SLA) or Regional Development Account (RDA) under the US aid agency assume 20 years of

repayment including 5 - 6 years of grace period with interest rate at 11.5%[47]. Annuity payments will be made twice a year, at the end of the second and fourth quarter.

A present factor of annuity factor (a reciprocal of Capital Recovery Factor)

$$a(i,n) = \frac{i(1+i)^n - 1}{i(1+i)^n}$$

where i : annual interest rate, n: repayment period

Equity-Loan-Grant mix

As indicated by BAPPENAS, investment requirements of the proposed project(s) will be financed by fiscal transfers from both the central and provincial governments and by loans to the municipality level government unit(s). Proceeds of foreign loan will be split into two components, vis-à-vis, around 65 percent onlent from the central government to the undertaking(s) and the remaining 35 percent grant[48] .

While there would be a number of external funds available for the city if the opportunity arises, it is envisaged that the loan proceeds of the external aid agency would most likely to be onlent to the city from the central government in the form of SLA, inter alia, with 20 years of repayment including 5-6 years of grace and 11.5 percent of interest rate. In addition, interest accrued to the disbursements during construction period (IDC) will be capitalized, thereby bearing no obligation of debt service during the initial stage of the Project(s). The current lending conditions of international lending institutions (multi-lateral agencies), such as World Bank, Asian Development Bank and others, also assume this IDC capitalization clause.

In the context of the foregoing, and with an annuity of Rp.13.5-15.5 billion (US$6-7 million), the affordable fund for Ujung Pandang city will be around Rp.75.65 billion (US$ 34 million) in time-slice over the period up to 2005 with the borrowings through SLA. As assumed above, IDC will be capitalized and hence difficulties will be encountered in borrowing US$45 million equivalent foreign loan where the scheduled annual debt services supersede the annuity funds possibly

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[47] Source: Ministry of Finance, BAPPENAS
[48] Source: BAPPENAS

available for the city. (See the Tables 4.3.1 and 4.3.2) Provided that another Rp.45.0 billion (US$20 million) of fund br granted from the Central government taking the above Loan-Grant mix into consideration, the project size would be enlarged combining to the total of Rp.121.5 billion (US$54 million).

Meanwhile, in appreciation of hardship to draw external finance on "multi-lateral funding scheme", it would be considered acceptable to assume that the city would get borrowings on "bi-lateral funding scheme" where the borrower pays back interest charge without debt carry-overs during the disbursement period. Provided this scheme as given, the affordable fund for the city will be around Rp.101.25 billion (US$45 million), thus making it possible for the project to be formulated with the afore-mentioned ceiling without grant and Rp.168.75 billion (US$ 75 million) with grant of Rp.67.5 billion (US$ 30 million) on SLA re-lending terms and conditions.

In summary, the estimated affordable funds by category are shown as follows.

Classification of Affordable Funds in compliance with SLA on-lending scheme

Lending Scheme	Without Grant Fund	Equity-Loan-Grant Mix
Multi-Lateral	Rp.76.6 billion (US$ 34 mil)	Rp.121.5 billion (US$ 54 mil)
Bi-Lateral	Rp.101.3 billion (US$ 45 mil)	Rp.168.8 billion (US$ 75 mil)

5) Sound Management of Public Finance

Change in Financial Position

The tables attached ( ) indicate the change in financial position of the city (uses and sources of funds) over the period up to 2015 given the borrowings of Rp101.3 billion (US$45 million) and Rp.76.6 billion (US$34 million) on bi-and multi-lateral funding schemes. Not unexpectedly, income continues to lag behind expenses accrued over the period of initial capital investment. Viewed in this light, it will be clear that external fund is in urgent needs to fulfill the investment backlog at the initial point in time. (Fig 3.1)

Debt Service Ratio

It should be noted that financial healthiness of entities is a function of an expense accrued each year but also the share of debt services out of the funds generated in a year. Viewed in this light, this section highlights the debt service ratio (DSR) as an

proxy index to represent soundness in financial management.

$$DSR_t = \frac{(Annual\ Debt\ Services)_t}{APBD_t}$$

where t denotes any year during the project period

It is well recognized that in the year 2002 the city may face the highest financial burden in debt payment once the proposed Project(s) be initiated in 1996 on external funds. Financial healthiness of the city as borne out by DSR will be ranging somewhere around zero (0) to 17 percent (multi-lateral scheme) and zero(0) to 12 percent (bi-lateral) over the period up to 2005, as shown in fig. In keeping with generally acceptable criterion of 20-25 percent of DSR as a mark-up cut-off point of financial healthiness for public administrative bodies, external fund borrowing with these relatively low-end figures of DSR would not undermine the credibility of the city. Given that the city's current financial obligation to cover debt services incurred to the preceding external borrowings be kept at Rp.3.4 annually, DSR will grow incremental one (1) to four (4) percent over the same period.

Revenue and Debt Services of KMUP, 1990/91 - 1994/95 (Unit: Rp. million)

	FY1990	FY1991	FY1992	FY1993	FY1994
City Revenue	8,766.1	11,021.9	11,719.3	13,681.7	15,062.9
Public Saving	6,325.8	6,858.8	4,496.6	4,645.5	4,610.0
Debt Services	98.0	194.7	2,901.9	947.2	3,422.1

Source: BAPPEDA II, KMUP

3. Pricing and Indicative Tariff

3.1 Marginal Cost Pricing

3.1.1 Introduction

Inadequate pricing, investment and regulatory policies which are likely to lead the pulic services undertakings to relatively distresssed financial performance has been a chronicle disease in the urban sanitation infrastructure sector. Among others, the current tariff policies are creating an immediate problem, as most power-suply undertakings in the country are unable to earn a sufficient rate of return to attract private debt or equity investment. The problems become increasingly difficult when rapid growth in sanitary services at a higher quality and reliability result in a larger scale demand for investible resources in the near future.

Investments in the urban sanitation sector have been financed through the public sector by general taxes, bilateral aid and concessionary loans from multilateral financing institutions. Nonetheless, with a critical lack of funds available and deteriorating public finances, which is a binding constraint to borrow external funds for the sector investment, financing through traditional sources have often been falling severely short of demand. This has led political decision makers and international aid practitioners to look for alternatives to finance investment needs. Mobilization of domestic and external resources through capital markets is now urgently called for.

Viewed in this light, associated with a number of government experiences of severe budget constraints, an appropriate framework for domestic urban sanitation sector pricing, tariffs and contracts is therefore required not only to achieve an efficient allocation of scarce resources, but also to maintain the long-term financial sustainability of utilities and sanitation service undertakings, and to attract private sector, and possibly external capital, to the sector to the extent possible. In pricing, there would be two key objectives: (i) tariffs should be sufficient to provide for the financial viability of the urban sanitation services and undertakings and generate a sufficient surplus to allow for their financing a significant part of their own investment programs in the years to come, and (ii) prices should be set at levels which encourage efficient use of service capacity and avoids wasteful consumption.

On account of the above, this section briefly reviews the microeconomics principles of pricing to achieve the policy objectives above, thus making it possible to review an allocative efficiency-oriented tariff structure for the power subsector in Turkey.

3.1.2 Microeconomics Background

The purpose of an economic system is to allocate the scarce resources of an economy to the production of goods and services for the use of individuals in the society. In a mixed economy, such as that of Turkey, two primary mechanisms are relied upon to fulfill the said task, vis-à-vis, the market pricing system by which private sector business undertakings respond to prices determined by the demand and supply levels in individual markets and undertake that level of economic activities in their own self-interest, and the public sector decisions through which a significant share of the resources of the economy will be directly and indirectly allocated by government expenditures, taxes, regulations and any other measures relevant. While a rationale for public sector activities has been well recognized and stressed by a number of economists and policy decision makers, particularly after

the days of the Great Depression in the United States in the early 1930's with the epoch making works in economics by J. M. Kaynes, this section will confine the discussions to the effectiveness of the market pricing mechanism in resource allocation in society.

(1) Pareto Optimality (Allocative Efficiency Criterion)

Ever since Adam Smith's time the virtue of the competitive market system as a mechanism for the allocation of scarce resources have been perceived. In competitive markets where self-interested individuals and firms would freely buy and sell at given prices, all participants will be better off from voluntary trading and the aggregate value of outputs produced from society's resources will be maximized. Much of the fields of welfare economics has been devoted to refining these concepts of social gains from trade, comparative advantage, and welfare maximization under the general axiom of economic efficiency. Central to an understanding of this modern welfare economics is Pareto Optimality, with a Pareto Optimum being defined as a state of affairs such that no one can be made better off without at the same time making at least one other person worse off[49]. This notion is depicted as follows:

Let general social welfare function be

$W=W(y_1, y_2,.....,y_n)$, where y denotes individual's welfare (well-being) in a society.

Pareto condition is that $W^A \geq W^B$

$$\text{if} \quad y_1^A \geq y_1^B, \cdots\cdots\cdots, y_n^A \geq y_n^B \quad for \quad \forall i$$

$$\text{and} \quad y_1^A > y_1^B, \cdots\cdots\cdots, y_n^A > y_n^B \quad for \quad \exists i$$

In the context of the economy, a Pareto Optimal allocation among uses exists if it is not possible to allocate reallocate resources so as to improve utility (well being) of one person/entity without at least reducing utility level of one other person/entity. Further, a change in resource allocation is said to constitute a Pareto Improvement if at least one person/entity is made better off as a result of the change and no one is worse off. With this, a change in resource allocation among arbitrary uses will be

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[49] The concept is named after the Italian economist Vilfredo Pareto who pioneered the theory of economic welfare. See V. Pareto, *Manuel D'Economie Politique*, 1909, chap.VII, and the Mathematical Appendix para.89.

judged by economists if a situation of economy under a certain set of resource allocation be "good" or "bad"[50]. In other words, an efficient allocation of resources is defined as a Pareto-Optimum one, it is not possible to make anyone better off without at a same time making someone else worse off. Similarly, a gain in economic efficiency is equivalent to a Pareto Improvement. The underlying theorem here is that Parerto optimum is a "necessary and sufficiant condition" of the equilibrium point in perfectly competitive markets, thereby providing a rational for marginal cost pricing.[51]

(2) Marginal opportunity cost pricing

With the standard allocative efficiency considerations in view, it is useful to obtain an indication of the benchmark level at which the price should be set. A number of papers have been written on the efficient ways to set prices on different goods and services, and production factors. In this section, a bird's eye view of the concept of marginal cost pricing and the current state-of-the-art to approximate it when financial sustainability and economic viability of development projects are to be evaluated.

Meanwhile, it would be noteworthy to delineate the concepts of "marginal opportunity cost (MOC) pricing" and "marginal cost (MC) pricing" used in the Report. While MOC pricing emphasizes the cost of consuming scarce resources in the light of the opportunity foregone by that consumption. On the measurement side, MOC denotes the shadow price of supply with a good deal of distortions in most of the economies worldwide, whereas MC pricing is used in lieu of the annuitized cost accrued to an investment project, inter alia, construction costs and recurrent costs. I this context, MOC pricing is most relevant to the economic analysis of development projects whereas MC pricing to the financial analysis therein.

A crucial distinction here is between marginal cost within a given capacity of the

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[50] As noted, the concept of Pareto Optimality is the normative basis according to which the allocation of resources is to be judged. Therefore, it shall be accepted as a basic value judgment that any Pareto-improving change constitutes an improvement in social welfare.

[51] One of the most important problems in welfare economics arises when judgment as to whether the change improves society's economic welfare involves interpersonal comparisons between the gainers and losers. That is, given that society's welfare consists of the aggregate welfare of individual members, it would be imperative to attach quantifiable weights to the gains and losses of welfare to individuals from a change in resource allocation. See, A. Bergson," A Reformulation of Certain Aspects of Welfare Economics", *Quarterly Journal of Economics*, Feb. 1938, O. Lange, *The Foundations of Welfare Economics, Econometrica*, July-Oct 1942, and P. Samuelson, *Foundations of Economic Analysis*, Chap. VIII, 1948. As regards the issues of economic welfare, optimum allocation of resources, interpersonal comparisons of utility, and others, see, for example, A.C. Pigou, *Wealth and Welfare*, 4th ed.,1932, L. Robbins, *An Essay on the Natural and Significance of Economic Science*, 2nd ed., 1935

system, and that allowing for capacity expansion. For small additions of supply in a certain period requiring no additional capital investment, the marginal cost is defined as short-run marginal (opportunity) cost (SRMOC), while a large amount of capital investment takes place intermittently over the long period, say 30 to 50 years, it is circumscribed as long run marginal (opportunity) cost (LRMOC). In practice, a smoothing of short-run fluctuation of incremental investments can be obtained by calculating LRMOCs and averaging them over time. This average can be defined as the incremental cost of all adjustments in the system expansion plan and operations, attributable to an incremental increase in demand.

When looked more closely,

LRMOC = MC of construction + Recurrent Cost (Fuel, and Operation and Maintenance costs)

The origins of marginal cost pricing theory date back as far as the works of P. Dupuit and subsequently H. Hotelling, in the 1930's[52]. N. Ruggles provided a comprehensive review of work in this area up to the next decade, and the theory developed, especially for the application of in the electric power sector, with contributions from the works of M. Boiteux, P. Steiner and others from the 1950's onwards[53]. More recently, the academic interest has led to more sophisticated investment models which permit determination of marginal costs, consideration of uncertainty, developments in peak load pricing, and so forth. On the practitioner's side, a number of contribution has been made by the economists of the international lending agencies, namely, M. Munasinghe, J. Warford, Y. Albouy, and others[54]. Backed up with these and others, the rationale for setting price equal to marginal cost to consequently attain the maximum economic welfare level will be clarified in this section.[55]

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[52] P. Dupuit, "De l'Utilite et de sa Mesure", *La Reforma Soziale*, Turin, 1932, H. Hotelling, "The General Welfare in Relation to Problems of Railway and Utility Rates", Econometrica vol 6, 1938, pp. 242-269

[53] N. Ruggles, "The Welfare basis of the Marginal Cost Pricing Principle", *Review of Economic Studies* vol.17 (1949/50), pp. 29-46, and "Recent Developments in the Theory of Marginal Cost Pricing", *Review of Economic Studies*, vol.27(1949-50), pp.107-126. See for example: M. Boiteux, "La Tariffication of des Demandes en Pointe, Revenue Generale de l'Electricite", vol. 58, 1949, P. Steiner, "Peak Loads and Efficient Pricing", *Quarterly Journal of Economics*, 1957, R. Turvey and D. Anderson, *Electricity Economics*, Johns Hopkins University Press, 1977

[54] For example, see M. Munasinghe, *Guidelines for Marginal-Cost Analysis of Power System*, WB, 1984, M. Munasinghe and J. Warford, *Shadow Pricing and Power Tariff Policy*, WB, 1978, J. Warford, *Marginal Opportunity Cost Pricing: Municipal Water Supply* (Early Draft), 1994, Y. Albouy, *Marginal Cost Analysis and Pricing of Water and Electric Power*, Inter-American Development Bank, 1983, and many others.

[55] In economics, LRMOC is defined as the amount by which aggregate costs are changed if the volume of output is increased or decreased by one unit. Frequently in accounting, marginal cost is used when strictly one should refer to average variable cost, which are not incurred if production does not take place. Ref: W. Hingley *Accounting*, Made Simple Book, 1989, p. 302

The rational for setting price equal to marginal cost may be clarified in mathematical terms as follows:

Net Benefit (NB) = Total Revenue (TR) - Total Cost (TC)

The necessary first order condition for maximizing net social benefits is to set the derivative of the net benefit function at zero, that is numerically such as:

$$NB(Q)=TR(Q)-TC(Q)$$
$$=p(Q)*Q - TC(Q)$$
$$(d/dQ)NB = ((\partial p/\partial Q) * Q + p) - \partial TC/\partial Q = 0$$
$$(1/((\partial Q/\partial p) * (p/Q))) + p = \partial TC/\partial Q$$
$$p(1 + 1/\varepsilon) = \partial TC/\partial Q$$

where p, Q and ε denote the price (the equation of demand schedule), quantity of supply (the equation of supply schedule) and price elasticity of supply which is mathematically depicted as $(\partial Q/\partial p) * (p/Q)$, respectively.

Provided that $\varepsilon = \infty$ under the assumption of perfectly competitive market,

$$P = \partial TC/\partial Q$$
$$= \text{Marginal Cost}$$

It is one of the basic axioms of economics that at the price p and supply (demand) Q, the total net benefit of consumption attributed to society is maximized with the optimum market clearing point (p,Q).

In a simple and static model of pricing, an economically efficient equilibrium price has the three invariable characteristics as such that (i) it will clear the market in terms of demand and supply, (ii) it will encourage additional production or exploitation whenever the expected costs are less than the expected value of incremental supplies, and (iii) it discourages "wasteful" consumption on the demand side.[56]

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[56] In theory, after having computed the basic shadow priced marginal costs as the benchmark for tariff setting, decision would be made to deviate from such "strict LRMC values" while reflecting decision makers' value judgment concerning other policy objectives, vis-à-vis, equity, financial sustainability, and preferential deployment of resources to specific sectors/regions. In addition, a "second best" departure from the "first best" LRMC pricing policy would be required where prices elsewhere in the economy do not reflect marginal social opportunity costs. Nonetheless, the discussions on this "optimal departures from marginal cost pricing" specifically for the Project has not been included largely due to the hypothetical nature of the issue, and the lack of information and time.

(3) Estimation of marginal opportunity costs

The model presented so far has been deliberately idealized and simplified to clarify the basic principles involved. While the marginal cost is an important pricing guidepost subject to a certain range of conditions, it is highly conceptual and there would be no data readily available for the estimation of future supply and demand schedules, thereby making it difficult to readily estimate in practice yet maintaining theoretical rigidity. Thus, a seek for proxy for the strict LRMOC, though indicative, has been initiated and sorted out mainly by power economists, as previously noted, since the 1950's.

In welfare economics and its applied segment of investment decision theory, in particular, the most commonly used variant of this theoretical concept is a levelized annuity cost plus recurrent cost over a fixed period of time. Specifically for the Project under the current study, it is defined that the required long-run marginal opportunity cost of supply of the sanitation subsector services in question is the cost of advancing one unit of services (sewerage treatment and solid waste management), which may be estimated in terms of the cost per cubic meter treated/managed, annuitized over the expected project period. Further in estimation, capital recovery factor (CRF) which is a function of the opportunity cost of capital (denoted by i) and project life (n) to estimate the levelized annuity cost.[57]

Thus, a numerical expression will be:

LRMOC = TC * CRF(i, n) + annual recurrent cost

where TC denotes the total capital investment cost, while CRF is depicted as:

$$\text{CRF}^{58}\ \frac{i(1+i)1^n}{(1+i)^n-1}$$

With this, objective of efficient pricing of goods and services is that prices should reflect the true economic opportunity costs of using scarce resources.

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[57] Another variant of MC widely used is the Long Run Average Incremental Cost (LRAIC) with its short accessibility to the relevant information and data. In theoretical terms it may not be correct nonetheless it is useful as an approximation. Mathematically it is expressed as LRAIC = [(Σ I/(1+i)t)/ (Σ Q/(1+i)t)] where *t* is a year in a project period (*t*=1,2,....,*n*), whereas *i*, I and Q denote a discount rate,an incremental investment and an incremental supply, respectively.

58 CRF is defined as a summation of depreciation (represented by a sinking fund factor) and opportunity cost of capital (of inflation rate), which is mathematically depicted as follows:

$$\frac{i(1+i)^n}{(1+i)^n-1} = \frac{i(1+i)^n+i-i}{(1+i)^n-1} = \frac{i[(1+i)^n-1)+i}{(1+i)^n-1} = \frac{i}{(1+i)^n-1}+i$$

(4) Average cost pricing

There would be a discussion regarding the overall rationale for the use of average cost pricing in lieu of marginal cost pricing where public utility prices be made everywhere equal to marginal cost. By far the most important considerations that conflict with the strict application of marginal cost pricing is the need for revenues where average cost decreases as output increases R. Coase, a Nobel-prize laureate at economics in 1990 and a partial advocate of average cost pricing, once discussed the issue in the context of general welfare loss and tax incidence in a society in such a way that "average cost pricing may sometimes prevent something being done which ought to be done, but it is also a means of avoiding errors which would certainly made if a policy of marginal cost pricing were adopted, and there is the redistribution of income which would occur and which could not be rectified without producing the same disadvantages which it is the aim of marginal cost pricing to avoid."[59]

Notwithstanding, in line with the generally accepted methodological frameworks and guidelines for economic appraisal of projects, Long Run Marginal Opportunity Cost (LRMOC) pricing reflects the practitioners' major concern with the amount of future resources used by consumer decisions, whereas Average Cost pricing represents the traditional accounting approach which is the recovery of sunk costs.

(5) Shadow pricing

In the idealized world of perfect competition, the interaction of atomoistic profit maximizing producers and atomoistic utility maximizing consumers gives rise to a situation where, for a given income distribution, no one can be better off without making someone else worse off, vis-à-vis, Pareto Optimal. In this state, prices reflect the true marginal social costs, scarce resources are efficiently allocated to maximize the total output in a society. Nonetheless, conditions are likely to be far

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[59] R. Coase, "The Theory of Public Utility Pricing and Its Application", *Bell Journal of Economics and Management Science*, Sep. 1970 pp.113- 128. Citing the advocating article of marginal cost pricing by Hotelling (op cit.,1938), Coase pointed out the possible weakness attributable to marginal cost pricing as follows: (i) this policy proposal does not take into account the stimulus to correct forecasting of having a subsequent market test whether consumers are willing to pay the total cost, (ii) it ignores the probable effects on the administrative structure, with state enterprise superseding private enterprise and centralized operations superseding decentralized operations, (iii) it involves a redistribution of income in favor of consumers of products produced in conditions of decreasing costs, and (iv) it failed to take into account the misallocation of resources resulting from the additional taxation necessitated by the subsidies (p.113). To articulate, Coace discussed that while "marginal cost pricing certainly allows a better choice at the margin than average cost pricing", but "this disadvantage of average cost pricing would be reduced and might be offset if marginal cost involved increased income taxes (p.120). Further, it would be interesting to note that "the argument for marginal cost pricing, like many propositions in modern welfare economics, is more concerned with diagrams on a blackboard than with the real effects of such policies on the working of economic system" while Coase refers to this type of economics as "blackboard economics" (p.119).

from that hypothetical and idealistic model of perfectly competitive market due to a good deal of prevalent distortions in the economy[60] , thus making it inevitable to substantially diverge from market (or financial) prices for goods and services. Hence, the use of appropriate shadow pricing will be necessitated in designing and evaluating the economic feasibility of the optimal investment programs.

While avoiding mingled procedures to estimate conversion factors for each of the goods and services, and production factors, shadow pricing will take place in a way that: transfer payment which is a shift of claims on real resources from one member or sector of society to another without any change in the national income will be excluded. The use of standard conversion factor (SCF) is considered to convert the market value of the Project components to its value in shadow prices expressed in terms of border currency units. Specifically in this Project, value added tax (VAT) corresponding to 10 percent of the local currency cost components will be deducted, and subsequently the SCF of 0.9 will be applied. [61]

3.1.3 Estimates of marginalcosts

Thus far the background economics theory and the current state-of-the-art for the approximation of marginal costs have been articulated. In the context of this, marginal costs have been estimated based on the major numerical assumptions as follows.

Capital Investment Costs (Full Cost Recovery): Of the total, Rp.92.9 billion (US$ 41.3 million equivalent), Rp.13.1 billion ($5.8 million) and Rp.64.5 billion ($30.8 million) inclusive of physical and price contingencies have been allocated to the wastewater, septage management, and solid waste sub-components, respectively, combining to a total of Rp.170.5 billion ($77.9 million). Base costs are all estimated as per 1995 price.

Capital Recovery Factor (CRF): With the discount rate of 10 percent over the 20 years of expected project life, CRF used to annuitize the capital investment costs is 0.1175.

Direct Beneficiaries: Assumptive numbers of direct beneficiaries used as a proxy to attain the cost of advancing one unit of the urban sanitation services concerned are 225,000, 1,300,000 and 1,350,000, for wastewater, desludging and solid waste,

[60] Distortions are largely due to monopoly practices, external economies and diseconomies (which are not internalized in the private market), interventions in the market process through taxes, import duties and subsidies, and so forth.
[61] 0.9 is the estimate of SCF currently in use by the World Bank.

respectively. Further, "entity" as a unit of beneficiaries includes households which assume 5.5 persons as members, private sector business undertakings, and public facilities.

Shadow Pricing: As previously noted, value added tax (VAT) corresponding to 10 percent of the local currency cost components is being deducted, and subsequently the SCF of 0.9 is applied considered to convert the market value of the Project components to its value in shadow prices expressed in terms of border currency unit. The foreign cost components of the Project are assumed to have been expressed at border prices, inter alia, CIF for the importables and FOB for the exportables.

Although indicative, the marginal costs and recurrent cost to supply one additional tonnage of wastewater treatment, septage management and solid waste collection and management in the forthcoming years till 2015 have been figured out to be around Rp.720.0 ($0.32), Rp.73,125 ($32.5), and Rp.41,400 ($18.4) per ton annually, respectively. The shadow priced marginal opportunity costs plus recurrent costs for the same sub-components are calculated to be Rp.630 (US$0.28), Rp.64,462 ($28.7), and Rp.36,900 ($16.4) per ton per year in that order, respectively.

Table 5.3.1-1: Financial Marginal Costs and Shadow Priced Marginal Opportunity Costs (Rp./ton/year)

	Wastewater	Septage Management	Solid Waste
Financial Marginal Cost	Rp.720 ($0.32)	Rp.73,125 ($32.5)	Rp.41,400 ($18.4)
Shadow Priced MOC	Rp.630($0.28)	Rp.64,462 ($28.7)	Rp.36,900 ($16.4)

3.2 Indicative Tariff Structure

3.2.1 Introduction

An appropriate framework for pricing (ratesetting) will be required not only to achieve an efficient allocation of resources, but also to maintain the long term financial sustainability of sanitation service undertakings to maintain the quality of services at a reasonable level, thereby enhancing the customer's willingness to meet their payment obligations and attracting a private sector participation possibly envisaged in the sector. In view of this, while referring to the tariff structure currently in use for the solid waste management service in the city, each of the

segments mostly relevant to the framework of tariff structuring and the proposed tariff structure, though indicative, will be summarized in this section.

In so doing, it would be noted that, in general, tariff structuring is undertaken based on the cost-of-service approach where considerable attention be given to clarify cost accounting items (operating/non-operating direct/indirect costs) incurred during daily operation of service undertakings. The Report, notwithstanding, does not present a detailed ratesetting framework which could be instantaneously replaced for the somewhat complicated tariff structure currently in use due to critical shortage of time and relevant data.

3.2.2 Tariff policy objectives

On account of the government policy to further proceed with financial decentralization in the urban sanitation sector development, the government strategy is directed to towards providing a level of service which the consumers have the ability to pay for, associated with a principle of full cost recovery after the reasonable period of time.[62] Under the new framework, operation/maintenance (O/M) costs, upon meeting debt service payments, will be fully covered by tariff in the short term, and possibly O/M costs plus depreciation after a reasonable period, say, a couple of years. In other words, the objective behind the tariff restructuring will be to achieve a break-even financial position at the outset, and possibly to the extent the undertakings could retain profits for investment expenditures to come. In line with this, the total future costs of supply will be allocated to each of the beneficiary categories in proportion to their affordability, and hence, the tariff would be raised, as appropriate, to enhance financial viability of the public service undertaking for efficient and effective operations as well as to curb the unnecessary excess demand.

Tariff will be made progressive (cascade tariff structure) with the explicit equity consideration that the poorer are cross-subsidized by the richer segment of the society. Numerical assumption for the benchmarked cross-subsidy from the economically affluent segments to the distressed ones will be that lower incomers will not to pay a higher proportion of their income on the sanitation subsector services concerned than the rich.

[62] Ref.: ADB *Water Supply and Sanitation Sector Study*, Main Report, 1990, p.109.

3.2.3 Tariff structuring framework

(1) Tariff design principles

Tariffs should be understandable, practical to apply, and viewed as fair by consumers,

Tariffs should allow the service undertakings to earn enough money to provide the quality of service at the required level by consumers,

Tariffs should be stable, and should permit consumers to plan for the long-term in making their investment decisions, and

Tariffs should promote economic efficiency, reflecting the true opportunity costs of consuming an extra scarce resource to society.

(2) Tariff design concept - "Harga Pokok"

As is in the case for the water tariff policy, "Harga Pokok" which is a cost-related benchmark being defined as the total revenue requirement divided by the volume of services produced and/or divided by the unit of beneficiaries[63]. Under the current study, Harga Pokok is equivalent to the marginal costs per domestic (household) users and per floor area with relevancy to commercial/industrial entity and public facility. Given that services are being provided for which customers will financially cover regardless of their actual disposal, ratesetting will simply consider the costs to be recovered and allocated the beneficiaries with due recognition of their affordability which is envisaged to be around 1 percent of income for sewerage and around 2 percent for solid waste, respectively.

(3) Beneficiaries classification and cost allocation weights

Direct Beneficiaries: Assumptive numbers of direct beneficiaries used as a proxy to attain the cost of advancing one unit of the urban sanitation services concerned are 225,000, 1,300,000 and 1,350,000, for wastewater, septage management and solid waste management, respectively. With this, it is further assumed that there exist the beneficiary households associated with the Project scope standing at around 40,900, 236,400, and 245,500, given that each of the household comprises 5.5 family members in average.

Unlike the case of domestic households, there has been no data available regarding

[63] Ref.: USAID, *Water Tariff Policy in Indonesia*, 1994, p.11

the number of commercial/industrial and public facilities within the Project area. Thus, floor area of each of the establishments in the area will be applied as a proxy to estimate the direct beneficiaries.

Based on the field survey carried out by the Team in 1995, the tariff-chargeable floor areas by beneficiary categories among commercial/industrial entities and public facilities relevant to the Project scope are assumed to be 431,696 sq. meters, 67,435 sq. meters, and 366,320 sq. meters for small and medium scale business entities, large scale business undertakings and public facilities, respectively. These figures are taken up from the year 2005 estimates as mean values over the project period.

Income Distribution: The income distribution of the city residents is highly deviated with the positive skewness of 1.8. With this, around 45 percent of the total population falls to the annual income of less than Rp.200,000 per month followed by 35 percent of medium incomers and 20 percent of the affluent people under Rp.450,000 per month and above, respectively. It is assumed that income distribution of the residents associated with the Project be identical to that of city residents as a whole. (Table 3.3)

Beneficiaries Classification and Welfare Weights (Cross-Subsidy): Domestic (household) users are classified as lower (referred to as R-1), medium (R-2) and higher income (R-3) groups with each of these attributed to the 0-45th percentile, 46-80th percentile and the residual of the total population. Commercial and industrial entities are divided into two sub-categories with the small and medium sized (BE-1), and the large scale entities (BE-2). A cohort comprising public entities (PE) is treated as an unit sub-category without any subdivision.

The welfare weights associated with the full cost recovery principle are specifically allocated to each of the beneficiary groups, as summarized below. With this, cross-subsidization is triple-folded, that is, in the sewerage subsector, (i) households cover 50 percent of the total financial burden while enjoying 70 percent of project benefit, thereby being subsidized by business entities, (ii) a higher income group subsidizes a lower income group with a half of the costs associated with the total household portion whereas the population share is as little as 20 percent, and (iii) large scale business entities with the floor share of 8 percent bear the financial burden of 30 percent of the costs attributed to the entity segment. As for the solid waste management subsector, the same consideration has been made with the specific cost allocation and cross-subsidization as follows. (i) households

cover only 50 percent of the total financial burden while enjoying 70 percent of project benefit, thereby being subsidized by business entities, (ii) a higher income group subsidizes a lower income group with a little bit less than a half of the costs associated with the total household portion whereas the population share is as little as 20 percent, and (iii) large scale business entities with the floor share of 8 percent bear the financial burden of a quarter of the costs attributed to the entity segment.

It would be noted that the middle income group of households and public entities are to share the financial burden in proportion to each of the share of presence.

Marginal costs: As previously estimated in 5.3.1 above, the levelized annuity costs to readily meet the financial obligation inclusive of debt service will reach at Rp.3.3 billion ($1.46 million), Rp.2.0 billion ($0.90 million), and Rp.11.6 billion ($5.14 million) for wastewater, septage and solid waste subcomponents, respectively.

Affodability: Provided that the maximum amount to pay for the tariffs accrued to the sanitation services concerned are generally accepted at 1 percent, 0.75 percent and 2 percent of disposable which accounts for 90 percent of the total income for wastewater, septic management, and solid waste management, respectively, the "bid prices" at the highest, or "willingness to pay" for wastewater, septage management, and solid waste management services are summarized as follows.

Willingness to Pay (Rp./month)

	R-1	R-2	R-3	BE/PE
Wastewater	1,440	3,040	64,000	98,900
Septic Management	1,080	2,280	4,800	74,200
Solid Waste	2,880	6,080	12,800	197,800

Thus far the indicative parameters for ratesetting are sorted out, and will be summarized herewith.

Key Parameters for Ratesetting regarding the Sanitation Services Concerned

	R-1	R-2	R-3	BE-1	BE-2	PE
Weights (Sewerage)	8 %	18%	25%	15%	15%	20%
Weights (Solid Waste)	10%	18%	23%	18%	12%	20%
of Household				-	-	-
Wastewater	16,400	12,700	7,300	-	-	-
Septage	13,900	10,800	6,200	-	-	-
Solid Waste	110,450	85,910	49,100	-	-	-
Floor Area	-	-	-	431,696	67,435	366,320
Annual Cost Share (Rp.m/yr)						
Wastewater	246	575	821	493	493	657
Septic Management	152	354	506	304	304	405
Solid Waste	1,157	2,024	2,602	2,082	1,388	2,313

3.2.4 Indicative tariff structure

In view of the foregoing, the following ratesetting will be indicated. It would be noted that, in general, tariff structuring is undertaken based on the cost-of-service approach where considerable attention be given to clarify cost accounting items (operating/non-operating direct/indirect costs) incurred during daily operation of service undertakings. The Report, notwithstanding, does not present a detailed ratesetting framework which could be instantaneously replaced for the somewhat complicated tariff structure currently in use due to critical shortage of time and relevant data.

Indicative Monthly Tariff per Entity/per sq. Meter for Full Cost Recovery

	R-1	R-2	R-3	BE-1	BE-2	PE
Indicative Tariff	per HH	per HH	per HH	per sq.met	per sq.met	per sq.met
Wastewater (Rp.)	5,459.3	12,283.3	27,637.5	418.8	1,788.4	548.7
Desludging (Rp.)	215.5	483.9	1,088.8	95.3	407.1	124.9
Solid Waste(Rp.)	872.5	1,963.2	4,417.2	401.6	1,715.0	526.2

Now that the tariff for wastewater indicated above place high above willingness to pay for households, it would not be acceptable to access the Project scope to be affordable. As for business entities, the monthly weighted average tariff per sq. meter is Rp.624.3 with the afore-mentioned share of floor area and the tariff set

forth to each of the business entities as given. Let the average willingness to pay for wastewater services provided be about Rp.100,000 per month, thus making the "maximum average floor area per entity" stand at 160 sq. meters. With this and all other factors as given, the average floor area of business entities in the city is most likely to be more than 160 sq. meters, thereby making it impossible to appraise the proposed services to be feasible and affordable, accordingly.

4. Financial Analysis

4.1 Introduction

The projects proposed under the study is subject to financial analysis that includes an assessment of financial viability (profitability) of revenue-generating components over the specified project life. The specific indicators and the indicative cut-off rate as borne out by financial internal rate of return (FIRR) will be used to measure and subsequently assess the overall financial sustainability. With a view to self-financing future investment costs while enabling the prospective sanitation service undertaking (s) to meet debt service obligations, revenue-earning undertakings will be expected to generate FIRR reasonably equivalent or close to the current opportunity cost of capital of about 8-10 percent[64]. In keeping with generally accepted guidelines for financial analysis, the financial costs/benefits used in the computation of FIRR will be in constant early 1995 prices. Further, the capital costs will be reconcilable with the base costs and physical contingencies, but with the exclusion of price contingencies and interest during construction.

While it is pertinent to investigate the financial positions of the municipality level units or participating agencies with a bearing on the accounting concept of "going-concern", projected financial statements and accounting analysis thereon were not prepared largely due the following reasons: (i) the current accounting and reporting system used by Dinas Kebershihan do not fully demonstrate its financial position because of lack of generally acceptable accounting principles and an appropriate management information system, (ii) time schedule to devise the institutional framework to come should further be elucidated.

4.1.1 Notes and assumptions

The basic assumptions used in the analysis include the followings: (i) project life. (ii) demographic and related factors. (iii) cost estimation (base cost plus physical

[64] The cut-off rate recommended by UNDP is 10%, which sounds too low with the current return of capital which ranges around 10-17 percent in view.

contingency), (vi) financial terms, (v) loan-grant mix, and (vi) tariff. The most relevant and detailed data/information, among others, are as follows.

(1) Project Cost

The total cost of the Project exclusive of possible interest during construction is estimated at Rp.170.5 billion (US$ 77.9 million equivalent as per 1995 price), with a foreign exchange and a local cost components of Rp.72.5 billion ($27.1 million) and $Rp.98 billion ($50.8 million), respectively. Of the total, Rp.92.9 billion ($ 41.3 million), Rp.13.1 billion ($5.8 million), and Rp. 64.5 billion ($30.8 million) are to be allocated to the wastewater, septage management, and solid waste sub-components, with each of these accounting for 53 percent, 7 percent, and 40 percent, respectively.

(2) House Connection

With a view to ensuring a consistent standard of construction, and to improving affordability of the sewerage service to lower-income users, provision for construction of individual household connections has been included in the Project cost.

(3) Contingencies

Reflecting expected increases in the base cost estimates of the Project(s) due to changes in quantities and methods of implementation, physical contingency allowances have been set at 5 percent of the base cost of each of the sub-projects. Further, in anticipation of increases in the base cost estimates of a project/projects due to changes in unit prices for the various project components/parts beyond the date of the base cost estimates, price contingency allowances have been set at 7 percent in 1996 and 6 percent in 1997 and thereafter of the base cost plus physical contingencies for the local cost expenditures and 2.7 percent for the foreign expenditures, respectively[65].

(4) Revenues

Tariff revenues based on marginal cost pricing rule are assumed to be the major source of income while capital works charge levied to newly constructed large scale, high-rise buildings in the project areas will be also taken into account. Nonetheless, other form of private sector involvement such as beneficiary's

[65] ADB estimates, PAI No. 1.3, Appendices 1,2, 1994

contribution (an one-shot charge to the prospective beneficiaries in the project areas on the right to connect their toilet facilities with major sewerage pipes) is set out of the revenue scope largely due to the political and social difficulties envisaged.

There hasn't been any explicit assumptions about tariff development over the Project period, thus implicitly assuming that there will be no change in real tariffs as per foreign exchange over the period concerned. In other words, the nominal tariff increase in rupiah term which would possibly take place during the Project period will be canceled out in respect of devaluation of the rupiah against the dollar and other major foreign currencies.

(5) Capital Works Charge

Rp.10,000 per sq. meter to the year 2005 and Rp.20,000 per sq. meter onwards. Various kinds of high-rise (with more than 5 stories being assumed) commercial/public building combining to a total of 10,000 sq meters per annum will be constructed in the city;

(6) Tariff

The following partial cost recovery tariff (O/M and house connection costs) will be set forth for each of the sanitation services concerned, while considering those full cost recovery ratesetting as politically and socially prohibitive.

Indicative Monthly Tariff per Entity/per sq. meter

Indicative Tariff	R-1 per HH	R-2 per HH	R-3 per HH	BE-1 per sq.m	BE-2 per sq.m	PE per sq.m
Wastewater (Rp.)	1,115.3	3,345.8	8,364.6	95.1	608.9	149.5
Septage (Rp.)	119.0	357.0	892.4	503	375.4	92.1
Solid Waste(Rp.)	872.5	1,963.2	4,417.2	401.6	1,715.0	526.2

4.2 Financial Internal Rates of Return (FIRRs)

Financial viability of the Project has been established by calculating a financial internal rate of return (FIRR) on the basis of the costs and benefits associated with the project. The cost flows consist of (i) capital investments for the provision of the sewerage and solid waste management services at a required level over the period of 1996 through 2015, excluding costs incurred prior to the afore-mentioned years (sunk costs), and (ii) the new and incremental operation and maintenance cost

of these facilities solid waste dumping sites.

The benefits comprise tariff revenues as borne out by the provision of wastewater, desludging and solid waste treatment services attributable to the investments during the fiscal year 1997 to 2000 for the sewerage and desludging, and to 2001 for the solid waste component. In addition, Capital works charge which leads to the city revenue at Rp.10,000 per sq. meter to the year 2005 and Rp.20,000 per sq. meter onwards is taken into account.

The FIRR of the investment plan with all costs and benefits expressed as per 1995 price level, is estimated at 11.4 percent inclusive of the two sub-components, inter alia, the sewerage and the solid waste subsectors. Divided into each of the sub-projects, FIRRs worked out to 10.5 percent and 12.7 percent for the sewerage and the solid waste sub-sectors, respectively. With the current opportunity cost of capital standing at around 8 to 10 percent, the FIRRs for the Project are to exceed the real cost of Project capital, thereby making it possible to evaluate the Project as financially viable. A summarized net cash-flow table is given as attached *(Table 3.4)*.

Provided that, in liue of marginal cost pricing, the Project benefits are measured by willingness to pay of the prospective beneficiaries and the tariff currently in use for solid waste, the FIRR calculation has no solutions because of the excessive cost streams over the project period.

5. Economic Analysis

5.1 Economic Internal Rates of Return (EIRRs)

Economic analysis of the Projects under the study has been quantitatively carried out wherever possible while taking into account a number of economic, social and environmental benefits accrued. The economic internal rates of return (EIRR) have been expeditiously estimated with the marginal cost-based tariff and the shadow priced project costs. Besides, reduction of morbidity rates, especially for waterborne diseases and infant mortality rates has been contemplated to intuitively measure its benefit in monetary term. To date, an overall values of real estate in the city boundary have not been experienced any price-hike to the extent, thus make it unlikely to present a rationally estimated land value-hike in the future. Thus, the secondary and tertial project benefits which would possibly take place in the wake of the Project completion[66] have not been taken into account.[67] Methodology of

[66] Indirect benefits accrued to the Project would be, for example, further investment of external funds to the city