9. FINANCIAL ASPECTS

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9.1 Background

Repelita V (1989-1994) sets forth the development target of 1,400,000 l.u. throughout Indonesia and about 600,000 l.u. in Jabotabek. The total investment fund required to achieve 1,400,000 l.u. is estimated to be about Rp. $5,768 \times 10^9$ 1/. The actual investment realized during Pelita IV, on the other hand, amounted to Rp. $1,765 \times 10^9$, comprising Rp. 673×10^9 foreign currency and Rp. $1,092 \times 10^9$ local currency. **Repelita V, therefore, requires development fund more than three times larger than the fund raised during Pelita IV.** To realize this development target, it is necessary for PERUMTEL to look into new sources of development fund, external and internal, in addition to the fund sources on which PERUMTEL has depended until Pelita IV.

Under these circumstances, the Study analyzed financial aspects of the project focusing on the following items.

Possibility of new fund raising approach:
- revenue sharing or BOT (Build, Operate and Transfer); and
- subscriber bond.

Financial condition of:
- WITEL IV; and
- PERUMTEL.

1/ Estimated assuming:
- development cost per line unit : US$ 2,060
- exchange rate : Rp. 2,000/US$

9.2 Fund Raising

9.2.1 Revenue Sharing

(1) Present Condition

As a measure to raise fund for achieving the development target of 1,400,000 l.u. during Repelita V, POSTEL and PERUMTEL plan to promote a certain part of the target by revenue sharing (or "Pola Bagi Hasil") approach. By this method, it would be possible for PERUMTEL to mobilize private fund for implementing projects without additional financial burden.

During Repelita V, 100,000 l.u. are planned to be installed by revenue sharing in Jakarta. Private investors were invited to submit pre-qualification documents due February 1989 for this portion. Short-listing of investors and submittal of proposal for investment plan are scheduled to follow.

Conditions of revenue sharing are to be determined through negotiation between investors to be selected and POSTEL/PERUMTEL.

(2) Applicability of Revenue Sharing Approach to Telecommunications Sector

Projects in the telecommunications sector are in most cases those forming integral parts of the total telecommunications network. This aspect is a unique nature of telecommunications projects which distinguishes them from other types of infrastructure projects, particularly those for which the implementation by BOT approach[1/] is discussed and planned such as:

1/ ANNEX 9-1 presents background, examples, institutional relationship and the pros and cons of BOT approach in general.

- thermal power plant;
- tollroad;
- industrial estate;
- airport terminal;
- bridge; and
- tunnel.

These infrastructure facilities are suited for implementation and operation by the private sector, since they are highly independent of other facilities and separation from other related facilities does not involve problems both at implementation and operation stages. By taking responsibility in the implementation and operation, private investors could make an effort in minimizing investment and operation costs to maximize profit, though determination of tariff is often consulted with government offices and affected by government policies.

In the case of telecommunications projects, the application of revenue sharing or BOT approach is considered more difficult than for projects in other sectors due to a number of constraints such as follows.

a) There is a dilemma of who should be responsible for operating project facilities. Independent operation of the project should be limited from the viewpoint of maintaining consistency in operation and tariff level with the rest of the telecommunications system. Motive for private investors to participate in the project would, however, be reduced in the event that PERUMTEL takes responsibility of operating project facilities to maintain consistency. Private investors would not be able to make an effort to maximize profit except at implementation stage in this case.

b) There is a difficulty in defining revenue to be accrued to a project. Revenue is generated when a call is completed through a variety of facilities. Therefore, revenue generated should theoretically be accrued to the system as a

whole. Difficulty in separating out and calculating revenue from the project would work negatively in encouraging potential investors to participate in the project.

(3) Issues to be Considered

While difficulty in promoting telecommunications projects by revenue sharing approach is clarified, POSTEL and PERUMTEL are actually in the process of promoting 100,000 l.u. development by revenue sharing method in Jakarta. Considering this development, the Study tried to point out issues to be considered in promoting telecommunications projects by revenue sharing method. Following are the major issues to be considered.

a) To initiate and promote projects by revenue sharing smoothly, it would be essential for POSTEL and PERUMTEL to understand behaviors of private investors. Basically two motives are considered for private investors to participate in the telecommunications projects by revenue sharing: economic principle and non-economic principle. By economic principle, investors regard project by revenue sharing as an investment opportunity. They would seek to maximize profit from investing on project. According to this criterion, projects with financial internal rate of return (FIRR) higher than those of other investment opportunities (e.g. deposit interest rate of bank) are attractive. They would not participate in project with FIRR lower than those of other investment opportunities.

Non-economic principle is related with market share. Investors might participate in projects in order to enter into the telecommunication market in Indonesia or increase the market share. Some investors might give higher priority to this criterion and participate in projects with relatively low return.

In reality, there would be no investor behaving solely up to either one of the two criteria above. They would analyze projects considering the both aspects and make a decision, though relative priority given to each criterion would differ from investor to investor.

b) Private investors aim to maximize revenue from the project as a result of acting according to the economic principle of investment. They, therefore, would pursue gaining maximum proportion of revenue from the project. On the side of PERUMTEL, it would be important to assess the financial feasibility of promoting project by revenue sharing for PERUMTEL based on cash flow analysis just in the same way as private investors would do for making investment decision. In determining the extent to which PERUMTEL compromizes to investors, financial analysis for PERUMTEL in the long-run should play a major role. It might, for example, turn out that the project pays for PERUMTEL even if all revenue from the project goes to investor considering that investment cost is borne by investor and the facilities shall be transferred to PERUMTEL after an agreed period of time.

c) Experiences in BOT in other countries and sectors are useful in grasping the items to which private investors pay particular attention. Private investors usually regard the items such as following as essential:

- guarantee of repatriation of profits;
- tax exemption for importing materials and equipment;
- prohibition of development of competitive project;
- guarantee of no expropriation of project facilities; and
- consistency of policy regarding revenue sharing.

To make project attractive enough for investors, POSTEL and PERUMTEL should consider providing the measures above in consultation with other government offices such as BAPPENAS and the Ministry of Finance.

9.2.2 Subscriber Bond

(1) Present Condition

PERUMTEL has a plan to issue subscriber bond in the near future as a measure to raise development fund. It is anticipated that the system might possibly be introduced in 1990 or 1991 provided that 1988 or 1989 financial statements of PERUMTEL be given unquestionable opinion by state auditor.

(2) Concept of Subscriber Bond

The objective of subscriber bond is to raise development fund in local currency. After the introduction of subscriber bond, an applicant for telephone installation is obliged to purchase subscriber bond in addition to installation charges. After the purchase of the bond, he can sell the bond in the secondary market or keep the bond until the redemption period is over when his bond is redeemed with interest added to the face value of the bond.

For reference, Fig. 9.1 shows the process of NTT subscriber bond from application for to installation of telephone. ANNEX 9-2 presents experience of Japan in raising fund through issuing subscriber bond.

(3) Condition of Subscriber Bond

The conditions of subscriber bond is planned by PERUMTEL as follows.

- Target:
  New applicants for telephone service (excluding existing subscribers) in the 7 major cities: Jakarta, Bandung, Semarang, Surabaya, Medan, Palembang and Ujung Pandang
- Interest:
  About 1% minus bank deposit rate which is 18 - 19% per year

- Target amount to be raised by the bond:
  Rp. 400 x 10^9 in 5 years
- Price of bond:
  Rp. 500,000 to Rp. 2,000,000/subscriber

(4) The Pros and Cons of Subscriber Bond

The pros and cons of subscriber bond are as follows.

a) Pros

- By subscriber bond, development fund could be raised at lower cost than loans from commercial banks.

- Long-term fund could be raised by subscriber bond. Loans from banks are generally in short term. Longer-term fund is more appropriate for investments on telecommunications facilities by PERUMTEL, since it takes a number of years for telecommunications projects before revenue begins to be generated.

- Issuance of subscriber bond would contribute to the development of security market in Indonesia. The Indonesian security market is still at the initial stage of development at present[1/]. Recently the number of companies entering into the security market tends to be increasing stimulated by the government's deregulation measures. The government's policy is to promote further growth of the security market to provide wider range of financial resources to the growing non-oil sector. Subscriber bond could reinforce this policy as a leading security considering its large amount and stability.

1/ Only seven companies were issuing bond as of October 1988. They are PT Jasa Marga, BAPINDO, Astra International, Bumi Daya IBJ leasing, Uppindo, East Java Bank and Papan Sejahtera.

b) Cons

- In the case of subscriber bond, it is difficult to mobilize a large amount of fund at short notice to meet immediate demand for fund, since fund is raised in response to application by new subscribers.

- Raising fund by subscriber bond involves complex administrative procedures. To manage the procedures, cooperation of trustee bank is indispensable.

(5) Issues to be Considered

Considering both the pros and cons of subscriber bond, the system is considered an effective measure to raise fund in local currency as a source of investment fund. In introducing the system, due consideration should be given to the following aspects.

a) Necessity of Public Enlightenment

People in general are not familiar with the concept of bond, let alone subscriber bond. Yet they are obliged to purchase subscriber bond when they apply for the installation of telephones. It is, therefore, necessary for PERUMTEL to provide sufficient explanation and information of the system to potential subscribers before introducing the system to avoid unnecessary confusions.

b) Improvement of Investment Performance

Investment on the new telecommunications facilities should be properly managed and promoted so that investment would smoothly and effectively lead to the generation of revenue. Improved investment performance is essential so as to carry out redemption of subscriber bond appropriately.

c) Improvement of Operational Performance

Operational efficiency should also be improved considering that subscribers become more sensitive to the performance of PERUMTEL after the introduction of subscriber bond.

d) Necessity of Sound Financial Management

Bond is a kind of debt meaning that PERUMTEL has to return the amount of fund raised in the future. In this sense, PERUMTEL has to take into account future cash flows concerning subscriber bond in formulating future investment plans and financial management plans.

Fig. 9.1 Process of NTT Subscriber Bond

9.3 Financial Conditions of WITEL IV and PERUMTEL

9.3.1 Introduction

Financial conditions of WITEL IV and PERUMTEL are briefly analyzed in this section. The objective is to grasp recent trend of financial performance of WITEL IV and PERUMTEL and examine directions for organizational and operational improvement. Under the circumstance in which PERUMTEL and WITEL IV are required to meet rapidly growing demand for telecommunications services, the analysis on financial aspects is particularly essential from the viewpoint of the generation of additional internal fund through efficiency improvement.

9.3.2 Financial Conditions of WITEL IV

Recent financial conditions of WITEL IV between 1985 and 1987 are summarized in Table 9.1. The following are the major findings.

(1) Revenue and Expenditure

a) Revenue grew at 20.9% per annum between 1985 and 1987, while expense increased at 16.6% per year during the same period. The operating ratio[1/] improved from 26.5% in 1985 to 24.7% in 1987.

b) Growth of revenue and expense are adjusted by consumer price index so as to get rid of impacts of inflation. Between 1985 and 1987, revenue in 1985 price level grew by 10.7% per year, while expense increased by 6.8% per year.

c) Profit in 1985 price level amounted to Rp. 291 x 10^9 in 1987, having grown 12.0% per year since 1985.

1/ Operating ratio is usually derived by dividing operating expenditure by operating revenue. In the Study, total expenditure was divided by total revenue to assess overall financial performance of WITEL IV.

(2) Labor Productivity

a) The number of personnel of WITEL IV was 7,511[1/] in 1987, constituting 18.2% of the total personnel of PERUMTEL. The rate of growth was 1.3% per year between 1985 and 1987.

b) Labor productivity of WITEL IV could be observed from profit in 1985 price divided by the number of employees. Profit in 1985 price per one employee grew from Rp. 31,694 x 10^3 in 1985 to Rp. 38,777 x 10^3 in 1987, which is equivalent to annual growth rate of 10.6%, indicating improved labor productivity of WITEL IV.

c) The number of personnel per 1,000 subscribers, an indicator to show efficiency of organization, was 25 for WITEL IV in 1987, whereas that of PERUMTEL was 53. This indicates high organizational efficiency of WITEL IV.

(3) Capital Productivity

a) Switching capacity (417,000 l.u.) and the number of subscribers (306,000) of WITEL IV in 1987 accounted for 41.1% and 39.5% of those of PERUMTEL respectively.

b) Switching capacity and the number of subscribers of WITEL IV kept rising at 19.7% and 18.7% per year respectively between 1985 and 1987. As a result, discrepancy between the switching capacity and the number of subscribers widened as shown by the number of subscribers - switching capacity ratio decreasing from 74.6% in 1985 to 73.4% in 1987, indicating larger proportion of the switching capacity was unutilized.

c) Capital productivity of WITEL IV, expressed in terms of profit per l.u. of switching capacity, (Rp. 833 x 10^3 per l.u.) was about six times larger than that of PERUMTEL (Rp. 137 x 10^3 per l.u.) in 1987.

1/ This figure includes guards, messengers, drivers, etc.

d) Capital productivity of WITEL IV deteriorated between 1985 and 1987 as shown by profit in 1985 price level per one l.u. below.

Year		Profit in 1985 Price (Rp. 10^3/l.u.)
1985	:	797
1986	:	733
1987	:	698

9.3.3 Financial Conditions of PERUMTEL

Recent financial conditions of PERUMTEL are summarized in Table 9.2. Following are the major findings.

(1) Revenue and Expenditure

a) Growth of revenue, 17.7%/year between 1984 and 1987, surpassed that of expense, 16.4%/year.

b) Operating ratio marked 85.8% in 1984, improved to 72.4% and 73.8% in 1985 and 1986 and deteriorated to 83.0% in 1987.

c) Profit in 1987 in 1984 price amounted to Rp. 111 x 10^9, which was more than 30% below 1985 and 1986 levels.

d) The number of personnel of PERUMTEL grew at 7.2% per annum between 1984 and 1987 reaching 41,198 in 1987.

(2) Labor Productivity

a) Labor productivity of PERUMTEL, expressed in profit in 1984 price per one employee, deteriorated from Rp. 4,527 x 10^3/employee in 1985 and Rp. 4,291 x 10^3/employee in 1986 to Rp. 2,700 x 10^3/employee in 1987.

b) The number of employees per 1,000 subscribers decreased from 62 in 1984 to 53 in 1987. The figure in 1987 is still

higher than those of ASEAN countries ranging between 10 and 35.[1/]

(3) Capital Productivity

a) Switching capacity and the number of subscribers grew at almost same rates between 1984 and 1987, 13.2% per year and 13.0% per year respectively. Switching capacity and the number of subscribers in 1987 numbered 1,013 x 10^3 l.u. and 774 x 10^3 respectively.

b) The ratio of the number of subscribers to switching capacity kept roughly constant, 76.8% in 1984 and 76.4% in 1987, indicating about 25% of the switching capacity remained idle.

c) Capital productivity of PERUMTEL, expressed in profit in 1984 price per one l.u. of switching capacity, deteriorated from Rp. 210 x 10^3/l.u. in 1985 and Rp. 199 x 10^3/l.u. in 1986 to Rp. 110 x 10^3/l.u. in 1987.

9.3.4 Implications

WITEL IV plays an important role in PERUMTEL with its revenue accounting for almost 57% of the total revenue of PERUMTEL. Considering that fixed assets and the number of personnel of WITEL IV account for only 25% and 16% of PERUMTEL respectively, the leading role of WITEL IV in terms of high investment and operational efficiency is observed. It could be said at the same time that problems faced by PERUMTEL reflect to a significant degree those of WITEL IV. In this sense, **the improvement of investment and operational efficiency of WITEL IV would contribute to the efficiency improvement of PERUMTEL as a whole.**

1/ The number of employees was 6 per 1,000 subscribers in Japan (NTT) in 1987.

The problems confronted by WITEL IV and PERUMTEL from the financial perspective could be summarized as follows.

WITEL IV:

- declining capital productivity.

PERUMTEL:

- declining labor productivity; and
- declining capital productivity.

To improve capital productivity, higher utilization of the existing switching capacity would be necessary. At present, only 73% and 76% of the existing switching capacities are utilized at WITEL IV and PERUMTEL respectively. These levels should be raised to about 90 to 95% through the expansion of subscriber cable networks that would increase the number of subscribers connected to the existing switches.

To improve labor productivity, the aspects of organizational restructuring and computerization should be duly considered. **Organizational restructuring could contribute to more efficient utilization of the existing manpower resources.** Centralization of operation and maintenance should be an important component of organizational restructuring as explained in Section 6.1, Institutional Framework.

Increasing demand for telecommunications service in the coming years should be dealt with by a limited number of personnel at WITEL IV and PERUMTEL. To achieve the development targets smoothly, more intense utilization of computers would be indispensable. Application of **computer-aided OSP[1/] administration** could play a major role in this aspect as explained in Section 6.3, Operation and Maintenance.

1/ OSP: outside plant

Table 9.1 Financial Condition of WITEL IV

Item	Unit	1985	1986	1987	1985-87 (%/year)
a. Revenue 1/	$Rp.10^6$	315,679	385,142	461,225	20.9
b. Expense 2/	$Rp.10^6$	83,646	119,306	113,759	16.6
c. Profit	$Rp.10^6$	232,033	265,836	347,466	22.4
d. Operating Ratio (b/a) 3/	%	26.5	31.0	24.7	3.5
e. CPI 4/	1985=100	100.0	109.2	119.3	9.2
f. Revenue in 1985 price: (a/(e/100))	$Rp.10^6$	315,679	352,694	386,609	10.7
g. Expense in 1985 price: (b/(e/100))	$Rp.10^6$	83,646	109,255	95,355	6.8
h. Profit in 1985 price: (c/(e/100))	$Rp.10^6$	232,033	243,440	291,254	12.0
i. Number of personnel 5/	no.	7,321	7,156	7,511	1.3
j. Profit/employee (c/i)	$Rp.10^3$/emp	31,694	37,149	46,261	20.8
k. 1985 profit/employee (h/i)	$Rp.10^3$/emp	31,694	34,019	38,777	10.6
l. Switching capacity	10^3 l.u.	291	332	417	19.7
m. Number of subscriber	10^3	217	247	306	18.7
n. No. subsc/switching cap (m/l)	%	74.6	74.4	73.4	-0.8
o. Revenue/SW cap. (a/l)	$Rp.10^3$/l.u.	1,085	1,160	1,106	1.0
p. Revenue/subsc (a/m)	$Rp.10^3$/subsc	1,455	1,559	1,507	1.8
q. 1985 revenue/SW cap (f/l)	$Rp.10^3$/l.u.	1,085	1,062	927	-7.6
r. 1985 revenue/subsc (f/m)	$Rp.10^3$/subsc	1,455	1,428	1,263	-6.8
s. Expense/SW cap (b/l)	$Rp.10^3$/l.u.	287	359	273	-2.6
t. Expense/subsc (b/m)	$Rp.10^3$/subsc	385	483	372	-1.8
u. 1985 Exp/SW cap (g/l)	$Rp.10^3$/l.u.	287	329	229	-10.8
v. 1985 Exp/subsc (g/m)	$Rp.10^3$/subsc	385	442	312	-10.1
w. Profit/SW cap (c/l)	$Rp.10^3$/l.u.	797	801	833	2.2
x. Profit/subsc (c/m)	$Rp.10^3$/subsc	1,069	1,076	1,136	3.1
y. 1985 Profit/SW cap (h/l)	$Rp.10^3$/l.u.	797	733	698	-6.4
z. 1985 Profit/subsc (h/m)	$Rp.10^3$/subsc	1,069	986	952	-5.7
aa. Empl/1000 subsc (i/m)	no./10^3subsc	33.7	29.0	24.5	-14.7

1/ Operating revenue plus non-operating revenue including international transactions

2/ Operating plus non-operating expenses

3/ Operating ratio usually indicates operating expense divided by operating revenue. In this table all expenses are divided by all revenues to indicate overall financial performance of WITEL IV. Operating expenses divided by operating revenues of WITEL IV are as follows:

	(%)
1985:	41.1
1986:	31.2
1987:	24.7

4/ CPI: Consumer price index, an indicator to show rate of inflation

5/ These figures include guards, messengers, drivers, etc.

Sources:

(1) Annual Fiscal Report of WITEL IV for 1985, 1986 and 1987.

(2) "Report on Realized Revenue" for 1986 and 1987. Revenues for 1986 and 1987 are based on this data obtained from WITEL IV. Financial reports of WITEL IV for 1984 and 1985 include revenue from international transactions, while those for 1986 and 1987 do not contain them. To maintain consistency, revenue for 1986 and 1987 are taken from "Report on Realized Revenue".

(3) PMC Main Task

(4) "Indonesia Adjustment, Growth and Sustainable Development", the World Bank, 1988

Table 9.2 Financial Condition of PERUMTEL

Item	Unit	1984	1985	1986	1987	1984-87 (%/year)
a. Revenue 1/	$Rp.10^6$	501,117	620,402	727,525	816,520	17.7
b. Expense 2/	$Rp.10^6$	430,039	449,285	536,840	678,010	16.6
c. Profit	$Rp.10^6$	71,078	171,117	190,685	138,510	24.9
d. Operating Ratio (b/a) 3/	%	85.8	72.4	73.8	83.0	-
e. CPI 4/	1984=100	100.0	104.4	113.9	124.5	7.6
f. Revenue in 1984 price: (a/(e/100))	$Rp.10^6$	501,117	594,326	638,467	655,822	9.4
g. Expense in 1984 price: (b/(e/100))	$Rp.10^6$	430,039	430,401	471,124	544,572	8.2
h. Profit in 1984 price: (c/(e/100))	$Rp.10^6$	71,078	163,925	167,343	111,250	16.1
i. Number of personnel 5/	no.	33,435	36,211	39,002	41,198	7.2
j. Profit/employee (c/i)	$Rp.10^3$/emp	2,126	4,726	4,889	3,362	16.5
k. 1984 profit/employee (h/i)	$Rp.10^3$/emp	2,126	4,527	4,291	2,700	8.3
l. Switching capacity	10^3 l.u.	698	779	839	1,013	13.2
m. Number of subscriber	10^3	536	587	658	774	13.0
n. No. subsc/switching cap (m/l)	%	76.8	75.4	78.4	76.4	-0.2
o. Waiting Applicants	10^3	326	380	418	n.a.	-
p. Revenue/SW cap. (a/l)	$Rp.10^3$/l.u.	718	796	867	806	3.9
q. Revenue/subsc (a/m)	$Rp.10^3$/subsc	935	1,057	1,106	1,055	4.1
r. 1984 revenue/SW cap (f/l)	$Rp.10^3$/l.u.	718	763	761	647	-3.4
s. 1984 revenue/subsc (f/m)	$Rp.10^3$/subsc	935	1,012	970	847	-3.2
t. Expense/SW cap (b/l)	$Rp.10^3$/l.u.	616	577	640	669	2.8
u. Expense/subsc (b/m)	$Rp.10^3$/subsc	802	765	816	876	3.0
v. 1984 Exp/SW cap (g/l)	$Rp.10^3$/l.u.	616	553	562	538	-4.4
w. 1984 Exp/subsc (g/m)	$Rp.10^3$/subsc	802	733	716	704	-4.3
x. Profit/SW cap (c/l)	$Rp.10^3$/l.u.	102	220	227	137	10.3
y. Profit/subsc (c/m)	$Rp.10^3$/subsc	133	292	290	179	10.5
z. 1984 Profit/SW cap (h/l)	$Rp.10^3$/l.u.	102	210	199	110	2.6
aa. 1984 Profit/subsc (h/m)	$Rp.10^3$/subsc	133	279	254	144	2.7
ab. Empl/1000 subsc (i/m)	no./10^3subsc	62	62	59	53	-5.2

1/ Operating plus non-operating revenue
2/ Operating and non-operating expenses
3/ CPI: Consumer price index, an indicator to show rate of inflation
4/ Expense of 1987 is obtained from TANSIUMTEL. The figure was derived by adjusting figures appearing on the income statement downward. The adjustment was made to get rid of the impacts of two factors that increased the expense in 1987. The two factors are,
- re-evaluation of fixed assets in 1987 resulting in the increase of depreciation expense, and
- change of depreciation method from straight line method to accelerating method.

Sources: (1) Japan Telecommunications Mission
(2) Annual financial reports of PERUMTEL (1984 to 1987)
(3) PMC Main Task

10. PRIORITY PROJECT

10. PRIORITY PROJECT

10.1 Selection of Priority Project

The Study selected "the expansion of junction network for expanded Jakarta multi-exchange (Metropolitan Jakarta) area" as the Priority Project to be implemented at the beginning of Repelita V. The Study prepared the implementation program (I/P) of the Priority Project comprising the following:

- justification;
- system design;
- cost estimate;
- implementation schedule; and
- financial analysis.

Logical junction circuit matrixes in expanded Jakarta multi-exchange area are attached as ANNEX 10-1, for reference.

10.2 Implementation Program of Priority Project

10.2.1 Justification

The study on the project that could effectively reinforce the government regional development policy of "east-west development" is categorized as that on the network as a whole.

Meanwhile it was announced by POSTEL/PERUMTEL that Jakarta message area (=MA) was extended up to BEK, TAN, DEP and CIB on Dec. 2, '88 (effective date: Nov. 20, '88).

On the other hand, Jakarta multi-exchange area has never been planned on the assumption that MA would be expanded; **it is urgently needed to arrange the junction circuits in Metropolitan Jakarta area, especially those connecting suburban area and DKI Jakarta** (formerly inter-Wilayah circuits) in order to make them fit for the expanded message area.

(1) Expanded Jakarta Multi-Exchange Area

a) Telephone Demand in Tangerang, Bekasi and Depok/Cibinong

In Metropolitan Jakarta area, **the telephone demand is high in Tangerang, Bekasi and Depok/Cibinong** other than DKI Jakarta area in Metropolitan Jakarta area; the table below indicates the telephone demand derived through the Study in those areas.

Table 10.1 Share of Telephone Demand in Tangerang, Bekasi, Depok and Cibinong in Metropolitan Jakarta

Area/Year	No. of Subscriber			
	1988	1994	1999	2004
Tangerang 1/	3,000	24,400	43,400	67,600
Bekasi 2/	1,900	26,400	46,800	72,600
Depok/Cibinong 3/	2,100	25,500	43,200	64,900
Total (Share)	7,000	76,300 (9%)	133,400 (11%)	205,100 (12%)
Metropolitan Jakarta Total		849,200	1,227,800	1,673,700

1/ Including the exchange areas: TAN, JUG and CPD.

2/ BEK, BKB, BGG and CL.

3/ DEP, SKJ, CIB and SWG.

The table above implicates the rapid growth of telephone demand in those areas reflecting the "east-west development" policy of the government.

b) Existing Junction Circuits

It is imperative that some 586,000 l.u. should be installed in order to cater fully for the rapidly growing demand in Metropolitan Jakarta area during Repelita V (1989-1994); about 10% of total telephone demand in Metropolitan Jakarta

area is centered around the exchange areas quoted above in TAN, BEK, DEP and CIB.

However the existing junction circuits (formerly inter-Wilayah circuits) connecting those areas with DKI Jakarta are not provided adequately except for DEP and CIB.

Table 10.2 Existing Junction Circuits

	Section	Existing Junction Circuits
1.	TAN - GB1	<Coax 240 ch System> O/G = 97 cct. I/C = 111 cct. SLDD = 9 cct. Special Service = 8 cct.
2.	BEK - GB1	<Coax 144 ch System> O/G = 49 cct. I/C = 63 cct. SLDD = 9 cct. Special Service = 8 cct.
3.	DEP - SM2 (GATSU)	<2GHz Radio System> 34 Mbps (1+1) <6GHz Upper Radio System) 1/ 140 Mbps (1+1) 2/
4.	DEP - CIB	<8GHz Radio System> 34 Mbps (1+1) 2/ <Coax 360 ch System> In Use = 132 cct.
5.	JIA - SM2 (GATSU)	<2GHz Radio System> 34 Mpbs (2+1)

1/ Used Frequencies: SM2 (GATSU) side
Tx 6,740 MHz Rx 7,080 MHz
6,660 7,000

2/ Newly installed. (Jan. 1989)

10.2.2 System Design

(1) Provision of Equipment

The system design of the Priority Project is carried out on the assumption that the capacities of respective sub-systems could meet the requirements for the years 1994 and 1999; the target planning years for the respective sub-systems are summarized below.

- Muldex 1994
- FO Cable 1999
- Radio 1994
- Power 1999

(2) Selection of Transmission System for Junction Circuits

a) Radio Transmission System

The use of radio transmission system for junction circuits shall be restricted as far as possible outside Metropolitan Jakarta area to secure the limited frequency resources.

In addition to the radio transmission systems shown in Table 10.2, the systems over the following frequency bands are under operation or planned in Metropolitan Jakarta area.

Table 10.3 Radio Transmission Systems in Metropolitan Jakarta Area

Freq. Band	System	Notes
1) 11GHz	Backup for FO Junctions: SLP - PLM (4.1 km) PLM - KB (3.3 km) KB - SM2 (2.2 km) SM2 - JT2 (6.3 km)	140 Mbps (2+1)
2) 4GHz	Jawa - Bali / Existing Backbone	1,260 ch (2+1)/analog
3) 4GHz	Trans-Sumatera/ " (Jakarta - Medan)	1,260 ch (2+1)/analog
4) 6GHz upper	Jawa - Bali / Planned Backbone	140 Mbps (3+1)/digital Contracted: Oct. 15, 1987
5) 6GHz upper	Trans-Sumatera/ "	140 Mbps (3+1)/digital Contracted: Nov. 30, 1988

b) Fiber Optics (FO) Cable Transmission System

Radio transmission systems[1/] shall not be employed for junction circuits in Metropolitan Jakarta area as long as the conditions for the use of FO cable are met.

FO cable transmission system is recommended to be employed for the expansion of the junction network in Jakarta multi-exchange area to the extent possible.

FO cable to be newly installed shall be of single-mode (SM) type taking into consideration:

- worldwide trend;
- capability of long distance transmission; and
- capability of capacity expansion.

1/ In case where the radio transmission system is used for the junction circuits, the frequency bands of higher than 11 GHz shall be assigned according to the guideline of POSTEL.

However, the use of radio transmission system over quasi-milliwave bands shall be preferably restricted to the path of comparatively short distance taking into account the heavy attenuation due to rainfall.

(3) System Configuration

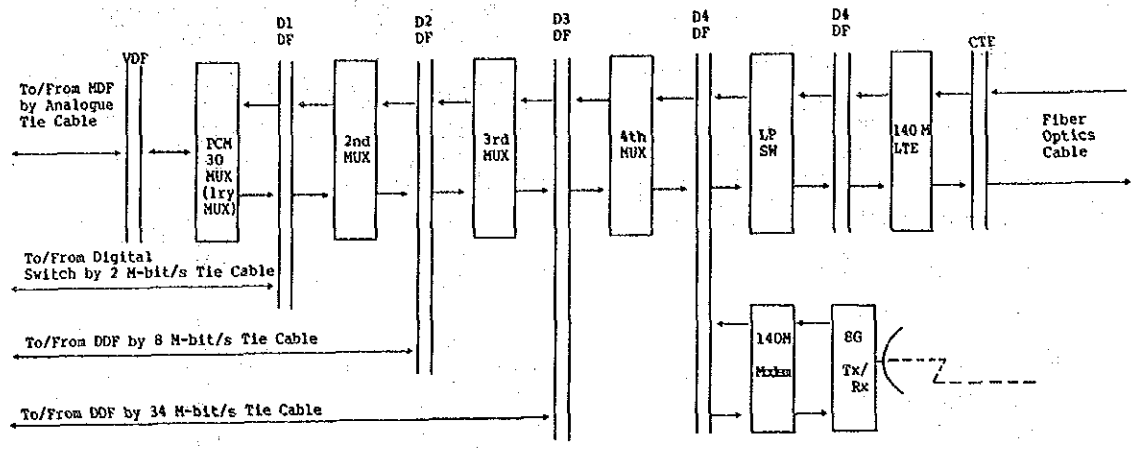
The typical system configuration of the 140 Mbps FO cable and radio transmission systems is given in Fig. 10.1 in the following page.

(4) Expanded Junction Network in Jakarta Multi-Exchange Area

Junction sections for the expanded Jakarta multi-exchange area proposed to be newly installed under the Priority Project are:

- FO Cable Transmission System	15 sections
- Radio Transmission System	2 sections
(Total)	17 sections 1/

1/ 17 sections includes 2 sections for suburban area. (Refer to the drawings in Volume II of this report, e.g., Key Map, Junction Network Configuration.)
Even though the Priority Project is defined as the study on expansion of junction network for expanded Jakarta multi-exchange (Metropolitan Jakarta) area, these suburban sections are included in system design and cost estimate of the Priority Project from the viewpoint of network optimization.



Legend

LTE : Line Terminal Equipment
MUX : Multiplex Equipment
LPSW: Line Protection Switch
DDF : Digital Distribution Frame
MDF : Main Distribution Frame
Tx/Rx : Transmitter/Receiver
CTF : Cable Termination Frame

Fig. 10.1 Typical System Configuration of 140 Mbps Transmission

a) Proposed FO Cable Transmission Sections

Table 10.4 FO Cable Sections

Section	Cable Length	No. of Cores
(Jakarta Multi-Exchange Area)		
1. JUG - TAN	5.5 km	6
2. TAN - CKG	12.7	10
3. KT2 - KT3	2.8	18
4. KT2 - ANC	4.5	6
5. ANC - TPR	5.6	6
6. KB - CDG	12.5	6
7. KL1 - KL2	3.8	6
8. CPE - CNE	7.8	8
9. SER - SRU	11.0	6
10. PSR - PDG	8.0	8
11. DEP - SKJ	7.5	8
12. BEK - BKB	6.0	10
13. KLD - BEK	17.6	14
14. JT - KLD	5.1	16
(Jakarta Suburban Area)		
15. BEK - CK	17.0	8
(Total)	127.4 km	

b) Proposed Radio Transmission Sections

Both sections below are not suitable for installation of FO cables due to the adverse route conditions across the highway.

Table 10.5 Radio Sections

Section	Path Length
(Jakarta Multi-Exchange Area)	
1. BEK - CL	19.0 km
(Jakarta Suburban Area)	
2. TAN - CKP	14.0

10.2.3 Cost Estimate

(1) Project Cost

The project cost required for implementing the Priority Project is estimated to comprise:

- **Foreign Currency Portion: 3,698 million yen (Rp. 56,892 million equivalent)**
- **Local Currency Portion: 2,934 million Rupiahs**

The breakdown of the project cost is given in the following table:

Table 10.6 Project Cost

	Item	Costs Foreign (M¥)	Costs Local (M Rp.)
1.	Equipment		
1.1	Muldex 1/	1,098	
1.2	LTE 2/	173	
1.3	Fiber Optics Cable (SM) 3/	202	
1.4	Digital Radio 4/	49	
1.5	S/V and Control 5/	121	
1.6	Power Supply 6/	103	
1.7	Tower 7/	30	
1.8	Vehicle for O & M		200
	(Subtotal)	(1,776)	(200)
2.	Installation Material	216	377
3.	Manual/Document	26	
4.	Measuring Equipment	153	
5.	Tool	26	
6.	Spare Parts	133	
	(Subtotal)	(554)	(377)
7.	Freight & Insurance 8/	93	
8.	Inland Transportation 8/	23	
	(Subtotal)	116	
9.	Installation/Test	580	926
10.	Building Modification 9/		21
11.	Training 10/	35	
12.	One-Year Guarantee 11/	33	
	(Subtotal)	648	947
13.	Consulting Service	224	
14.	Contingency	380	
	Total of Foreign Currency Portion:	**3,698**	
15.	Land Acquisition 12/		150
16.	Construction of Station Building 12/		360
17.	Civil Work (Duct and Manhole) 13/		900
	Total of Local Currency Portion:		**2,934**

1/ Muldex: 60% of 140 Mbps transmission capacity is assumed to be utilized due to grouping, on 2 Mbps basis.

2/ LTE: Line Terminal Equipment (O/E & E/O conversion)

3/ FO Cable: The duct-type cable is used for most of the junction sections except for part of the section between BEK and CK (= approx. 16 km); direct-burried type for other sections.

4/ Digital Radio System: The frequency band used is assumed 8GHz taking into consideration the rainfall attenuation over quasi-milliwave bands.

5/ S/V & Control: Modification work for integrating new S/V & Cont. with the existing one is excluded.

6/ Power Supply: No power supply system is taken into account in case where digital muldex equipment are existing.

7/ Radio Tower: Only three towers will be erected in BEK, CK and TAN; the existing tower is utilized for the Priority Project.

8/ Freight, Insurance and Inland Transportation:
4% of the total cost of Items 1 through 6 in the table above is assigned for Freight and Insurance; 1% for Inland Transportation.

9/ Building Modification: Seven (7) PCM rooms need to be modified for expansion.

10/ Training: This includes 2-month factory training and 2-month on-the-job training/lectures for 15 engineers/technicians.

11/ One-Year Guarantee: Dispatch of an engineer for one year after service-in.

12/ Land Acquisition and Building Construction: 10% of totally required cost for land acquisition and building construction is quoted in the table above for the contribution of expanded junction circuits under the Priority Project.

13/ Civil Work: It is assumed that most (80%) of the existing cable duct could be used for pulling FO cable under the Priority Project; 10% of the totally required costs for civil work is the assigned cost for new cable duct in comparison with the enormous amount of civil work required for subscriber cable laying.

(2) Disbursement Schedule

The project cost is disbursed as shown in the table below in accordance with the implementation schedule depicted in Section 10.2.4.

Table 10.7 Disbursement Schedule

(Unit: Million Rupiahs)1/

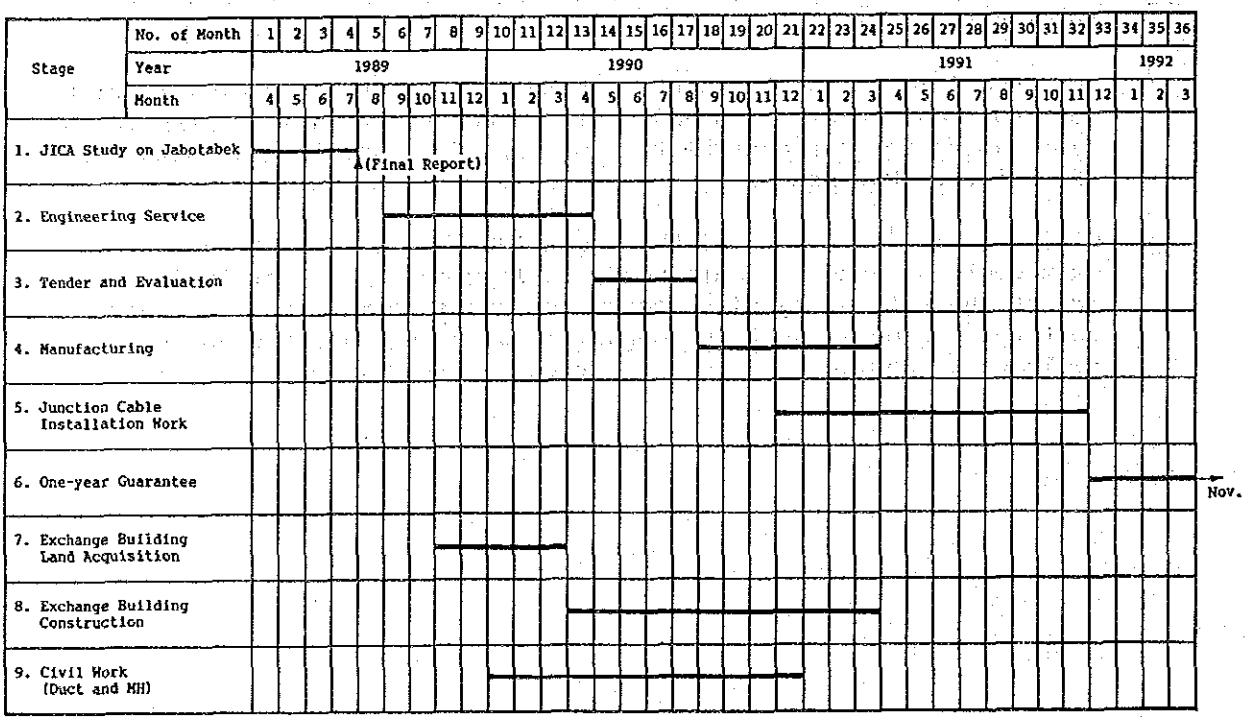
Year	Disbursement
1989	1,155
1990	24,337
1991	33,996
1992	338
Total	59,826

1/ Exchange Rate: US$ 1.0 = Rp. 2,000 = ¥130

10.2.4 Implementation Schedule

Shown below is the implementation schedule of the Priority Project; the keys to successful implementation of the Priority Project lie in land acquisition, building construction and civil work.

Table 10.8 Implementation Schedule of the Priority Project



10.2.5 Financial Analysis

(1) Objective of Financial Analysis

Financial analysis is carried out to assess financial feasibility of the Priority Project: if the project shall generate sufficient revenue in comparison with investment cost and annual operating expenditures. The result of financial analysis shall be referred to as a criterion for judging if the project is worth promoting to implementation stage.

(2) Methodology of Financial Analysis

Financial internal rate of return (FIRR)[1/] shall be derived as the indicator to show financial feasibility of the project based on cash flow of the project. Major items of cash flow are the following.

Cost
- Investment cost
- Operating expenditure

Revenue
- Telephone services revenue:
  - installation fee
  - monthly recurrent charge
  - pulse (SLDD, local, suburban)
- Non-voice services revenue

Overall flow of financial analysis is presented in Fig. 10.2.

1/ Financial internal rate of return (FIRR):
discount rate at which present values of cost and revenue become equal or "r" in the following equation.

$$\sum_{n=1}^{n} \frac{\text{Revenue}}{(1+r)^n} = \sum_{n=1}^{n} \frac{\text{Cost}}{(1+r)^n}$$

where, r : discount rate
n : number of year from the beginning of the project

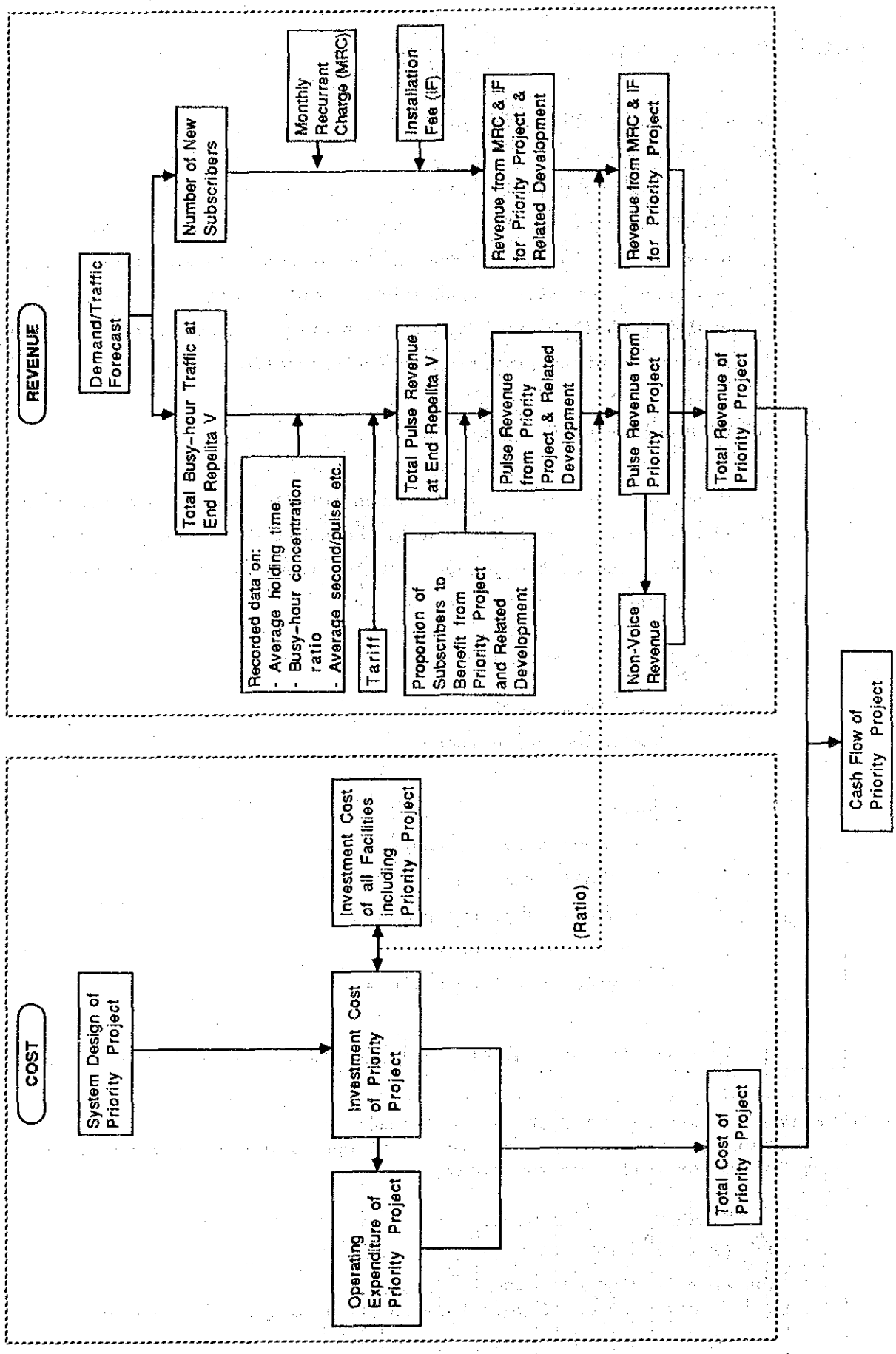


Fig. 10.2 Flow of Financial Analysis

An important point to note is the method taken for estimating revenue to be accrued to the Priority Project. The Priority Project (expansion of junction network for expanded Jakarta multi-exchange area) forms an integral part of the telecommunications development of Jakarta multi-exchange area during Repelita V. To estimate how much of the revenue to be generated from telecommunications services during Repelita V could be accrued to the Priority Project, the following method was employed in the Study.

a) estimate development cost of facilities including the Priority Project and other facilities such as switches and subscriber cable networks required to supply services to new subscribers who will directly benefit from the Priority Project;

b) estimate investment cost of the Priority Project based on system design;

c) derive the proportion of investment cost of the Priority Project estimated in item b) to the investment cost derived in item a);

d) derive total revenue to be generated by new subscribers to benefit from the Priority Project and other facilities during Repelita V;

e) multiply the proportion derived in item c) above with the total revenue derived in item d) above and estimate revenue to be accrued to the Priority Project; and

f) prepare cash flow of the Priority Project based on b) and e).

(3) Assumptions of Financial Analysis

The following basic conditions were assumed in the Study.

a) Project life is assumed to be 15 years from the commencement of operation.

b) Financial internal rate of return (FIRR) is applied as the indicator of financial viability of the Priority Project.

c) The costs and revenues are expressed in terms of 1989 constant prices.

d) The project facilities are assumed to start operation partly in 1992. It is assumed that the operation levels in 1992 and 1993 are 60% and 80% of the full operation stage respectively. The project facilities reaches 100% operation in 1994 when capacities of all other facilities catch up with that of the Priority Project.

e) The present tariff system is applied to revenue calculation.

f) Corporate income tax is imposed on the profit of PERUMTEL at the rate of 35%.

g) Salvage values of facilities are not considered in the analysis, since the effect on FIRR is negligible.

(4) Estimate of Cost

a) Investment Cost of All Facilities Related with the Priority Project

Total development cost of all telecommunications facilities required to supply services to 236,100 new subscribers[1/] is estimated to be Rp. 789,164 x 10^6. This estimate was made assuming the following number of line units (l.u.) to be newly installed and development cost per line units.

1/ This figure is derived from the demand-oriented planning figure during Repelita V subtracted by the number of subscribers to be covered by the ongoing project, e.g., JKT PCM Phase 2 (OECF).

Number of l.u. to be Installed during Repelita V (l.u. in 10^3)	Development Cost l.u. 1/	Contents of Cost/l.u.
72.2	Rp. 4,120 x 10^3	land, building, switch and subscriber cable networks
163.9	Rp. 3,000 x 10^3	building, switch and subscriber cable networks

1/ Development costs of US$ 2,060/l.u. and US$ 1,500/l.u. were converted to Rupiahs by applying the exchange rate of US$ 1.00 equal Rp. 2,000 (the rate officially used in Repelita V).

b) Investment Cost of the Priority Project

Total investment cost of the Priority Project is estimated at Rp. 59,826 x 10^6 as presented in Section 10.2.3, which is equivalent to 7.58% of the total development cost for 236,100 subscribers estimated in item a) above. In accordance with the implementation schedule presented in Section 10.2.4, annual disbursement schedule of the Priority Project is prepared as follows.

Year	Cost (Rp. 10^6)
1989	1,155
1990	24,337
1991	33,996
1992	338
Total	59,826

c) Annual Operating Expenditure

Annual operating expenditures are assumed to be 10% of the total investment cost based on the experience of WITEL IV. They include such costs as personnel cost, maintenance cost, office cost and working capital. Annual operating expenditures of the Priority Project at full operation stage are estimated to be Rp. 5,983 x 10^6.

(5) Estimate of Revenue

a) Revenue from Installation Fee

Current installation charge of Rp. 500,000 per subscriber is applied to new subscribers of Jakarta multi-exchange area. It is assumed that installation charge be collected a year prior to the initiation of operation of the project facilities. Revenue from installation fee is to be generated in the following schedule.

Year	Revenue (10^6 Rp.)
1991	5,370
1992	1,790
1993	1,790
Total	8,950

It is assumed that 60% of revenue from all telephones to be installed be collected in 1991 and the rest of 40% in 1992 and 1993 in equal amount (20% each).

b) Revenue from Monthly Recurrent Charge

Revenue from monthly recurrent charge of Rp. 3,500 per subscriber is applied. Revenue from monthly recurrent charge is generated in the following schedule.

Year	Revenue (10^6 Rp.)
1992	5,950
1993	7,933
1994 & thereafter	9,916

The levels of operation are 60% and 80% in 1992 and 1993 respectively reaching full operation in 1994.

c) Revenue from Pulse

Revenue from pulse generation is derived from the following equation.

- Revenue/year: (Number of calls/day)x(Pulses/call)
  x(Tariff/pulse)
  x(Annual working days/year)

Each of the items in this equation is estimated as follows.

- Number of calls/day:

  $\frac{\text{Busy-hour traffic(E)x3,600 sec./hour}}{\text{Average holding time in sec.}}$ / (Busy-hour concentration ratio)

- Pulses/call:

  $\frac{\text{Average holding time in second}}{\text{(Tariff: seconds/pulse)}}$

The figures used in deriving revenue from pulse generation are summarized as follows.

	SLDD	Suburban	Local
- busy-hour traffic in 1994[1/] (erlang)	3,811	258	46,568
- average holding time[2/] (seconds)	150	150	150
- busy-hour concentration[3/] ratio	0.125	0.125	0.125
- proportion of the number[4/] of calls between 6:00 and 21:00 and those between 21:00 and 6:00			
6:00 - 21:00 :		95%	
21:00 - 6:00 :		5%	
- average second per pulse[5/]			
6:00 - 21:00	3.2	60	180
21:00 - 6:00	6.4	60	180
- tariff			
charge per pulse (Rp.)[6/]	75	75	75
second per pulse	2 to 6	60	180

1/ Busy-hour traffic in 1994 are based on the result of demand and traffic forecast presented in Tables 4.10 and 4.11 of Chapter 4.

2/ Average holding time of 150 seconds is derived from historical data of local and SLDD calls recorded in EWSDs installed at 10 exchanges in Jakarta.

3/ Busy-hour concentration ratio is generally 1/8 to 1/9. The Study applied conservative figure of 1/8 (or 0.125) to the analysis.

4/ The number of calls during 6:00 and 21:00 is assumed to account for 95% of all calls in a day. Recorded data of calls during 21:00 - 6:00 ranges between 1 and 6%.

5/ Average second per pulse for SLDD was estimated to be 3.2 based on historical data recorded at Jakarta trunk transit exchange (GB1).

6/ The present tariff system was applied to the analysis. Charge on 1 pulse is 75 Rupiahs. Tables 10.9 and 10.10 summarize the present tariff system in Indonesia. ANNEX 10-2 presents the present tariff system in detail.

Based on these basic figures, revenues from pulse generation in 1994 are estimated for the existing and new subscribers to be added during Repelita V (964,400 subscribers in total) as follows.

	(in Rp. 10^6)
SLDD	: 754,029
Suburban	: 3,344
Local	: 201,174
Total	: 958,547

Revenues to be generated by the development of all facilities for 236,100 new subscribers are derived by multiplying 24.5% (236,100/964,400) with the total revenue estimated above as follows.

Table 10.9 Installation and Monthly Recurrent Charges of Telephone Service

Area	Installation Charge (Rp.)	Additional Charge Outside Service Area (Rp. per 100 m)	Extension Line (Rp. per Line)	Monthly Recurrent Charge
I	500,000	50,000 - 100,000	63,000	Automatic 5 big cities 1/: Rp. 3,500/month Other areas: Rp. 2,000/month Manual Capacity more than 500 l.u.: Rp. 2,000/month Capacity less than 500 l.u.: Rp.1,000/month
II	350,000		32,000	
III	200,000	40,000 - 80,000	19,000	
IV	175,000		13,000	
V	125,000	30,000 - 60,000	10,000	
VI	90,000	20,000 - 40,000	7,000	
VII	75,000		3,750	

1/: 5 big cities: Jakarta, Bandung, Semarang, Surabaya and Medan

Table 10.10 Charges on Pulse for Telephone Service

Category	Distance (km)	Manual (Minute in Rupiahs) Ordinary	Urgent	Automatic (Metering Pulse Interval, Second per Pulse) 6:00-21:00	21:00-6:00
Local	-	to be covered by monthly recurrent charge		- 180 for 5 areas 1/ - No limit for other areas	
SLDD Calls					
0	Inter-area (suburban)	75	75	60	60
I	to 100	375	750	6	12
II	100 - 200	450	900	5	10
III	200 - 300	560	1,120	4	8
IV	300 - 1,000	750	1,500	3	6
V	more than 1,000	1,125	2,250	2	4

1/ 5 areas: Jakarta, Palembang, Jambi, Sekupang and Bandarlampung

	(in Rp. 10^6)
SLDD	: 184,737
Suburban	: 819
Local	: 49,288
Total	: 234,844

Revenue to be accrued to the Priority Project is estimated to account for 7.6% of the revenue estimated above. The rest of 92.4% is to be accrued to other facilities such as switches and subscriber cable networks. This ratio is the proportion of the investment cost of the Priority Project estimated based on system design (Rp. 59,826 x 10^6) to the cost of developing all facilities required to supply services to 236,100 new subscribers (Rp. 789,164 x 10^6). Revenues of the Priority Project at full operation stage (1994 and thereafter) are estimated as follows.

	(in Rp. 10^6)
SLDD	: 14,005
Suburban	: 62
Local	: 3,736
Total	: 17,803

The process of deriving revenues is explained in detail in ANNEX 10-3.

d) Tariff System

As far as the tariff system is concerned, PERUMTEL proposed adjustments of the present tariff system to Department of Tourism, Post and Telecommunciations in early 1989. Proposed adjustments include the increase of installation charge, monthly recurrent charge and charge on local calls and the decrease of charge on SLDD calls. The proposal is waiting to be approved by the department, cabinet assembly and President. The Study applied the present tariff system to the financial analysis considering the following.

- Data on the proposed new tariff system was not released by PERUMTEL, since it was still in the administrative process for acquiring approval.

- It was informed by PERUMTEL that the proposed adjustments are minor and the present tariff structure remains basically unchanged.

- Sensitivity analysis to be carried out in financial analysis includes the assessment of impacts of revenue fluctuation. This part of financial analysis could deal with the modification of the tariff structure as a factor influencing revenue fluctuation.

(6) Financial Internal Rate of Return

Based on the costs and revenues estimated as explained so far, cash flow of the Priority Project was prepared as shown in Table 10.11. Financial internal rate of returns (FIRRs) were calculated to assess financial viability for the base case as well as for a number of cases in which costs and revenues were supposed to fluctuate. The results are as follows.

Case	FIRR before Tax (%)	FIRR after Tax (%)
Base	**31.7**	**21.5**
Cost 10% up	28.3	18.8
Revenue 10% down	28.0	18.5
Cost 10% up & Revenue 10% down	24.7	16.0
Revenue 30% down	19.8	12.1

FIRRs were calculated for net profit before tax and net profit after tax. The former is to see financial viability of the project itself, while the latter is aimed at assessing financial soundness of the project from the viewpoint of PERUMTEL. PERUMTEL is supposed to pay 35% of its net profit to the government as corporate income tax.

FIRRs thus derived show financial soundness of the Priority Project. The base case FIRR before tax is calculated to be 31.7%, which is significantly higher than prevalent bank deposit interest rate of about 18%: a criterion often applied for making investment decision. Even under the conditions where cost is increased 10% and revenue decreases 10%, FIRR before tax exceeds 18% reaching 24.7%.

From the viewpoint of PERUMTEL as well, the Priority Project is financially justifiable to be promoted to the implementation stage as indicated by high FIRRs after tax. Base case FIRR after tax is calculated to be 21.5% exceeding prevailing interest rate. Even under the worst case of cost 10% up and revenue 10% down, FIRR maintains 16.0%.

The case in which revenue is 30% below the base case is assumed for the situation in which the capacities of facilities such as switches and subscriber cable networks are increased at a slower rate than the expansion of junction network to be implemented by the Priority Project. FIRR after tax in this case falls to 12.1% indicating improper coordination between the development of junction network and that of other facilities results in the decline of financial viability of the Priority Project.

In other word, **more than 70% of realization of the planning figure** (c.f.: 60% realization in WITEL IV during Pelita IV) is desirable, with synchronization of respective sub-system projects, **in order not to jeopardize the financial viability of the Priority Project.**

High FIRRs of the Priority Project except the last case are a reflection of high investment efficiency of Jakarta multi-exchange area, where population of high economic standard are densely populated. Certain amount of investment in Jakarta multi-exchange area would result in the increase of subscribers at a much higher rate than in other areas, leading to the generation of relatively greater amount of revenue in comparison with invested cost.

10.2.6 Economic Benefits

The Priority Project shall contribute to the economic growth of Jabotabek and Indonesia in a number of aspects. Though they are difficult to be quantified, these economic benefits of the Priority Project are listed hereunder.

a) The Priority Project shall contribute to the more intense utilization of the existing telecommunications network in Jakarta multi-exchange area. Successful call ratio shall be raised since the Priority Project solves to a large extent the bottleneck of insufficient capacity of junction network. Enhanced efficiency of the existing telecommunications network shall create a number of economic benefits through positively affecting other sectors as the items listed below show.

b) The improvement of the telecommunications system shall generate a number of benefits related with the transport sector. The telecommunications and transport facilities mutually substitute as the means of communication. The improvement of telecommunications facilities shall, thus, lead to reduced number of trips. The reduced number of trips shall result in time saving for communication, energy conservation and environmental improvement. These benefits are particularly essential for Jabotabek where traffic congestion is causing serious problems of deteriorated urban functions and air pollution.

c) The improvement and expansion of telecommunications system have positive impacts on manufacturing and commerce sectors in increasing productivity. In the manufacturing sector, management and control efficiency could be improved for such activities as purchasing of material, order taking, delivery, billing and inventory and production management. The service sector whose main activity is information-oriented, receives even greater benefit from telecommunications improvement. Speedy communication leads to efficient market operation from at

international commodities dealing level down to village trading level.

In the light of the fact that the Jabotabek area alone produces about 17% of the secondary and tertiary GDP of Indonesia, improved efficiency in these sectors in Jabotabek would spearhead and contribute to the improvement of overall production and operational efficiency of the manufacturing and commerce sectors in Indonesia.

d) At the age of globalization, it is becoming increasingly important to enhance the attractiveness of Metropolitan Jakarta area as a major investment location for foreign investors. This aspect is particularly important considering the recent trend that companies in the world are becoming more mobile than ever seeking best investment locations across national borders. The improvement of telecommunications system in Metropolitan Jakarta area shall contribute to attracting a larger number of foreign investments, thus leading to acceleration of economic growth through the increase of gross regional product, increase of employment opportunities and multiplier effects on other sectors.

Table 10.11 Cash Flow of the Priority Project (1/2)

(million Rupiahs) FIRR = 31.7% 21.5%

		COST			REVENUE								BALANCE	Tax	Balance after tax
							Pulse				Non-voice	Total			
	Year	Investment	O&M	Total	Institn	Monthly	SLDD	Sbrbn	Local	Total					
1	1989	1,155	0	1,155	0	0	0	0	0	0	0	0	-1,155	0	-1,155
2	1990	24,337	0	24,337	0	0	0	0	0	0	0	0	-24,337	0	-24,337
3	1991	33,996	0	33,996	5,370	0	0	0	0	0	0	5,370	-28,626	0	-28,626
4	1992	338	5,983	6,321	1,790	5,950	8,403	37	2,242	10,682	1,068	19,490	13,169	4,609	8,560
5	1993	0	5,983	5,983	1,790	7,933	11,204	50	2,989	14,243	1,424	25,390	19,407	6,793	12,615
6	1994	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
7	1995	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
8	1996	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
9	1997	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
10	1998	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
11	1999	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
12	2000	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
13	2001	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
14	2002	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
15	2003	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
16	2004	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
17	2005	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
18	2006	0	5,983	5,983	0	9,916	14,005	62	3,736	17,803	1,780	29,500	23,517	8,231	15,286
TOTAL		59,826	89,739	149,565	0	8,950	142,791	201,670	894	53,805	256,370	25,637	433,747	284,182	118,405	165,777

Table 10.11 Cash Flow of the Priority Project (2/2)

SENSITIVITY ANALYSIS

	FIRR =	28.3%			18.8%		FIRR =	28.0%			18.5%			24.7%		16.0%			19.8%		12.1%
		COST	10%	UP			REVENUE	10%	DOWN			COST	10%	UP &REVENUE	10%	DOWN		REVENUE	30%	DOWN	
Year	Cost	Revenue	Balance	Tax	Balance after tax	Cost	Revenue	Balance	Tax	Balance after tax	Cost	Revenue	Balance	Tax	Balance after tax	Cost	Revenue	Balance before tax	Tax	Balance after tax
1 1989	1,271	0	-1,271	0	-1,271	1,155	0	-1,155	0	-1,155	1,271	0	-1,271	0	-1,271	1,155	0	-1,155	0	-1,155
2 1990	26,771	0	-26,771	0	-26,771	24,337	0	-24,337	0	-24,337	26,771	0	-26,771	0	-26,771	24,337	0	-24,337	0	-24,337
3 1991	37,396	5,370	-32,026	0	-32,026	33,996	4,833	-29,163	0	-29,163	37,396	4,833	-32,563	0	-32,563	33,996	3,759	-30,237	0	-30,237
4 1992	6,953	19,490	12,537	4,388	8,149	6,321	17,541	11,220	3,927	7,293	6,953	17,541	10,588	3,706	6,882	6,321	13,643	7,322	2,563	4,760
5 1993	6,581	25,390	18,809	6,583	12,226	5,983	22,851	16,868	5,904	10,964	6,581	22,851	16,270	5,695	10,576	5,983	17,773	11,790	4,127	7,664
6 1994	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
7 1995	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
8 1996	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
9 1997	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
10 1998	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
11 1999	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
12 2000	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
13 2001	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
14 2002	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
15 2003	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
16 2004	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
17 2005	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
18 2006	6,581	29,500	22,919	8,022	14,897	5,983	26,550	20,567	7,199	13,369	6,581	26,550	19,969	6,989	12,980	5,983	20,650	14,667	5,134	9,534
TOTAL	164,522	433,747	269,225	115,252	153,973	149,565	390,372	240,807	103,412	137,395	164,522	390,372	225,850	100,259	125,591	149,565	303,623	154,057	73,425	80,632

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ANNEX

ANNEX 1-1

List of Persons with whom JICA

Study Team Met/Discussed

List of the Persons with Whom JICA Study Team Met/Discussed (1/3)

	Name	Title	Address	/ Tel No.
POSTEL				
1	Sri Slameto	SEKDITJEN POSTEL	Jl. Kebon Sirih No.37 JKT	342088, 330008-121
2	Soeharsono	DITJEN-POSTEL	"	
3	Suhardi	"	Jl. Kebon Sirih No.37	
4	Soedarpo	"	"	
5	Tanti Dewi. S	"	"	
6	Benyamin Sura	"	"	
7	W. Indah Widiastuty	"	"	
8	Woerfiendarti			
9	Samlawi			
10	Kicky AM			
11	P. Adjie			
PARPOSTEL				
1	Rai Sarjana			
2	Koesmarihati S			
PERUMTEL				
1	Roesno	PGS. KAWITEL IV	Jl. S. Parman JKT	3655045
2	Saleh Gunawan	ex-KASUBDITBINPROPEMTEL	Jl. Cisanggarung No.2 Bd	43800, 55301
3	Syonan Sembiring	KABINPROTRATEL	Jl. R. E. Martadinata Bd	56521
4	Yayat Suprijatna	KABINPROTRATEL A	"	56511
5	Effendi	BINPROTRATEL	"	56511
6	Achmad Supriyadi	BINPROTRATEL	"	56511
7	Remedi Perangin Angin	KAPUSRENTEL	Jl. Diponegoro No.26 Bd	51831, 55312
8	Koesharijanto	KADINRENLINTASTEL	"	51603
9	Mulia Tambunan	KABINPROSISTEL D	Jl. Wr. Supratman No.84 Bd	73049, 73350
10	Lumumba Sirait	BINPROSISTEL	"	
11	Angger Pramunditto	"	"	
12	Undang Sudirman	"	"	
13	Arko Maryono	"	Jl. Diponegoro No.2 Bd	433538,55316
14	Bajoe Narbito	ex-KABINPROSENTEL B	Jl. Citarum Bd	72573, 55234
15	Dewi Arumi	BINPROSENTEL	"	55231
16	Agus Budi Tjahjono	"	"	55234
17	Sugeng Wahyudianto	"	"	73394
18	Syarif	BINPROJARTEL	Jl. Cimanuk Bd	55313
19	Lukman	"	"	55310
20	Willy Yanthi	TRAFIKTEL	Jl. Lombok No.24 Bd	72122
21	Munadi	KASI YAN Bekasi	Bekasi	
22	Sudiharto	" Depok	Depok	
23	Murdi Murat	KSS TEKNIK TRANSMISI Cibinong		
24	Elan Suklan	KSS JARLOK Cibinong	Cibinong	
25	Muchlas Suyono	KASI YAN Tangerang	Tangerang	
26	Taufik Akbar	KABINPROSATEL		
27	Sadhono Hadi	KABINPROSISTEL		
28	Widjojo Amudji	KADITPEMTEL		

List of the Persons with Whom JICA Study Team Met/Discussed (2/3)

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30	Boediono	KAWITEL IV	"	
31	Anthon	URUSAN PENGAMANAN, WITEL IV	"	
32	Azwar Nurdin	KADINYAN, Jakarta Barat		
33	Darmawan	TANSIVATEL		
34	P. Sudarno	TANSIVATEL		
35	I. Krisnardi	ex-KAMATEL		
36	E. Sudarma	MATEL		
37	M. Hasjim	TANSIUMTEL		
38	G.A. Gani	TANSIUMTEL		
39	Efendi	MODATEL		
40	Hatta	MODATEL		
41	Setiawan	KASUBDITBINPROPEMTEL		
42	H. Soedarko	FUNGSUS II, Operation Department		
43	Uus Sr	SUBDIN EM, WITEL IV		
44	Sudradjat	SUBDIN EM, WITEL IV		
45	Soewandi	FUNGGUS II, Operation Department		
46	Bondan S	DITPEM		
47	Bambang Saktijoso	KADINTEKSENPON		
48	Syarifuddin Salmani	SUBDIN TEKNIK MULTIPLEX		
49	Eddy Subagyo	KASUBBAGT TEKSENPON		
50	Burhanuddin	KASI HUB. ANTAR SENTRAL ANALOG		
51	Arie Fitriyadi	KASI HUB. ANTAR SENTRAL DIGITAL		
52	Syafrawi NP. W.	KASI OPERASI DIGITAL		
53	Sunarto	KSS Trunk B.		
54	Iskandari	KAKPEMTEL		
55	Luharto	KAKANDAPON Bogor		
56	Daya Sunarman	KASOBDIN TEK MUX		
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List of the Persons with Whom JICA Study Team Met/Discussed (3/3)

	Name	Title	Address	/ Tel No.
3	Peter Gardiner	Data Management Specialist /Ditjen Cipta Karya		
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8	Bambang P. Maharyadi	Co-Term Leader Consolidation Study/JUDP	"	"
9	George W. Jelineck	BAPPEDA/DKI	Jl. Merdeka Selatan JKT	3792562
10	Adjat Sudradjat	Secretary of BKSP	"	353741
11	Aihara	Team Leader PMC Option	"	513993
12	Yokoo	"	"	
13	Ned Ames	Louis Berger USA/ IUIDP for West Jawa	Jl. Jend. Sudirman, Bd	7390622
14	E. Gardana	Chief of BAPPEDA Jawa Barat	Jl. Taman Sari, Bd	81676
15	Asnawi Singarimbun	Chief of Communication Section of BAPPEDA Jawa Barat	"	
16	Loenggana	BAPPEDA Jawa Barat	"	
17	Haryono Soediarto	City Planning Division/Ditjen Cipta Karya	Jl. Raden Patah I/No. 1 JKT	7263923
18	Hidayat Abdullah	"	"	
19	Endang Suwardi	Chief of BAPPEDA Bogor	Jl. Veteran Bo	24240
20	Hadi Bora	Secretary of BAPPEDA Bogor	"	
21	Akip	Staff of BAPPEDA Tangerang		22117
22	Farid	Staff of BAPPEDA Bekasi		72232
23	T. Yamazaki	JICA Expert/ BINPROJARTEL		
24	S. Enomoto	JICA Expert/PUSREN		
25	K. Tanaka	OPMC, Bandung		
26	S. Shoji	OPMC, Bandung		
27	H. Tsuchiya	JICA Expert/DITKUGTEL		
28	J. Wood	Cipta Karya		
29	A.A. Gafar	Jabotabek IUIDP		
30	R.M. Negara	BKSP Jabotabek		
31	Rivai Pane	Bogor KDD		
32	Agus Darman	Nepostel		
33	Tonnis W. Vugteveen	Nepostel		

(Note): JKT = Jakarta Bd = Bandung Bo = Bogor