CHAPTER 16

FINANCIAL ANALYSIS

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16.1 Objective and Methodology of Financial Analysis

16.1.1 Introduction

The purpose of this chapter is to estimate the required amount of resources to carry out the Project and the revenues generated from the Project, and analyze the profitability of the Project from the financial viewpoint. The financial analysis also tries to illustrate how the future financial situation will look like when the Project is carried out.

In order to analyze the profitability, a cash flow projection will be estimated at first. The future operating revenues, the future capital expenditures, and to operating expenditures are estimated to examine the cash in-flow and out-flow of the Project.

The profitability analyses are made by the following steps:

1) identifying conditions and assumptions of the Project,
2) estimating the revenues of the Project (financial cash in-flow),
3) estimating the capital expenditures and the operating expenditures of the Project (financial cash out-flow),
4) creating a pro forma "cash flow table" and a "profit and loss statement (P/L)" and estimating the financial internal rate of returns (FIRR),
5) performing a few sensitivity analyses.

16.1.2 Identification of the Project

The long-term telecommunications development plan in the Study Area, which consists of three five-year phases between the fiscal years of 1993 and 2007, is considered as one project in this study. The followings are the basic assumptions of the financial analysis of the Project.

1) Project

   TOT has already contracted with CP Telecom (now the name was changed to be Telecom Asia) for the construction and maintenance of a local telecommunications network and facilities in the BMA during the seventh ESDP period of TOT (FY 1992 to FY 1996). CP Telecom is expected to construct two (2) million lines in the BMA on their own financial arrangements and do partial O&M work for the new facilities.

However, the BTO scheme is not taken into consideration in the Study. The whole expansion and development of the telecommunications networks and facilities in the Study Area is assumed to be implemented by one operating entity.

2) Project Life

The project life is set to be 35 years from FY 1993. The fifteen years from FY 1993 to FY 2007 are regarded as the construction period of the Project (Phase-1, Phase-2, and Phase-3). After the completion of all the construction, additional 20 years will be assumed as an operation period taking the service lives of telecommunications facilities into account. The operation will start from the beginning of the Project life, i.e., FY 1993.

The annual installation and supply volume is one-fifth of the total volume in each phase. It is assumed that the construction starts one year before the operation begins, i.e., FY 1992.

The facilities of which economic lives are shorter than the Project period are to be replaced during the Project period. When the facilities have remaining useful life time at the end of the Project period, the non-used value is recovered.

Scrap value is not taken into account since it is usually negligible.

3) Exchange Rate

All revenues and costs are calculated in the Thai local currency Baht. In this study, the following exchange rate is employed:
1 Baht = 5.5 Japanese Yen.

4) Sunk Cost

Sunk cost is not taken into account. In the case of an expansion project, the incremental internal rate of return, which results from accounting for the incremental investment, sales, and operating costs, is appropriate since it only takes account of incremental net benefits resulting from the incremental production of the expansion project. Therefore the past expenses which were already borne is not taken into account.

On the other hand, the future cost for rehabilitations, replacements, and renewal of the existing facilities will be added to the total cost needed for the Project implementation since the well maintained existing facilities are indispensable for the whole telecommunications networks and facilities to provide the better quality of service.

5) Inflation

The effect of inflation is not considered basically. Price changes are an important factor affecting projects throughout their implementation and economic life, with respect to capital and operating costs as well as revenues. If all prices increased at the same rate at home or abroad, their relative levels would not change. If, in case that all prices were deflated in order to correct for the general increase in nominal (or current) prices, "real" prices, i.e., prices expressed in constant value terms, would result. In this case, the comparison of costs and benefits of a project for the purpose of calculating its economic and financial IRR should not be affected by changes in the general price level resulting from inflation[1].

However, prices of utility services such as electricity, water supply, postal service, transportation, and telecommunications do not usually go up with inflation because they are generally controlled and regulated by the government.

Thailand is now facing an investment boom and especially salaries for engineers and technicians are increasing rapidly because of the supply shortage. The construction material cost has also increased with a high rate for the last few years but the supply shortage for construction materials can be eased by the increase of production or import. However, it takes a longer period to increase well qualified technicians and engineers and the shortage for these people will continue longer. Therefore, the price increase is taken into consideration only for staff salary and annual increase rate of 8% is applied until FY 2007.

The effects on the profitability by the price increase of the network construction will be examined in a sensitivity analysis.

6) Revenue and Cost Estimation

The present tariff system as of December 1991 is used for the revenue estimation. For the cost estimation, the historical data of the TOT expenses are taken into consideration.

7) Financial Loan

It is assumed that up to 75% of the investment funds can be debt-financed.

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[1] J. Christian Duvigneau and Ranga N. Prasad, Guidelines for Calculating Financial and Economic Rates of Return for DFC Projects -WORLD BANK TECHNICAL PAPER NUMBER 33- (Washington, D.C.: The WORLD BANK, 1984), p. 15.

16.2 Installation Schedule of Main Telephone Line (Sales Plan)

Table 16.2-1 shows the planned number of main telephone lines to be connected in each study area during the three phases.

Table 16.2-1 Main Telephone Installation Plan for Each Phase

	BMA	Nakhon Pathom	Samut Sakhon	Ayutthaya	Total Study Area	Share
Phase-1 (1993-1997)	2,371,094	49,123	56,575	31,606	2,508,398	46.98%
Phase-2 (1998-2002)	1,499,541	75,607	56,201	34,758	1,666,107	31.20%
Phase-3 (2003-2007)	1,040,626	64,884	34,791	24,995	1,165,296	21.82%
Total	4,911,261	189,614	147,567	91,359	5,339,801	100.00%

The total number of main telephone lines to be connected in the 15 years is planned to be approximately 5.4 million lines, almost five (5) times larger than the current number. 4.9 million lines, more than 90% of the total connected lines, is planned to be connected in the BMA.

In order to fulfill all the unsatisfied telephone demand within the Phase-1 and eliminate waiting applicants by the end of this phase, the Phase-1 needs the largest number of lines to be connected approximately 2.5 million lines, 47% of the total. The Phase-2 has 1.5 million lines, 31%, and the Phase-3 has one million lines, 22%.

When the 15-year long-term plan is successfully completed, the Study Area is expected to have 6.6 million connected main telephone lines, six times larger than the current number.

Table 16.2-2 and Figure 16.2 show the number of estimated main telephone lines to be connected in the Study Area, BMA and the Surrounding Area, i.e., Nakhon Pathom, Samut Sakhon, and Ayutthaya according to the telephone installation schedule.

Section 13.1 in Chapter 13 describes the detailed installation schedule and the total number of main telephone lines in the Study Area.

Table 16.2-2 Estimated Number of Main Telephone Lines Connected in the Study Area

Year	BMA	Nakhon Pathom	Samut Sakhon	Ayutthaya	Total Study Area
1990 *	900,941	14,267	9,198	11,869	936,275
1991	1,054,832	15,101	9,769	12,360	1,092,063
1992	1,229,394	15,934	10,341	12,852	1,268,521
1993	1,703,345	25,743	21,645	19,158	1,769,891
1994	2,177,446	35,562	32,956	25,471	2,271,435
1995	2,651,680	45,384	44,270	31,794	2,773,128
1996	3,126,024	55,218	55,591	38,122	3,274,955
1997	3,600,488	65,057	66,916	44,458	3,776,919
1998	3,900,125	80,168	78,149	51,401	4,109,843
1999	4,199,928	95,285	89,386	58,347	4,442,945
2000	4,499,861	110,403	100,625	65,303	4,776,191
2001	4,799,869	125,532	111,871	72,256	5,109,527
2002	5,100,029	140,664	123,117	79,216	5,443,026
2003	5,307,892	153,629	130,067	84,206	5,675,794
2004	5,515,905	166,598	137,021	89,205	5,908,728
2005	5,724,052	179,575	143,977	94,205	6,141,809
2006	5,932,295	192,561	150,941	99,206	6,375,003
2007	6,140,655	205,548	157,908	104,211	6,608,322

Note: * The figures in FY 1990 is the actual data as of the end of September 1990. The figures from FY 1991 are the estimated figures made in the Study.

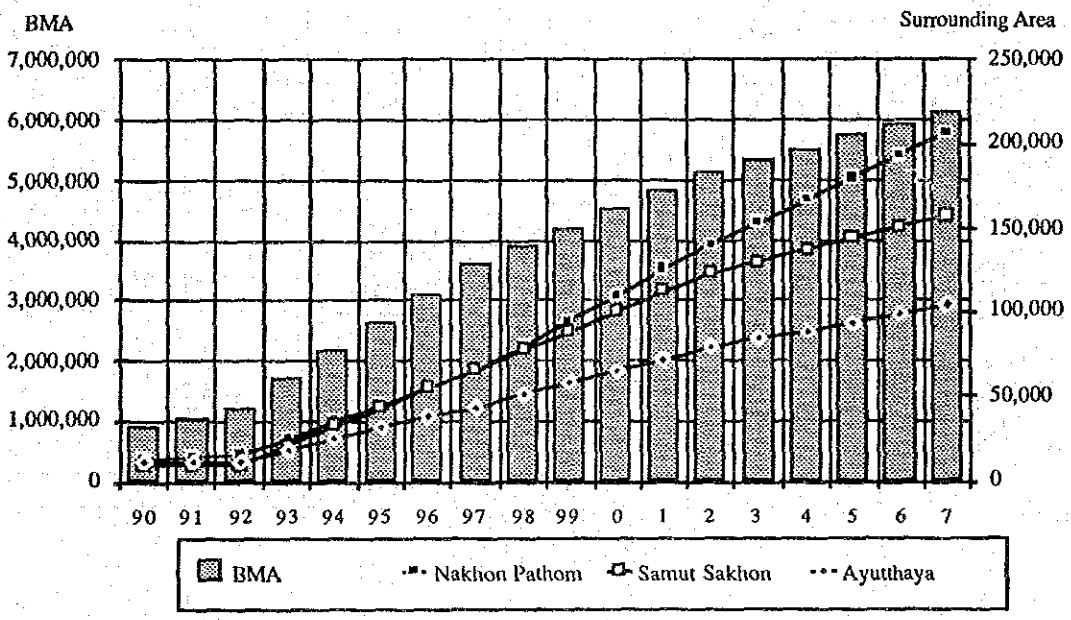


Figure 16.2 Estimated Number of Main Telephone Lines Connected in the Study Area

Table 16.2-3 shows the number of newly connected main telephone lines in each phase for each area by type of subscribers.

Table 16.2-3 The Number of Connected Main Telephone Lines in Each Phase

	Subscriber Line			Public	Total
	Private + Government	TOT	Sub Total		
Total					
Phase-1	2,480,684	5,196	2,485,880	22,518	2,508,398
Phase-2	1,632,266	8,368	1,640,634	25,473	1,666,107
Phase-3	1,122,952	13,477	1,136,429	28,867	1,165,296
Total	5,235,901	27,042	5,262,943	76,858	5,339,801
BMA					
Phase-1	2,346,649	4,906	2,351,555	19,539	2,371,094
Phase-2	1,468,548	7,901	1,476,449	23,092	1,499,541
Phase-3	1,001,734	12,724	1,014,458	26,168	1,040,626
Total	4,816,931	25,531	4,842,462	68,799	4,911,261
Surrounding Area Sub Total					
Phase-1	134,035	290	134,325	2,979	137,304
Phase-2	163,717	468	164,185	2,381	166,566
Phase-3	121,218	753	121,971	2,699	124,670
Total	418,970	1,511	420,481	8,059	428,540
Nakhon Pathom					
Phase-1	47,898	122	48,020	1,103	49,123
Phase-2	74,534	196	74,730	877	75,607
Phase-3	63,571	316	63,887	997	64,884
Total	186,003	634	186,637	2,977	189,614
Samut Sakhon					
Phase-1	55,926	32	55,958	617	56,575
Phase-2	55,636	51	55,687	514	56,201
Phase-3	34,109	82	34,191	600	34,791
Total	145,671	165	145,836	1,731	147,567
Ayutthaya					
Phase-1	30,210	137	30,347	1,259	31,606
Phase-2	33,548	220	33,768	990	34,758
Phase-3	23,539	354	23,893	1,102	24,995
Total	87,297	711	88,008	3,351	91,359

16.3 Revenue Estimation

16.3.1 Premises of Revenue Estimation

TOT classifies the telephone subscribers into the following five categories:

1) Business,
2) Residence,
3) Government,
4) TOT,
5) Public Telephone.

The revenues of the Project comes from the following charges:

a) Installation Charge,
b) Monthly Charge,
c) Local Call Charge,
d) Trunk Call Charge,
e) Others (Relocation Charges, Leased Circuit Charges, etc.).

The revenues are estimated from the installation charge, the monthly charge, the local call charge, and the trunk call charge from the business, the residence, and the government subscribers. Telephone lines for TOT's internal use are not taken into account for the revenue estimation because they are free of charge and do not yield revenues.

In order to estimate the revenues from the Project, the total revenue from the network in the Study Area is estimated at first. After that, the revenue from the Project is divided according to the telephone line shares of the existing facilities and the future expanded facilities.

The revenue from the public telephone service is estimated separately since the revenue per line of the public telephone service is much higher than that of the ordinary telephone service subscribers.

The Study Area is a part of Thailand. There is no difficulty for the local call revenue estimation because the local calls originate and terminate inside the Study Area. For the trunk call revenue estimation, there arises a complex issue. When there is an out-going trunk call from the Study Area to other outside area, the trunk call revenue is charged to a subscriber in the Study Area in the case of STD (Subscriber Trunk Dialing).

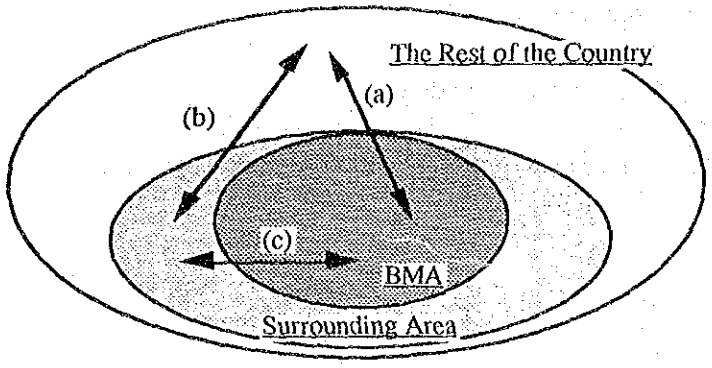


Figure 16.3.1 Chart of Trunk Call between Areas

A trunk call from the Study Area to the other area, which is (a) and (b) in Figure 16.3.1, uses and occupies not only the facilities in the Study Area but also those in the other area, i.e., the provincial local network and the long-distance transmission network. Therefore, the trunk revenue ideally should be separated to these areas according to some rules when the operating entities for these areas are not the same or there is an accounting rule to distribute the cost and the revenue for each real operating unit . The same should be applied ideally when there is an in-coming trunk call from the other area to the Study Area.

However, in order to avoid this complexity for the revenue estimation, the study eliminates this issue and estimates only the whole trunk revenue generated by the out-going trunk call from the Study Area as the trunk revenue of the Project.

16.3.2 Telephone Service Tariff

In order to estimate the operating revenue, the present tariff system is applied basically. Modifications and assumptions on the tariff system used in the revenue estimation are as follows:

1) Installation Charge

In the present tariff system of TOT, the installation charge differs by the following two types:

a) For a telephone purchased by the subscriber and installed by TOT 3,700 Baht, [1]
b) For a telephone purchased and installed by the subscriber 3,350 Baht,

[1] Source: TOT, Greater Bangkok Telephone Directory, page 5 "Telephone Servci Rates"

In this Study, the installation charge is set to be 3,350 Baht per new installed line, which is b) case.

2) Monthly Charge (Subscription Fee)

The monthly subscription fee for both residence and business users is 50 Baht for a rotary dial telephone line (in case that an accommodating local switch is Cross Bar (XB) type) and 100 Baht for a push button telephone line (in case that an accommodating local switch is SPC type) . The number of push button telephone lines is increasing year by year and its share is now 65% in FY 1989 as shown in Table 16.3.2-1.

Table 16.3.2-1 The Number of Main Tel. Stations by Type of Telephones

Year	Rotary Dial	Push Button	Total	Share of P.B.
1977	260,806	0	260,806	0%
1978	295,433	201	295,634	0%
1979	331,009	575	331,584	0%
1980	365,168	726	365,894	0%
1981	379,577	2,798	382,375	1%
1982	400,789	16,169	416,958	4%
1983	408,681	45,124	453,805	10%
1984	414,820	93,785	508,605	18%
1985	395,390	211,186	606,576	35%
1986	374,496	399,406	773,902	52%
1987	382,123	491,124	873,247	56%
1988	390,425	585,349	975,774	60%
1989	393,224	732,875	1,126,099	65%

Note: Private and Government
Source: TOT, Telephone Statistical Report, 1981, 1989

It is planned that the all present XB switches used in the Study Area will be removed and replaced with SPC switches by FY 2000. Therefore, the monthly subscription fee until FY 2000 is set to be 75 Baht which is just an average of 50 Baht for a dial telephone line and 100 Baht for a push button telephone line, and from FY 2001 it is set to be 100 Baht per line per month.

3) Local Call Charge

The present charge of a local call made within the same province from a normal subscriber's telephone is 3 Baht no matter how long it lasts. TOT has an intention to adopt a "time metering system" or "local timed calling plan" in the Bangkok Metropolitan Area in the near future. The local call revenue is calculated on the basis of the present tariff sys-

tem in this study, though the local call traffic can be affected by the time metering system when it is put into practice.

4) Trunk Call Charge

The present charge of a domestic trunk call varies by distance from 3 to 18 Baht per minute for a normal subscriber telephone in the day time (7:00 - 18:00). Table 16.3.2-2 shows the present tariff of a domestic trunk call.

Table 16.3.2-2 Tariff Table of Domestic Trunk Call (as of June 1, 1989)

Rate	Within the Same Long Distance Code Number			Between Different Long Distance Code Number			Long Distance Public Telephone		
Distance	7:00 ~ 18:00	18:00 ~ 22:00	22:00 ~ 7:00	7:00 ~ 18:00	18:00 ~ 22:00	22:00 ~ 7:00	7:00 ~ 18:00	18:00 ~ 22:00	22:00 ~ 7:00
0 - 50 km	3.00	1.50	1.00	3.00	1.50	1.00	3.00	1.50	1.00
51 - 100	6.00	3.00	2.00	6.00	3.00	2.00	6.00	3.00	2.00
over 101	9.00	4.50	3.00	-	-	-	-	-	-
101 - 200	-	-	-	9.00	4.50	3.00	8.00	4.00	2.67
201 - 350	-	-	-	12.00	6.00	4.00	12.00	6.00	4.00
351 - 500	-	-	-	15.00	7.50	5.00	15.00	7.50	5.00
over 501	-	-	-	18.00	9.00	6.00	20.00	10.00	6.67

(Baht/minute)

16.3.3 Call Revenue Estimation

The revenues from telephone usage is classified into two items, local call revenue and trunk call revenue. The call traffic tends to increase in accordance with the increase of the number of the connected main telephone lines. The number of local calls in the future can be estimated by a regression analysis between the number of local calls and the number of connected main telephone lines because the time-series data of the number of calls for the type of subscribers are available. As for the trunk call revenue, the trunk call revenue is estimated by a regression analysis between the trunk call revenue and the number of connected main telephone lines.

The regression analysis is based on the billing data instead of the accounting records of TOT, because the accounting records can not be separated into detail.

The number of local calls and the trunk call revenue are estimated separately for the BMA, Nakhon Pathom, Samut Sakhon, and Ayutthaya. The estimation procedure and the detail data are described in APPENDIX. The regression analyses estimate the number of local calls and the trunk revenue with the following equations.

1) BMA

a) Local Call:

Pulses (1,000) = 1.566973 × (Ave. Main Tel. Line) + 151748.3719

b) Trunk Revenue:

Trunk Revenue (Thousand Baht) = 2.6797 × (Ave. Main Tel. Line) - 440149.5516

2) Nakhon Pathom

a) Local Call:

Pulses (1,000) = 1.2602 × (Ave. Main Tel. Line) - 848.3357

b) Trunk Revenue:

Trunk Revenue (1,000) = 10.8481 × (Ave. Main Tel. Line) - 14988.9426

3) Samut Sakhon

a) Local Call:

Pulses (1,000) = 1.1009 × (Ave. Main Tel. Line) + 731.4896

b) Trunk Revenue:

Trunk Revenue (1,000) = 12.0238 × (Ave. Main Tel. Line) - 7052.3754

4) Ayutthaya

a) Local Call:

Pulses (1,000) = 1.0511 × (Ave. Main Tel. Line) - 220.2249

b) Trunk Revenue:

Trunk Revenue (1,000) = 12.2568 x (Ave. Main Tel. Line) - 9246.7560

In order to estimate the revenues from the Project, the total revenue from the network in the Study Area is estimated at first. In the revenue estimation process, the future revenue from the new subscribers is calculated with the following steps:

1) The telephone call revenue from all the subscribers in the Study Area including both the existing and the new subscriber lines that will be installed in the Project is estimated at first applying the linear regression models (A = "the whole"),

2) The telephone call revenue from only the existing subscriber lines is calculated next (B = "the existing"). The existing revenue (B) is calculated based on the estimated number of local calls and trunk revenue per subscriber line for the fiscal year of 1992,

3) The telephone call revenue from the new subscriber line is calculated by subtracting B from A (C: the new = A: the whole - B: the existing).

Hence, the amount of the revenue for the existing lines is estimated to be constant for the Project period. Figure 16.3.3 shows the local and trunk call revenue from the existing lines and the new lines installed in the long-term plan.

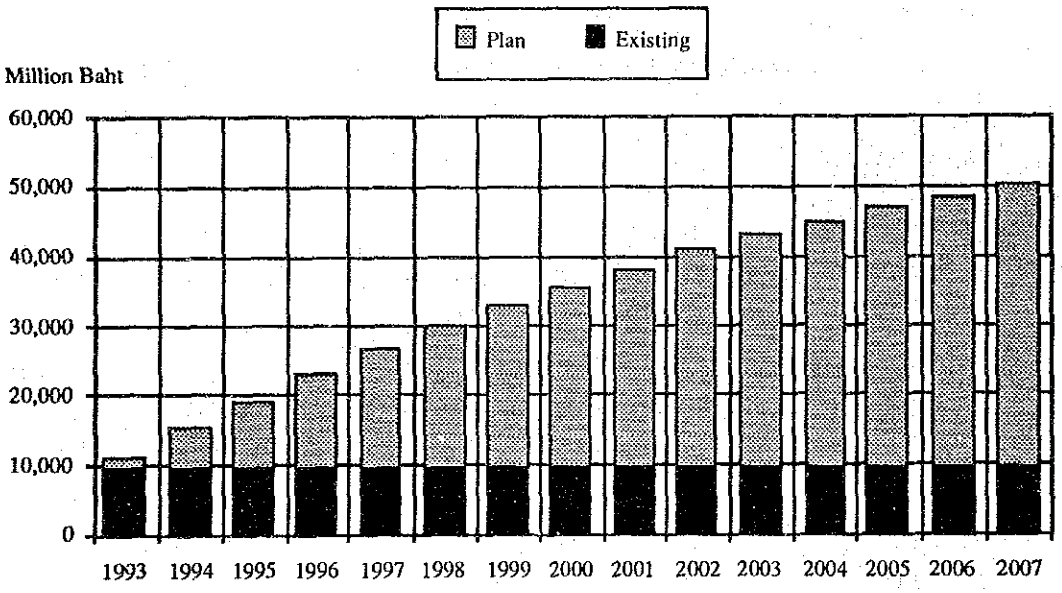


Figure 16.3.3 Local and Trunk Call Revenue Estimation (Private + Government)

16.3.4 Other Revenues

Besides the local call and trunk call revenues, there are other revenues such as leased circuit charges, relocation charges, the revenue from advertising in the directory. Table 16.3.4 shows the operating revenues of TOT from the whole country in the past ten years. A weighted average share of these revenues to the total telephone revenue in the past ten years is 8.84%. Therefore in this revenue estimation, 8% of the total telephone revenue is assumed for other revenues.

Table 16.3.4 Operating Revenue in the Past Ten Years

(Unit: Million Baht)

Year	1. Local Service (Subscriptio n + Call Revenue)	2. Trunk Service	3. Telephone Revenue (=1+2)	4. Revenue from Other Service	5. Share (=4/3)	Total Operating Revenue
1981	1,739.129	925.008	2,664.137	256.112	9.61%	2,920.249
1982	2,013.404	1,230.556	3,243.960	301.795	9.30%	3,545.755
1983	2,183.506	1,417.636	3,601.142	316.915	8.80%	3,918.057
1984	2,463.533	1,733.101	4,196.634	370.662	8.83%	4,567.296
1985	2,702.853	1,899.571	4,602.424	614.113	13.34%	5,216.537
1986	3,931.245	2,834.305	6,765.550	1,062.477	15.70%	7,828.027
1987	5,052.440	3,564.902	8,617.342	789.161	9.16%	9,406.503
1988	5,870.430	4,489.874	10,360.304	678.298	6.55%	11,038.602
1989	6,844.848	5,457.437	12,302.285	903.933	7.35%	13,206.218
1990	8,382.714	6,980.206	15,362.920	1,047.319	6.82%	16,410.239
Total (81-90)	41,184.102	30,532.596	71,716.698	6,340.785	8.84%	78,057.483

Source: TOT, Telephone Statistical Report

16.3.5 Deposit

A subscriber must deposit 3,000 Baht when he applies for a telephone line. This deposit will be refunded to a subscriber upon termination of the service if no telephone bill is left unpaid. Therefore, the deposit is not counted as the revenue but a source of the funds. From the view point of the cash flow of the Project, the deposit is to be taken into the "Cash In-flow" and refunded at the end of the Project period.

16.3.6 Public Telephone Revenue

Table 16.3.6 shows the revenue per public telephone in the Bangkok Metropolitan area, the provincial areas, and the whole Kingdom. The revenue per public telephone increased more than twice within these six years. In order to estimate the public telephone revenue for the future, the revenue per public telephone in FY 1990 is to be applied based on the total public telephone revenue.

1) Revenue per public telephone in the BMA : 30,000 Baht
2) Revenue per public telephone in the Surrounding Area : 88,000 Baht

Table 16.3.6 Revenue per Public Telephone

(Unit: Baht per set / year)

Year	1985	1986	1987	1988	1989	1990
1. BMA Tel. Area						
1.1 Local Public Telephone	13,679	22,352	23,818	25,551	25,389	32,390
1.2 Trunk & Rural Long Public Telephone	23,310	6,798	4,332	2,788	2,792	2,408
1.3 Total Public Telephone	14,063	21,620	22,780	24,313	24,119	30,513
2. Prov. Tel. Area						
2.1 Local Public Telephone	10,704	57,984	68,412	77,654	82,746	96,190
2.2 Trunk & Rural Long Public Telephone	86,277	73,697	76,409	84,766	83,854	83,658
2.3 Total Public Telephone	42,307	65,598	72,607	81,589	83,405	88,222
3. Whole Kingdom						
3.1 Local Public Telephone	13,250	27,970	31,207	34,294	35,024	43,130
3.2 Trunk & Rural Long Public Telephone	70,206	59,050	61,683	69,418	70,268	70,747
3.3 Total Public Telephone	20,213	32,929	36,901	41,447	43,068	50,282

16.3.7 Total Revenue Estimation

Table 16.3.7-1 shows the future total operating revenue estimates. Table 16.3.7-2 shows the future cash in-flow estimates of the Project.

Table 16.3.7-1 Total Operating Revenue Estimation of the Project

(Unit: Million Baht)

Year	Installation Fee	Subscription Fee	Local Call Charge	Trunk Call Charge	Public Telephone	Other Service	Total
1993	1,663	223	1,224	706	79	179	4,073
1994	1,662	670	3,617	2,178	240	536	8,904
1995	1,662	1,117	5,972	3,690	407	895	13,743
1996	1,662	1,563	8,308	5,221	580	1,254	18,587
1997	1,661	2,009	10,633	6,762	758	1,613	23,437
1998	1,095	2,380	12,547	8,112	933	1,918	26,985
1999	1,094	2,674	14,054	9,266	1,106	2,168	30,362
2000	1,094	2,968	15,559	10,421	1,285	2,419	33,745
2001	1,093	3,261	17,062	11,577	1,468	2,669	37,131
2002	1,093	3,555	18,563	12,734	1,655	2,921	40,520
2003	754	3,803	19,829	13,718	1,848	3,136	43,088
2004	753	4,005	20,862	14,530	2,045	3,315	45,511
2005	752	4,208	21,894	15,341	2,247	3,495	47,938
2006	752	4,410	22,924	16,152	2,455	3,675	50,367
2007	751	4,611	23,953	16,962	2,666	3,855	52,798

Table 16.3.7-2 Details of the Project Cash In-flow Estimation

(Unit: Million Baht)

Year	Insta-llation Fee	Subscrip-tion Fee	Local Call Charge	Trunk Call Charge	Public Telephone Usages	Other Service	Deposit	Total
1993	1,663	223	1,224	706	79	179	1,489	5,562
1994	1,662	670	3,617	2,178	240	536	1,489	10,392
1995	1,662	1,117	5,972	3,690	407	895	1,488	15,231
1996	1,662	1,563	8,308	5,221	580	1,254	1,488	20,076
1997	1,661	2,009	10,633	6,762	758	1,613	1,488	24,925
1998	1,095	2,380	12,547	8,112	933	1,918	980	27,965
1999	1,094	2,674	14,054	9,266	1,106	2,168	980	31,342
2000	1,094	2,968	15,559	10,421	1,285	2,419	979	34,724
2001	1,093	3,261	17,062	11,577	1,468	2,669	979	38,110
2002	1,093	3,555	18,563	12,734	1,655	2,921	978	41,498
2003	754	3,803	19,829	13,718	1,848	3,136	675	43,763
2004	753	4,005	20,862	14,530	2,045	3,315	675	46,186
2005	752	4,208	21,894	15,341	2,247	3,495	674	48,612
2006	752	4,410	22,924	16,152	2,455	3,675	673	51,040
2007	751	4,611	23,953	16,962	2,666	3,855	672	53,471
2008	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2009	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2010	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2011	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2012	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2013	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2014	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2015	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2016	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2017	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2018	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2019	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2020	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2021	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2022	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2023	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2024	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2025	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2026	0	4,712	24,467	17,367	2,773	3,946	0	53,264
2027	0	4,712	24,467	17,367	2,773	3,946	-15,708	37,557

16.4 Cost Estimation

The costs of this Project are composed of the following items:

1) Capital Expenditure:

   a) Initial investment costs (facilities, equipment, land and buildings, civil work, vehicles, construction and installation, consultant fee, reserve fund),

   b) Replacement and rehabilitation costs (facilities and equipment which are to be replaced during a project life),

2) Working Capital:
   Current assets which correspond to fund in hand, inventory, uncollected revenue, etc.,

3) Operating Expenditure:
   Personnel expenses, administrative expenses, and repair and maintenance expenses,

4) Taxation:
   Remittance to the Treasury and Value Added Tax (VAT),

5) Financial Cost:
   Interest payment and amortization of debt.

16.4.1 Capital Expenditure Estimation

The capital expenditure of the telecommunications networks and facilities such as switching, outside plant, and transmission facilities is examined and estimated in Chapter 13. The existing facilities at the end of the year of FY 1992 require rehabilitation, replacement, and renewal when their service lives end. We also estimate the costs of replacement and renewal of the existing facilities in addition to the future expansion investment cost. The total project investment cost includes the following two costs:

1) New installation cost for the expansion project ,
2) Replacement and renewal costs of the existing facilities.

The network management systems and the customer service systems are indispensable also in addition to the network facilities such as switching, outside plant and transmission in order to

operate and maintain the expanded networks and facilities with efficiency and provide the customers with quick services. Therefore, 10% of the total network facility costs is to be allocated for the network management systems and the customer service systems in this financial analysis.

In order to expand the telephone network, the following cost items must be also included as the project implementation costs.

a) Vehicle cost,
b) Miscellaneous work and equipment cost,
c) Project implementation expenses,
d) Consultant Fee,
e) Contingency fund.

From the budget of the fifth EDP Project (1984-1992), the percentage share of the total budget of these 5 cost items on the total amount of inside plant cost, outside plant cost, and transmission equipment cost is calculated as 8.69%. In this financial analysis, 10% of the total facility costs is estimated as the Project implementation costs.

The facilities of which economic lives are shorter than the Project period are to be replaced during the Project period. In this case, the replacement cost of each facility is estimated by the same way that the initial investment cost was calculated.

When the facilities have remaining useful life time at the end of the Project period, the non-used values at the end of the Project period will be recovered.

Scrap value is not taken into account because it is negligible.

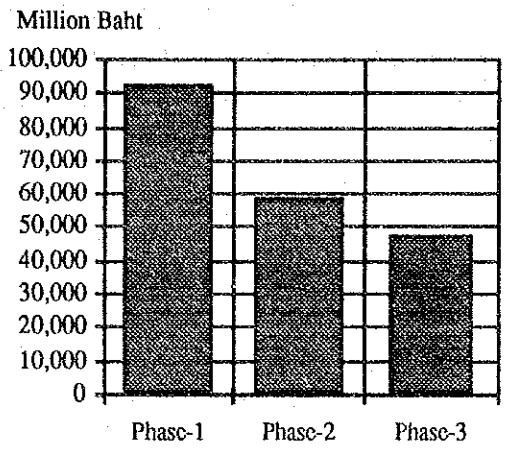


Figure 16.4.1-1 Total Investment Cost

Figure 16.4.1-1 shows the total investment cost estimated on the above mentioned conditions. The total investment cost for the Project is approximately 198 billion Baht, in which the Phase-1 requires the largest investment cost of about 92 billion Baht; the Phase-2 requires 59 billion Baht; and the Phase-3 requires 47 billion Baht.

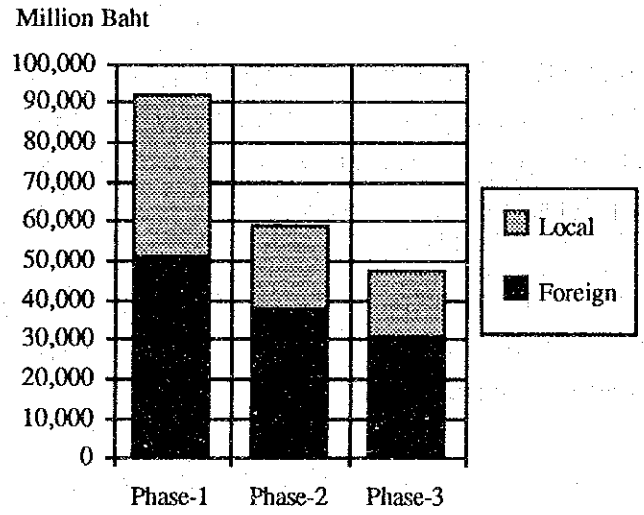


Figure 16.4.1-2 Foreign and Local Portion of the Total Capital Expenditure

Figure 16.4.1-2 sand Table 16.4.1-1 show the local and foreign portions of the investment cost in each phase. 60% of the total investment , approximately 119 billion Baht, is to be imported while 40%, approximately 80 billion Baht, is the local portion.

Table 16.4.1-1 Foreign and Local Portion of Investment Cost

(Unit: Million Baht)

	Phase-1		Phase-2		Phase-3		Total	
Foreign	50,930	55%	37,531	64%	30,158	64%	118,619	60%
Local	40,956	45%	21,533	36%	17,056	36%	79,544	40%
Total	91,886	100%	59,064	100%	47,214	100%	198,163	100%

Note: Right column of each phase shows the percentage share of each portion on the total in each phase.

The facilities constructed during the fifth ESDP (1984-1992) period will need to be replaced during the Phase-2 and the Phase-3. It is indispensable to make a rehabilitation plan for the existing facilities which will exceed their life time and become deteriorated. Since it is expected that these costs will increase drastically in the near future, it should be necessary to make a well synchronized plan to coordinate rehabilitation and expansion to avoid service quality grade down and overlapped or duplicated construction work.

Figure 16.4.1-3 and Table 16.4.1-2 show the composition of the total capital expenditure by type of construction such as expansion, replacement and renewal of the existing facilities, and replacement of the new expanded facilities.

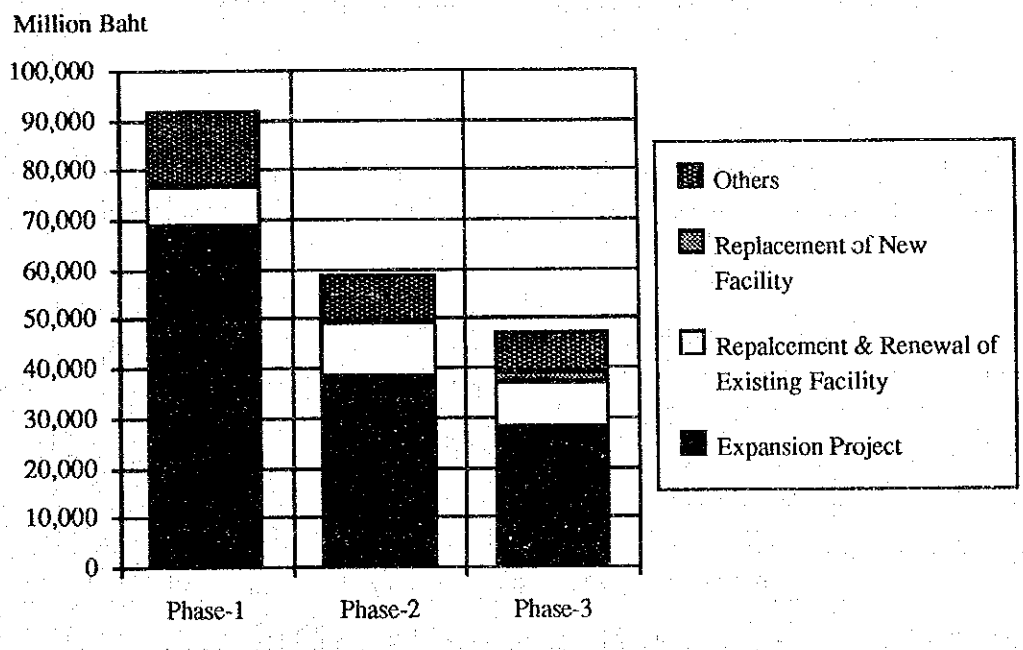


Figure 16.4.1-3 Capital Expenditure by type of Construction

75% of the total capital expenditure in the Phase-1 is invested for the expansion project; however, the share will decrease to 65% and 59% in the Phase-2 and the Phase-3, respectively. On the other hand, the investment costs for replacement and renewal of the existing facilities will increase from 9% in the Phase-1 to 19% in the Phase-2 and 20% in the Phase-3. The investment costs for replacement and renewal are estimated to be 7.9 billion Baht in the Phase-1, 11.0 billion Baht in the Phase-2, 9.4 billion baht in the Phase-3, and 28.3 billion Baht in total.

Table 16.4.1-2 Investment Cost by type of Construction

(Unit: Million Baht)

	Phase-1		Phase-2		Phase-3		Total	
Expansion Project	68,681	75%	38,225	65%	27,856	59%	134,764	68%
Replacement & Renewal of Existing Facility	7,891	9%	10,995	19%	9,442	20%	28,327	14%
Replacement of New Facility [1]	0	0%	0	0%	2,046	4%	2,046	1%
Others [2]	15,314	17%	9,844	17%	7,869	17%	33,027	17%
Total	91,886	100%	59,064	100%	47,214	100%	198,165	100%

Note: 1 Replacement of the new expanded facilities means that since public telephone is supposed to have 10 years service life time, the first installed public telephone during Phase-1 should be replaced during Phase-3.

2 Others includes:
1) the network management systems and the customer service system, and
2) the project implementation costs.

Table 16.4.1-3 shows the share of each capital expenditure for the type of facility. The capital expenditure for outside plant has the largest share in the Phase-1, approximately 45%.

Table 16.4.1-3 Total Investment Cost by Facility

(Unit: Million Baht)

	Phase-1		Phase-2		Phase-3		Total	
Land & Building	94	0.10%	48	0.08%	27	0.06%	169	0.09%
Switching	22,524	24.51%	16,128	27.31%	12,211	25.86%	50,863	25.67%
Outside Plant	37,713	41.04%	17,362	29.40%	12,139	25.71%	67,214	33.92%
Drop Wire	2,007	2.18%	1,333	2.26%	932	1.97%	4,272	2.16%
Transmission	11,575	12.60%	11,985	20.29%	9,365	19.84%	32,925	16.61%
CCS No.7	613	0.67%	49	0.08%	0	0.00%	662	0.33%
Public Telephone	2,046	2.23%	2,315	3.92%	4,670	9.89%	9,031	4.56%
Others [1]	15,314	16.67%	9,844	16.67%	7,869	16.67%	33,027	16.67%
Total	91,886	100.00%	59,064	100.00%	47,214	100.00%	198,163	100.00%

Note: 1 Others includes:
1) the network management systems and the customer service system, and
2) the project implementation costs.

Table 16.4.1-4 shows the total investment cost in detail.

Table 16.4.1-4 The Total Investment Cost in Detail

(Unit: Million Baht)

1. Expansion Project

	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Land & Building	94	0	94	48	0	48	27	0	27
Switching	964	19,855	20,819	476	9,742	10,218	379	7,679	8,058
Outside Plant	26,765	8,679	35,444	12,195	3,954	16,149	7,660	2,483	10,143
Drop wire	1,505	0	1,505	1,000	0	1,000	699	0	699
Transmission	1,113	6,545	7,658	1,179	6,934	8,113	882	5,190	6,072
CCS No.7	0	613	613	0	49	49	0	0	0
Public Tel.	736	1,310	2,046	833	1,482	2,315	944	1,680	2,623
Sub Total	31,177	37,002	68,179	15,730	22,162	37,892	10,591	17,032	27,623

2. Replacement of Expanded Facilities

	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Public Tel.	0	0	0	0	0	0	736	1,310	2,046
Sub Total	0	0	0	0	0	0	736	1,310	2,046

3. Replacement and Renewal of Existing Facilities

	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Land & Building	0	0	0	0	0	0	0	0	0
Switching	118	1,586	1,704	375	5,534	5,910	624	3,530	4,153
Outside Plant	1,764	505	2,269	943	270	1,213	1,551	445	1,996
Transmission	569	3,348	3,917	562	3,310	3,872	478	2,815	3,293
Sub Total	2,451	5,440	7,891	1,881	9,114	10,995	2,653	6,789	9,442

4. Total Project Capital Expenditures

	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Land & Building	94	0	94	48	0	48	27	0	27
Switching	1,082	21,441	22,524	851	15,277	16,128	1,003	11,209	12,211
Outside Plant	28,529	9,184	37,713	13,138	4,224	17,362	9,211	2,928	12,139
Drop Wire	2,007	0	2,007	1,333	0	1,333	932	0	932
Transmission	1,681	9,894	11,575	1,741	10,244	11,985	1,360	8,005	9,365
CCS No.7	0	613	613	0	49	49	0	0	0
Public Telephone	736	1,310	2,046	833	1,482	2,315	1,680	2,990	4,670
Sub Total	34,130	42,442	76,572	17,944	31,276	49,220	14,213	25,131	39,345
Management Systems [1]	3,413	4,244	7,657	1,794	3,128	4,922	1,421	2,513	3,934
Implement. Costs [1]	3,413	4,244	7,657	1,794	3,128	4,922	1,421	2,513	3,934
Total Cost	40,956	50,930	91,886	21,533	37,531	59,064	17,056	30,158	47,214

Note: 1 The cost for this item is estimated as 10% on the sub total of the facilities cost. The local and foreign portion of this item is for calculations only.

In order to estimate the annual investment cost, it is assumed that a half of the annual cost is to be paid in the previous year. Hence, the installation cost will appear in the cash flow table from FY 1992. Table 16.4.1-5 shows the annual investment cost during FY 1992 and FY 2007.

Table 16.4.1-5 Annual Investment Cost

(Unit: Million Baht)

Year	Land & Building.	Switching	Outside Plant & Public Tel.	Transmission & CCS No.7	Others	Total Cost
1992	47.03	2,266.16	3,165.98	1,183.45	1,332.52	7,995.14
1993	47.03	4,520.16	7,678.66	2,401.40	2,929.45	17,576.70
1994	0.00	4,507.11	9,123.64	2,383.62	3,202.88	19,217.25
1995	0.00	4,500.12	8,824.18	2,521.35	3,169.13	19,014.79
1996	0.00	4,488.49	8,593.56	2,526.81	3,121.77	18,730.63
1997	23.99	3,901.18	6,384.28	2,381.86	2,538.26	15,229.58
1998	23.99	3,307.78	4,388.10	2,421.46	2,028.27	12,169.59
1999	0.00	3,358.35	4,872.37	2,409.19	2,127.98	12,767.90
2000	0.00	3,233.22	4,426.34	2,396.92	2,011.30	12,067.77
2001	0.00	3,045.89	3,628.74	2,396.92	1,814.31	10,885.85
2002	13.45	2,744.08	3,306.25	2,134.98	1,639.75	9,838.51
2003	13.45	2,442.28	3,508.96	1,873.04	1,567.55	9,405.28
2004	0.00	2,442.28	3,989.51	1,873.04	1,660.97	9,965.79
2005	0.00	2,442.28	3,871.30	1,873.04	1,637.32	9,823.94
2006	0.00	2,442.28	3,265.46	1,873.04	1,516.16	9,096.94
2007	0.00	3,303.06	1,708.31	2,119.97	1,426.27	8,557.61
2008	0.00	4,163.85	444.08	2,401.40	1,401.87	8,411.20
2009	0.00	4,163.85	458.74	2,383.62	1,401.24	8,407.45
2010	0.00	4,163.85	469.33	2,521.35	1,430.91	8,585.44
2011	0.00	4,163.85	480.81	2,526.81	1,434.29	8,605.76
2012	0.00	3,103.75	3,659.20	2,381.86	1,828.96	10,973.77
2013	0.00	2,043.64	8,184.45	2,421.46	2,529.91	15,179.47
2014	0.00	2,043.64	9,643.63	2,409.19	2,819.29	16,915.76
2015	0.00	2,043.64	9,355.98	2,396.92	2,759.31	16,555.85
2016	0.00	2,043.64	9,136.20	2,396.92	2,715.35	16,292.11
2017	0.00	1,827.62	6,658.44	2,134.98	2,124.21	12,745.26
2018	0.00	1,611.60	4,388.10	1,873.04	1,574.55	9,447.29
2019	0.00	1,611.60	4,872.37	1,873.04	1,671.40	10,028.42
2020	0.00	1,611.60	4,426.34	1,873.04	1,582.20	9,493.18
2021	0.00	1,611.60	3,628.74	1,873.04	1,422.68	8,536.06
2022	0.00	2,887.73	3,115.67	2,119.97	1,624.67	9,748.04
2023	0.00	4,163.85	3,119.90	2,401.40	1,937.03	11,622.18
2024	0.00	4,163.85	3,585.78	2,383.62	2,026.65	12,159.91
2025	0.00	4,163.85	3,454.69	2,521.35	2,027.98	12,167.87
2026	0.00	4,163.85	2,836.53	2,526.81	1,905.44	11,432.63
2027	0.00	2,081.93	1,272.77	1,171.13	905.17	5,431.00

Note: Annual investment cost from FY 2008 is automatically calculated on the assumption that the facilities of which economic lives are shorter than the Project life are to be replaced during the Project life using the same cost as initial investment (from FY 1992 to FY 2007).

16.4.2 Working Capital

Working capital is the current assets which correspond to fund in hand, inventory, uncollected revenue, and so forth. For the financial estimation, the amount of the working capital is set to be 50% of the total revenue based on the percentage share of the current assets on the total revenue in the past nine years of TOT. The detail data of the current assets of TOT is shown in APPENDIX.

The required annual increase of the working capital is estimated as a component of the cash out-flow in each year and the total working capital is refunded at the end of the Project, year 2027.

16.4.3 Operating Expenditure Estimation

Operating expenditure is the expenses which are indispensable to operation and maintenance of telecommunications networks. This cost is composed of manpower cost, operation and administration cost, and maintenance and repair cost. The detail procedures to estimate these operating expenses are described in APPENDIX.

1) Personnel Expenses Estimation (Staff Remuneration)

Personnel Expenses for this Project is calculated by the following equation:

Personnel Expenses = [Number of employees increased by the Project] x
[Average Personnel Expenses per Employee]

The required number of employees as a whole in the future is analyzed and estimated in Chapter 12. The number of employees increased with the Project is calculated by the share of the number of main telephone lines increased by the Project on the total main telephone lines.

In this study, the average personnel expenses per employee is to be 110 thousand Baht and annual wage increase rate is to be 8% taking from the average increase rate in the last 6 years.

2) Other Administrative Expenses Estimation

The other administrative expenses in the future can be estimated by the following equation:

Other Administrative Expenses (million Baht)
= 0.9273 X Lines connected (thousand) - 94.8792

3) Repair and Maintenance Expenses

The repair and maintenance expenses in the future can be estimated by the following equation:

Maintenance cost (Million Baht) = 0.3513 X Lines connected (Thousand) + 25.5502

4) Bad Debt

One (1) percent of the operating revenue is estimated as uncollectable.

5) Depreciation

The straight-line depreciation method is applied. The following depreciation years are used for each facility:

a)	Switching Facility	10 year,
b)	Outside Plant	20 year,
c)	Transmission	15 year,
d)	Public Telephone	7 year.

The depreciation of buildings is not estimated here because the construction cost of buildings is quite small compared with other facility installation costs.

16.4.4 Financial Cost

The loan conditions are given in Subsection 16.5.2.

16.4.5 Taxation

1) Corporate Profit Tax

TOT has an obligation as a state owned enterprise to pay the remittance to the Treasury when its net profit is positive just like the business profit tax for private companies. The present remittance is 30 % of the net profit at the present; however, it is likely to be increased to 40% by the Government from FY 1992. Therefore, 40% of the net profit is estimated as the remittance to the Treasury after the net profit is estimated from the income statement estimation.

2) Value Added Tax (VAT)

The Thai Government recently legislated a 7% VAT, which took effect from the first of January, 1992. It was assumed that the 7% VAT was shifted onto the subscribers and added on their telephone charges; however, TOT could not do so and has to bear the VAT. Therefore, VAT is taken into account in this financial forecast in the cash outflow.

16.4.6 Bonus

When the net profit after the remittance to the Treasury in one operating year is positive, a bonus is paid in the next year. This study assumes five (5) month salary as for the bonus to directors and employees, which is paid in the next year when the accumulated net profit becomes positive.

16.5 Financial Cash Flow Projection

16.5.1 Financial Cash Flow of the Project

The financial IRR of the Project is calculated as 10.05%, which is slightly lower than the present Bank rates from Bank of Thailand[1]. Figure 16.5.1-2 shows the net present value of the Project with the discount rate from 7% to 21%. The figure shows that the net present value of the Project is approximately 8,000 million Baht at 9% discount rate and approximately 30,200 million Baht at 7% discount rate.

Table 16.5.1 shows the cash-flow of this Project itself without any outside financing and Figure 16.5.1-1 illustrates the net cash-flow trend from FY 1992 until 2007. Annual net cash flow is negative until FY 1997 and turns to be positive from FY 1998. The negative

[1] Bank rate at April 1991 is 12% (Source: Bank of Thailand).

accumulated net cash flow will keep increasing until 1997 and reaches approximately minus 66 billion Baht. Accumulated net cash flow keeps negative until FY 2005 then turns to become positive from FY 2006. The next main issue is how to provide funds for the Project for these periods.

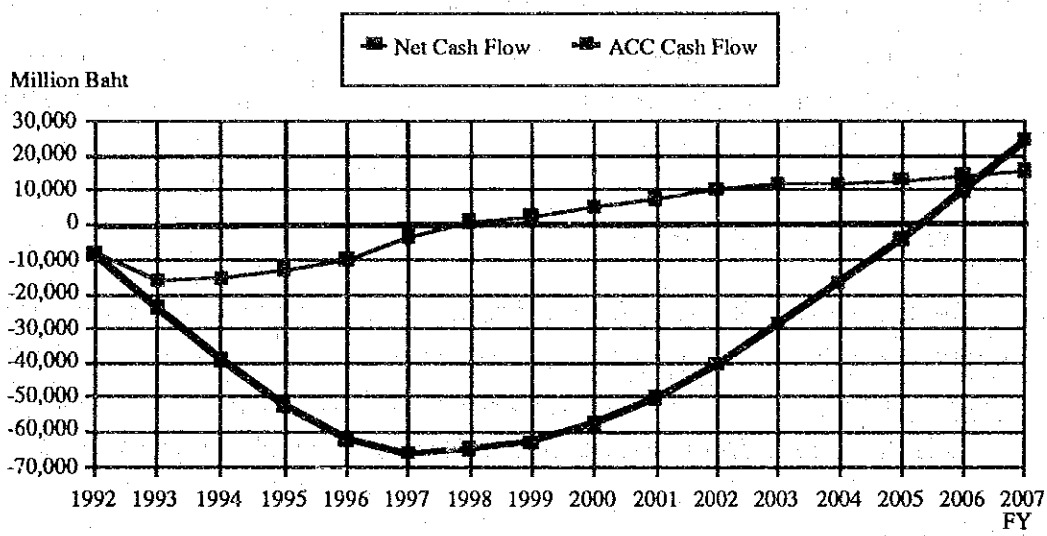


Figure 16.5.1-1 Annual Net Cash Flow and Accumulated Cash Flow without Finance

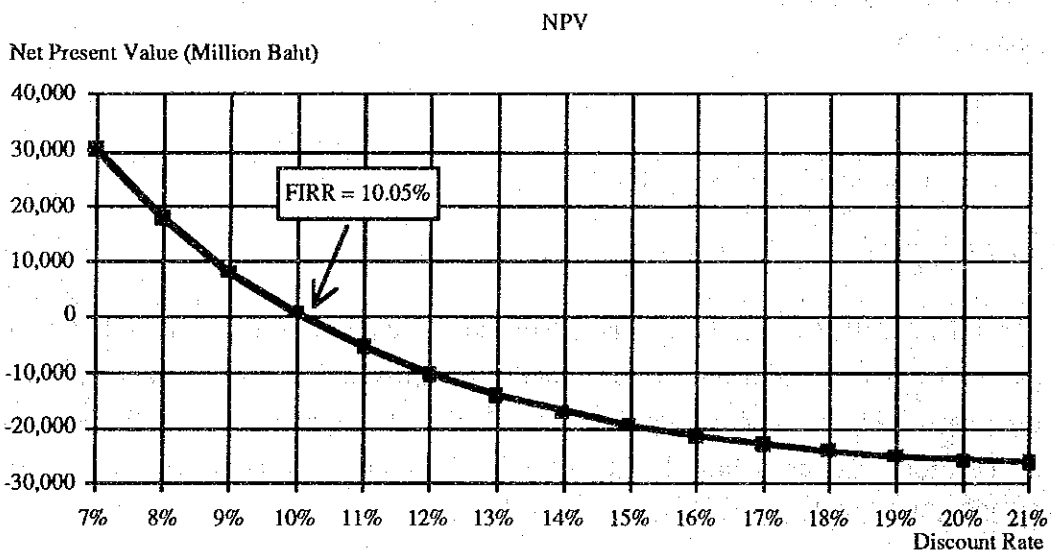


Figure 16.5.1-2 Net Present Value of the Project

Table 16.5.1 The Cash Flow of the Project without Borrowings

(Unit: Million Baht)

Year	Cash In-Flow			Cash Out-Flow				Net Cash Flow	ACC Cash Flow
	Operating Revenue	Deposit	Total	Capital Exp.	Working Capital	Operating Exp.*	Total		
1992	0	0	0	7,995	0	0	7,995	-7,995	-7,995
1993	4,073	1,489	5,562	17,577	2,037	1,964	21,577	-16,015	-24,010
1994	8,904	1,489	10,392	19,217	2,415	4,304	25,937	-15,544	-39,554
1995	13,743	1,488	15,231	19,015	2,419	6,588	28,022	-12,791	-52,345
1996	18,587	1,488	20,076	18,731	2,422	8,868	30,021	-9,946	-62,291
1997	23,437	1,488	24,925	15,230	2,425	11,158	28,813	-3,888	-66,179
1998	26,985	980	27,965	12,170	1,774	12,911	26,854	1,111	-65,068
1999	30,362	980	31,342	12,768	1,689	14,571	29,027	2,315	-62,753
2000	33,745	979	34,724	12,068	1,691	16,250	30,009	4,715	-58,038
2001	37,131	979	38,110	10,886	1,693	18,012	30,591	7,519	-50,519
2002	40,520	978	41,498	9,839	1,695	19,824	31,358	10,141	-40,378
2003	43,088	675	43,763	9,405	1,284	21,543	32,232	11,532	-28,846
2004	45,511	675	46,186	9,966	1,211	23,213	34,391	11,795	-17,051
2005	47,938	674	48,612	9,824	1,213	24,915	35,952	12,660	-4,391
2006	50,367	673	51,040	9,097	1,215	26,674	36,986	14,054	9,663
2007	52,798	672	53,471	8,558	1,216	28,498	38,271	15,200	24,862
2008	53,264	0	53,264	8,411	233	30,602	39,246	14,018	38,881
2009	53,264	0	53,264	8,407	0	31,765	40,172	13,092	51,973
2010	53,264	0	53,264	8,585	0	31,766	40,351	12,913	64,886
2011	53,264	0	53,264	8,606	0	31,737	40,342	12,922	77,809
2012	53,264	0	53,264	10,974	0	31,706	42,680	10,584	88,393
2013	53,264	0	53,264	15,179	0	31,693	46,872	6,392	94,785
2014	53,264	0	53,264	16,916	0	31,661	48,577	4,687	99,472
2015	53,264	0	53,264	16,556	0	31,632	48,188	5,077	104,549
2016	53,264	0	53,264	16,292	0	31,604	47,896	5,369	109,918
2017	53,264	0	53,264	12,745	0	31,568	44,313	8,951	118,869
2018	53,264	0	53,264	9,447	0	31,666	41,113	12,151	131,021
2019	53,264	0	53,264	10,028	0	31,758	41,787	11,478	142,498
2020	53,264	0	53,264	9,493	0	31,848	41,341	11,923	154,421
2021	53,264	0	53,264	8,536	0	31,950	40,486	12,778	167,199
2022	53,264	0	53,264	9,748	0	32,053	41,801	11,463	178,662
2023	53,264	0	53,264	11,622	0	31,999	43,621	9,643	188,305
2024	53,264	0	53,264	12,160	0	31,962	44,122	9,142	197,448
2025	53,264	0	53,264	12,168	0	31,925	44,093	9,171	206,619
2026	53,264	0	53,264	11,433	0	31,885	43,317	9,947	216,566
2027	53,264	-15,708	37,557	-73,386	-26,632	31,855	-68,164	105,720	322,286

Note: * Operating Expenditure here includes "Taxation" and "Bonus Payment".

16.5.2 Financial Cash Flow with Financing Assumption

In order to provide funds for the Project's initial investment cost, 10-year long-term loans from outside sources are taken into consideration .

The following terms and conditions are employed:

1) The operating entity is able to invest 5,000 million Baht per year during the first 6 years from FY 1992 until FY 1997, 3,000 million Baht per year during the next 3 years from FY 1998 until FY 2000, 2,000 million Baht in FY 2001, and 1,000 million Baht in FY 2002,
2) The shortage in the cash balance of the Project is financed by the long-term loans from outside up to 75% of the initial investment cost,
3) The interest rate of the long-term loans is to be 12% and interest payment begins from the end of the first year when borrowed,
3) the grace period is 3 years and repayment period is 7 years.

On this assumption, a required loan is estimated as follows.

Table 16.5.2-1 Financing Assumption for the Project

(Unit: Million Baht)

Year	Own Fund	Loan	Capital Expenditure	Loan/CAPEX[1]
1992	5,000	3,500	7,995	44%
1993	5,000	12,500	17,577	71%
1994	5,000	12,500	19,217	65%
1995	5,000	11,000	19,015	58%
1996	5,000	10,600	18,731	57%
1997	5,000	7,000	15,230	46%
1998	3,000	5,000	12,170	41%
1999	3,000	5,000	12,768	39%
2000	3,000	4,000	12,068	33%
2001	2,000	2,000	10,886	18%
2002	1,000	0	9,839	0%
2003	0	0	9,405	0%
2004	0	0	9,966	0%
2005	0	0	9,824	0%
2006	0	0	9,097	0%
2007	0	0	8,558	0%
Total	42,000	73,100	202,343	36%

Note: CAPEX stands for "capital expenditures".

Table 16.5.2-2 shows the cash balance at the beginning, the cash from operation, the investment of own fund, the long-term loans, the loan repayment, and the cash balance at ending in each year during the Project period.

Table 16.5.2-2 Loans and Repayment Schedule

(Unit: Million Baht)

FY	Cash Balance at Beginning	Cash from Operation	Own Fund	Long-term Loan	Loan Repayment	Cash Balance at Ending
1992	0	-8,415	5,000	3,500	0	85
1993	85	-17,337	5,000	12,500	0	248
1994	248	-17,525	5,000	12,500	0	223
1995	223	-15,599	5,000	11,000	500	124
1996	124	-13,352	5,000	10,600	2,286	85
1997	85	-7,505	5,000	7,000	4,071	509
1998	509	-2,460	3,000	5,000	5,643	406
1999	406	-1,101	3,000	5,000	7,157	147
2000	147	1,599	3,000	4,000	8,157	589
2001	589	4,897	2,000	2,000	8,871	615
2002	615	8,173	1,000	0	9,086	702
2003	702	10,131	0	0	7,871	2,961
2004	2,961	10,853	0	0	6,371	7,443
2005	7,443	12,063	0	0	4,800	14,706
2006	14,706	13,694	0	0	3,286	25,115
2007	25,115	15,004	0	0	2,286	37,833
2008	37,833	13,936	0	0	1,571	50,198
2009	50,198	13,072	0	0	857	62,412
2010	62,412	12,913	0	0	286	75,040
2011	75,040	12,922	0	0	0	87,962
2012	87,962	10,584	0	0	0	98,546
2013	98,546	6,392	0	0	0	104,939
2014	104,939	4,687	0	0	0	109,626
2015	109,626	5,077	0	0	0	114,703
2016	114,703	5,369	0	0	0	120,071
2017	120,071	8,951	0	0	0	129,023
2018	129,023	12,151	0	0	0	141,174
2019	141,174	11,478	0	0	0	152,652
2020	152,652	11,923	0	0	0	164,575
2021	164,575	12,778	0	0	0	177,353
2022	177,353	11,463	0	0	0	188,816
2023	188,816	9,643	0	0	0	198,459
2024	198,459	9,142	0	0	0	207,601
2025	207,601	9,171	0	0	0	216,773
2026	216,773	9,947	0	0	0	226,720
2027	226,720	105,720	0	0	0	332,440

16.6 Profit and Loss Statement of the Project

Table 16.6 shows the estimated income statement of the Project.

Table 16.6 Profit and Loss Statement of the Project

(Unit: Million Baht)

Year	Op. Revenue	Op. Expend.	Op. Income	Other Expend.	NIBTB [1]	Tax	Bonus	NIATB [2]	ACC NIATB
1992	0	0	0	420	-420	0	0	-420	-420
1993	4,073	2,579	1,494	1,920	-426	0	0	-426	-846
1994	8,904	5,306	3,598	3,420	178	0	176	2	-844
1995	13,743	8,007	5,736	4,680	1,056	422	313	321	-523
1996	18,587	10,680	7,907	5,678	2,230	892	436	901	378
1997	23,437	13,354	10,084	6,029	4,054	1,622	558	1,874	2,253
1998	26,985	15,219	11,766	5,952	5,814	2,326	684	2,804	5,057
1999	30,362	17,148	13,214	5,693	7,521	3,009	797	3,716	8,773
2000	33,745	19,135	14,610	5,194	9,416	3,766	921	4,728	13,501
2001	37,131	21,033	16,098	4,370	11,728	4,691	1,058	5,979	19,480
2002	40,520	22,935	17,585	3,279	14,306	5,722	1,208	7,375	26,855
2003	43,088	23,757	19,331	2,335	16,996	6,799	1,374	8,824	35,679
2004	45,511	24,593	20,918	1,570	19,348	7,739	1,530	10,079	45,758
2005	47,938	25,496	22,442	994	21,448	8,579	1,702	11,167	56,925
2006	50,367	26,408	23,959	600	23,359	9,344	1,890	12,125	69,050
2007	52,798	27,331	25,468	326	25,142	10,057	2,097	12,988	82,038
2008	53,264	30,195	23,070	137	22,933	9,173	2,324	11,435	93,473
2009	53,264	30,213	23,052	34	23,017	9,207	3,494	10,316	103,789
2010	53,264	30,210	23,054	0	23,054	9,222	3,494	10,338	114,128
2011	53,264	30,283	22,982	0	22,982	9,193	3,494	10,295	124,422
2012	53,264	30,358	22,907	0	22,907	9,163	3,494	10,250	134,672
2013	53,264	30,392	22,872	0	22,872	9,149	3,494	10,229	144,901
2014	53,264	30,471	22,794	0	22,794	9,118	3,494	10,182	155,083
2015	53,264	30,544	22,720	0	22,720	9,088	3,494	10,138	165,221
2016	53,264	30,615	22,649	0	22,649	9,060	3,494	10,095	175,316
2017	53,264	30,705	22,560	0	22,560	9,024	3,494	10,042	185,357
2018	53,264	30,460	22,805	0	22,805	9,122	3,494	10,188	195,546
2019	53,264	30,229	23,036	0	23,036	9,214	3,494	10,327	205,873
2020	53,264	30,003	23,261	0	23,261	9,304	3,494	10,462	216,335
2021	53,264	29,748	23,516	0	23,516	9,406	3,494	10,615	226,951
2022	53,264	29,491	23,774	0	23,774	9,510	3,494	10,770	237,721
2023	53,264	29,626	23,638	0	23,638	9,455	3,494	10,689	248,409
2024	53,264	29,718	23,546	0	23,546	9,418	3,494	10,633	259,043
2025	53,264	29,811	23,453	0	23,453	9,381	3,494	10,578	269,620
2026	53,264	29,913	23,352	0	23,352	9,341	3,494	10,517	280,137
2027	53,264	29,987	23,277	0	23,277	9,311	3,494	10,472	290,609

Note: 1 NIBTB stands for "Net Income before Tax and Bonus".
2 NIATB stands for "Net Income after Tax and Bonus".

16.7 Sensitivity Analysis

16.7.1 Case Assumption and the Calculation Result

The Project FIRR is calculated as 10.05% on the conditions and assumptions set in the previous sections of this chapter as the Base Case. These conditions and assumptions will change in the long-term period. This section tries to see how these changes affect the feasibility of the Project by sensitivity analyses. The Study sets assumptions on the fluctuation ranges of telephone subscription demand, operating revenues, and capital expenditure. The following cases are examined.

1) The telephone subscription demand:
   a) 10% decrease (Case 1-A),
   b) 20% decrease (Case 1-B).

2) The telephone call revenue:
   a) 10% decrease (Case 2-A),
   b) 20% decrease (Case 2-B).

3) The capital expenditure (the initial investment cost):
   a) 10% increase (Case 3-A),
   b) 20% increase (Case 3-B).

1) Telephone Demand Decrease Case

When the telephone subscription demand decreases by 10% (Case 1-A) and 20% (Case 1-B), the Project FIRR falls to 7.83% and 5.43% from 10.05% of the Base Case.

The Project net cash flow becomes positive from FY 1998 in the Base Case; however, FY 1999 in Case 1-A and FY 2000 in Case 1-B. The accumulated net cash flow becomes positive from FY 2006 in the Base Case; however, FY 2008 in Case 1-A and FY 2011 in Case 1-B.

When the assumption of the cash investment by the operating entity for these cases is the same condition as for the Base Case, the required total amount of loan becomes 100.5 billion Baht for Case 1-A, and jumps up at 174.0 billion Baht for Case 1-B, while 73.1 billion Baht for Base Case as shown in Table 16.7.1-1.

These cash flow projections are calculated on the same investment cost while the demand differs. The demand decrease causes significant downward effects on the cash in-flow

because the installation fee, the monthly charge, the call revenues, and the deposit are all decreased as the number of installation goes down.

Table 16.7.1-1 Telephone Demand Decrease Case

(Unit: Million Baht)

Case	Base Case	Case 1-A	Case 1-B
		Demand 10% Down	Demand 20% Down
FIRR	10.05%	7.83%	5.48%
Net Cash Flow turns to positive at	1998	1999	2000
Accumu. Net Cash Flow turns to be positive at	2006	2008	2011
Required Loan			
1992	3,500	3,500	3,400
1993	12,500	12,500	12,900
1994	12,500	13,500	14,200
1995	11,000	12,500	13,700
1996	10,600	12,000	14,400
1997	7,000	8,000	11,400
1998	5,000	7,500	11,000
1999	5,000	8,000	12,200
2000	4,000	7,000	11,600
2001	2,000	6,000	11,300
2002	0	5,000	10,500
2003	0	3,500	9,200
2004	0	1,500	7,700
2005	0	0	8,400
2006	0	0	6,100
2007	0	0	4,200
2008	0	0	4,600
2009	0	0	4,200
2010	0	0	3,000
Total	73,100	100,500	174,000

2) Telephone Call Revenue Decrease Case

When the local call revenue and the trunk call revenue from the subscriber telephone decreases by 10% (Case 2-A) and 20% (Case 2-B) from the Base Case, the Project FIRR falls to 8.25% and 6.25% from 10.05% of the Base Case.

The year when the Project net cash flow becomes positive is the same for the Base Case and the Case 2-A; however two years delayed for the Case 2-B as FY 2000. The accumulated net cash flow becomes positive from FY 2006 in the Base Case, FY 2007 in the Case 2-A and FY 2009 in the Case 2-B.

When the cash investment by the operating entity is assumed to be the same as the Base Case for these cases, the required total amount of loans becomes 87.6 billion Baht for the Case 2–A, and jumps up at 114.95 billion Baht for the Case 2-B as shown in Table 16.7.1-2.

Table 16.7.1-2 Telephone Call Revenue Decrease Case

(Unit: Million Baht)

Case	Base Case	Case 2-A	Case 2-B
		Revenue 10% Down	Revenue 20% Down
FIRR	10.05%	8.25%	6.25%
Net Cash Flow turns to positive at	1998	1998	2000
Accumu. Net Cash Flow turns to be positive at	2006	2007	2009
Required Loan			
1992	3,500	3,500	3,500
1993	12,500	12,400	12,500
1994	12,500	12,900	13,300
1995	11,000	11,500	12,500
1996	10,600	11,100	12,500
1997	7,000	7,600	8,900
1998	5,000	6,500	7,900
1999	5,000	7,000	8,600
2000	4,000	5,700	8,300
2001	2,000	4,700	6,800
2002	0	3,200	6,900
2003	0	1,500	5,900
2004	0	0	4,600
2005	0	0	2,700
2006	0	0	50
2007	0	0	0
2008	0	0	0
2009	0	0	0
2010	0	0	0
Total	73,100	87,600	114,950

3) Capital Expenditure Increase Case

When the investment cost increases by 10% (Case 3-A) and 20% (Case 3-B) from the Base Case, the Project FIRR falls to 8.72% and 7.57% from 10.05% of the Base Case.

The year when the Project net cash flow becomes positive is the same for the Base Case and the Case 3-A; however one year later in the Case 3-B. The accumulated net cash

flow becomes positive from FY 2006 in Base Case, FY 2007 in the Case 3-A and FY 2008 in the Case 3-B.

When the cash investment by the operating entity is assumed to be the same as the Base Case for these cases, the required total amount of loan becomes 107.5 billion Baht for the Case 3-A, and jumps up at 161.0 billion Baht for the Case 3-B as shown in Table 16.7.1-3 .

Table 16.7.1-3 Capital Expenditure Increase Case

(Unit: Million Baht)

Case	Base Case	Case 3-A	Case 3-B
		Cost 10% Up	Cost 20% Up
FIRR	10.05%	8.72%	7.57%
Net Cash Flow turns to positive at	1998	1998	1999
Accumu. Net Cash Flow turns to be positive at	2006	2007	2008
Required Loan			
1992	3,500	4,400	5,300
1993	12,500	14,400	16,500
1994	12,500	15,100	17,700
1995	11,000	13,600	16,700
1996	10,600	13,300	17,000
1997	7,000	9,400	12,700
1998	5,000	7,300	11,200
1999	5,000	8,800	12,100
2000	4,000	7,500	10,700
2001	2,000	6,200	11,200
2002	0	4,600	10,000
2003	0	2,500	8,200
2004	0	400	6,700
2005	0	0	4,300
2006	0	0	700
2007	0	0	0
2008	0	0	0
2009	0	0	0
2010	0	0	0
Total	73,100	107,500	161,000

16.7.2 Results of Sensitivity Analysis

Table 16.7.2 shows the result of the sensitivity analyses of the Project. While the investment cost increase case has the smallest downward effect on the Project FIRR, the demand decrease case has the largest downward effect. When the demand decreases by 20%, the Project FIRR

goes down to 5.48% from 10.05% and the Project cash balance keeps negative until FY 2010. The accumulated amount of loans becomes 174,000 million Baht during these 19 years in this case.

This analysis indicates that the well coordination of the investment and installation plan with the actual subscription demand is the most essential for the investment efficiency and avoiding over-investment and repetitive refinancing for debt repayments.

Table 16.7.2 Result of Sensitivity Analysis of the Project

Case	Condition	FIRR	Net Cash Flow turns to positive at	Accumu. NCF turns to be positive at	Total Loan (Million Baht)
Base Case		10.05%	FY 1998	FY 2006	73,100
Case 1-A	Demand 10% Down	7.83%	FY 1999	FY 2008	105,000
Case 1-B	Demand 20% Down	5.48%	FY 2000	FY 2011	174,000
Case 2-A	Revenue 10% Down	8.25%	FY 1998	FY 2007	87,600
Case 2-B	Revenue 20% Down	6.25%	FY 2000	FY 2009	114,950
Case 3-A	Cost 10% Up	8.72%	FY 1998	FY 2007	107,500
Case 3-B	Cost 20% Up	7.57%	FY 1999	FY 2008	161,000

CHAPTER 17

PRIORITY PROJECTS

CHAPTER 17 PRIORITY PROJECTS

17.1 Introduction

17.1.1 Selection of the Priority Projects

In order to implement the long-term plan, three priority projects are selected by the Study Team as described in Chapter 15 on the condition that they are to be selected from projects excluding those already decided to be carried out with the BTO scheme. They are as follows:

1) Replacement of deteriorated facilities,
2) Establishment of Outside Plant Technical & Research Support Centers (OTRSC),
3) Reinforcement of Outside Plant Maintenance Centers (OPMC).

In the telecommunications development plan, it is indispensable to consider a telecommunications network plan; and expansion, replacement, rehabilitation, and modernization, operation and maintenance of telecommunications facilities, because telecommunications services can not be provided without telecommunications networks and facilities.

Since the next telephone expansion project will be executed by a BTO scheme during the seventh TOT ESDP period, TOT can and must utilize most of their resources to modernize their networks and facilities, to establish better network and facility management systems, and to develop future cores of engineers, professionals and management personnel during the seventh TOT ESDP period.

Therefore, replacement of deteriorated and out-of-date facilities is to be selected as the top priority project. The replacement and rehabilitation of deteriorated subscriber cables and wires will contribute greatly to improve the telecommunications service quality

17.1.2 The Top Priority Project

As mentioned above, the Study Team considers and recommends the "Replacement of Deteriorated Facilities" as the top priority project.

17.2 Replacement of Deteriorated Facilities

17.2.1 Necessity of the Project

As described in Chapter 9, replacement of deteriorated telecommunications facilities in outside plant, switching and transmission, should be carried out in accordance with the network ex-

pansion plan, the new telecommunication services introduction plan, the service quality grade-up program, and the operation and maintenance improvement plan. Figure 17.2.1 shows main problems and remedies.

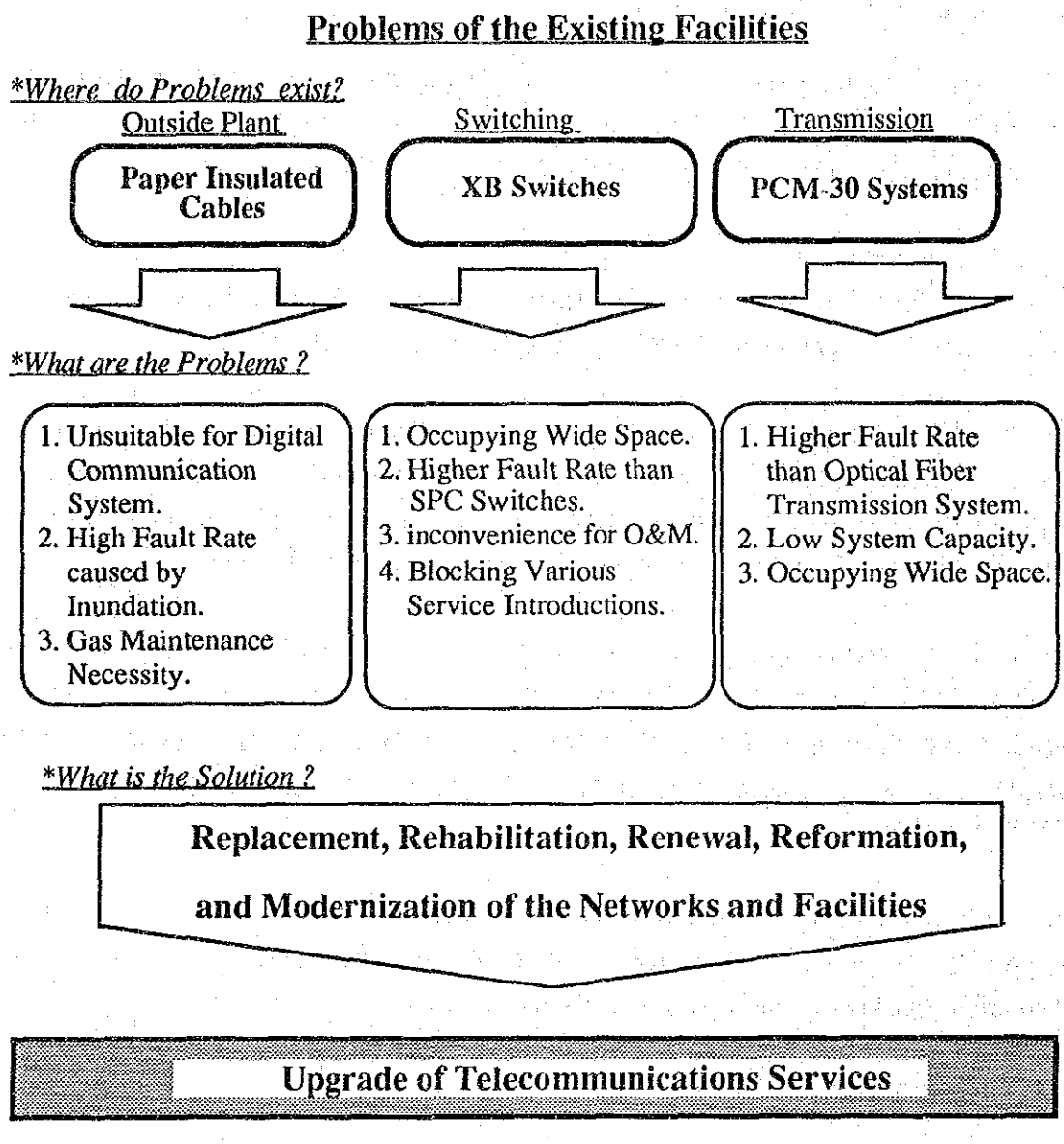


Figure 17.2.1 Replacement of the Facilities

17.2.2 Replacement Plan of Outside Plant

1) Implementation Procedure

As described in Chapter 13, replacement of the paper insulated cables should be carried out in accordance with the local cable expansion plan, the ISDN introduction plan, and the maintenance improvement plan. The long and bulky bunch of drop wires which are

spanned over streets should be replaced with cables immediately. However, for the present, the Study Team has not grasp all of those situations in detail yet. Therefore, a replacement plan of timeworn paper insulated cables is proposed here. Namely, the cables to be replaced are selected by taking the following factors into consideration:

a) cable installed more than 20 years ago,
b) cables in the strategic target areas,
c) cables with low replacement cost.

2) Replacement Plan in each Phase

The number of cables to be replaced in each phase is estimated as shown in Table 17.2.2.

Table 17.2.2 Paper Insulated Cable Replacement Plan

Area	Exchange Name	Phase 1			Phase 2			Phase 3		
		Kind of cable	Lines	Pairs	Kind of cable	Lines	Pairs	Kind of cable	Lines	Pairs
BMA 1	Phloen Chit	ASP&LTJ	9	9,600	ASP	2	6,000	ASP	5	8,800
		ASP	9	16,600						
BMA 1	Samran Rat	ASP	6	12,800						
BMA 1	Krung Kasem	ASP	10	18,300	ASP	2	4,500			
BMA 1	Surawong	ASP	4	11,400	ASP	4	12,600	ASP	5	15,600
BMA 1	Sam Sen							ASP	1	3,000
BMA 1	Asok-Din Daeng							ASP	3	9,000
BMA 1	Pathum Wan							ASP	2	4,200
BMA 2	Chaiyaphruk	ASP	10	23,700	ASP	1	3,000			
BMA 2	Bang Na	ASP	3	6,300	ASP	1	2,700	ASP	3	7,200
BMA 2	Samut Prakhan				ASP	1	2,700	ASP	2	3,900
BMA 2	Khlong Chan	ASP	1	3,000	ASP	2	5,400	ASP	2	5,100
BMA 2	Thungmahamek	ASP	7	11,700	ASP	1	3,000			
BMA 2	Sathu Pradit	ASP	1	1,200	ASP	1	2,100			
BMA 2	Thanon Tok	ASP	1	3,000	ASP	1	2,100			
BMA 2	Pu Chao Saming Phrai				ASP	1	1,800	ASP	3	9,800
BMA 2	Phra Khanong							ASP	4	10,200
BMA 2	Hua Mak							ASP	4	10,800
BMA 2	Trok Chan							ASP	3	7,800
BMA 3	Thon Buri	LTJ	3	1,100	ASP	2	8,000	ASP	1	3,000
		ASP	6	13,800						
BMA 3	Bang Khae	ASP	2	5,100	ASP	1	2,400	ASP	1	2,100
BMA 3	Dao Khanong	ASP	2	5,400	ASP	2	2,400	ASP	3	7,800
BMA 3	Phra Pradaeng				ASP	1	2,400			
BMA 3	Bang Phlat	ASP	3	5,900	ASP	1	3,000	ASP	1	2,400
BMA 3	Phanu Rangsi							ASP	1	900
BMA 3	Phasi Charoen							ASP	2	5,400
BMA 3	Charansanitwong							ASP	3	8,400
BMA 4	Phahon Yothin	LTJ	8	3,500	ASP	2	6,100	ASP	3	3,600
		ASP	4	9,000						
BMA 4	Intramara	ASP	2	6,000	ASP	1	2,700			
BMA 4	Bang Khen	ASP	2	4,200	ASP	1	1,200			
BMA 4	Bang Su	ASP	2	4,200	ASP	4	9,900	ASP	1	2,400
BMA 4	Ngam Wong Wan				ASP	3	8,400			
BMA 4	Don Muang	ASP	1	1,200	ASP	1	3,000			
BMA 4	Nonthaburi							ASP	3	6,000
BMA 4	Lat Phrao 1							ASP	3	8,400
BMA 4	Lak Si	ASP	1	1,500				ASP	2	5,700
BMA 4	Lat Phrao 2							ASP	2	5,400
	TOTAL		97	178,500		36	95,400		63	156,900

Note: ASP stands for "Paper or Wood Pulp Insulation Stalpeth Sheathed Cable".
LTJ stands for "Lead Sheathed Paper Insulated Lead Sleeve Joint Cable".

17.2.3 Replacement Plan of XB Switching Systems

1) Purpose

The purpose of the replacement of XB switching systems with SPC systems are:

- to utilize limited exchange office space required for the future facility expansion to accommodate all the waiting applicants by the year of 2007,
- to upgrade the service quality such as successful call rate (call completion rate),
- to provide customers with various network services which SPC systems can afford,
- to introduce various new telecommunications services,

2) Condition of the Replacement

When and which XB switches should be replaced must be judged by taking the following conditions into consideration:

a) Space Requirement for Facility Expansion

More office space will be needed in most of the exchange offices to install new switches to accommodated additional subscribers, more than 2 million lines by the year of 1997 and 3,792,000 subscriber lines by 2007. However, there are few offices which have enough space for further installation. Most of the exchange offices which are located in the central area of Bangkok have no space for additional switches because XB switching systems occupy the space.

The SPC switching systems can accommodate subscribers seven times more than XB switching systems in the same space. Therefore, these exchange offices at which large facility expansion is required but available space is small must have higher priority for XB switches replacement.

b) Staff Relocation from XB Switching Systems Operation and Maintenance

A severe shortage for telecommunications software engineers in the near future is expected, because demand for software development of switching systems, network control and management systems, facility management systems, and customer service systems will increase. It becomes more difficult to keep sufficient qualified system engineers. However, a large number of staff will be utilized from

XB switch operations and maintenance work when the XB switches are replaced with the SPC switches.

They have capabilities to become system engineers of telecommunications. If they are provided with suitable training chances and programs, they can become an intelligent work force to realize the intelligent networks.

c) New Services Introduction

The XB switches must be replaced to offer new services in the strategic target areas according to the strategies and priority considered in Chapter 11.

Exchange offices with the highest priority for new service introduction are PNC, SRR, KKM, SRW, ASD, PTW, and PYT.

The second highest priority exchange offices for new service introduction are TMM, STD, HAM, PSP, and LTP-1.

d) Operation Starting Years of XB Switches

Timeworn XB Switches must be given a higher priority for replacement because the fault rate of these facilities are expected to increase. Table 17.2.3-1 shows the year when each XB switch was put into operation.

Table 17.2.3-1 XB Switch Operation Starting Year

Area	Unit Name	Opening Year	Line Capacity	Type	Area	Unit Name	Opening Year	Line Capacity	Type
1	PNC-1	1971	12000	C400	3	TNB-1	1970	20000	C400
1	PNC-2	1971	10000	C400	3	BKE-1	1971	6000	C400
1	SRR-1	1970	10000	C400	3	DKN-1	1971	12000	C400
1	SRR-2	1970	10000	C400	3	PPG-1	1969	3310	C400
1	SRR-3	1978	10000	C400	3	PSN-1	1979	5000	C400
1	KKM-2	1970	10000	C400	3	CSW-1	1979	5100	C400
1	SRW-1	1976	10000	C400	3	BGT-1	1976	11000	C400
1	SRW-2	1976	10000	C400	3	Sub total		62410	
1	SRW-3	1978	10000	C400	4	ITM-1	1971	10000	C400
1	SMS-1	1980	5800	C400	4	BGN-1	1970	10000	C400
1	ASD-1	1979	10000	C400	4	BGS-1	1970	10000	C400
1	PTW-1	1980	5384	C400	4	NWW-1	1969	5300	C400
1	Sub total		113184		4	DNW-1	1970	3480	C400
2	BNA-1	1970	12000	C400	4	PYT-1	1967	12000	C400
2	CYP-2	1970	13000	C400	4	PYT-2	1976	5800	C400
2	KGC-1	1971	13000	C400	4	LKS-1	1976	6000	C400
2	TMM-1	1968	10000	C400	4	NTB-1	1979	3300	C400
2	STD-1	1971	3250	C400	4	LTP-1	1979	5200	C400
2	TNT-1	1970	5250	C400	4	LTP-2	1979	3200	C400
2	PSP-1	1977	7000	C400	4	Sub total		74280	
2	PKG-1	1979	8000	C400					
2	HAM-1	1979	8000	C400	2	SPK-1	1964	5000	ARF102
2	TKC-1	1979	10000	C400					
2	Sub total		89500			Total		344374	
Province	Unit Name	Opening Year	Line Capacity	Type	Province	Unit Name	Opening Year	Line Capacity	Type
6	SPR-1	1975	1000	ARF102	9	WNI-1	1979	1000	ARF102
6	SKN-1	1978	2000	ARF102	9	PCI-1	1979	1000	ARF102
6	NPT-1	1971	3000	PC1000	9	AYT-1	1973	1426	PC1000
6	BPN-1	1979	1000	ARF102	9	Total		10426	

3) Method

a) Replace XB switches by installing SPC switches in the places they were. If the space to install SPC switches is not enough to accommodate all subscriber lines, create new space.

b) Actual replacement must be carried out evenly for each year not to create unnecessary and unbearable work load. The operation starting years of the existing XB switches are concentrated in 1970 and 1979 as Figure 17.2.3 shows.

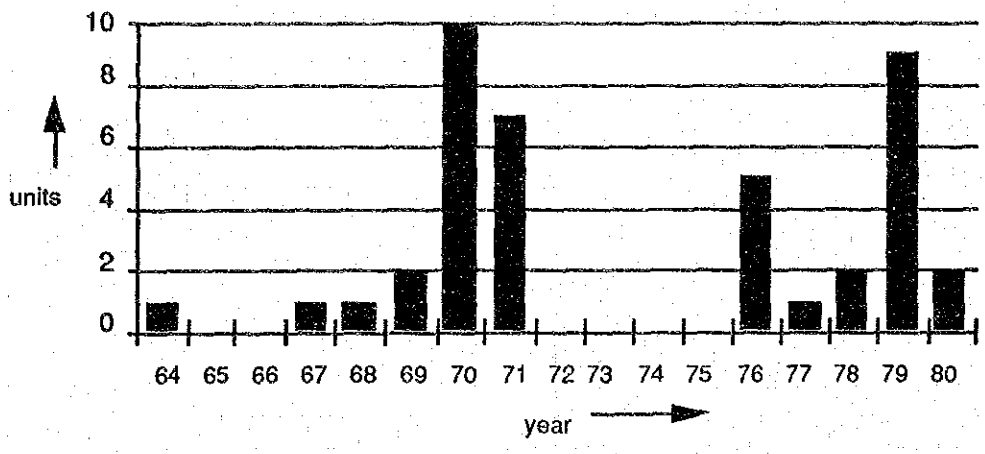


Figure 17.2.3 XB Switch Operation Starting Year

It is important to schedule even work loads. All the local XB switches should be replaced before the tandem XB switches are replaced in the BMA.

c) Replacement schedule

The XB switch replacement is carried out in two phases. In the Phase-1, those XB systems are to be replaced that all the XB switches in the metropolitan area-1 and in other areas where large subscriber line expansion (more then 40,000 subscriber lines by the end of 2007) is expected, or expansion space is available, or new services introduction is highly desired, or the existing XB switches are old and deteriorated. In the Phase-2, all the XB switches in the areas where medium to small subscriber line expansion (less then 40,000 subscriber lines by the end of 2007) is expected, or the rest of the areas are to be replaced.

In the Phase-1, 35 local XB switch units in the BMA and the Surrounding Area which accommodates 245,250 subscriber lines are to be replaced. In the Phase-2, 13 local XB switch units for 109,550 subscriber lines are to be replaced.

In the Phase-1, 1,505 circuits of 1 tandem XB switch will be replaced. In the Phase-2, 4,158 circuits of 3 tandems will be replaced.

Table 17.2.3-2 shows the XB switch capacity to be replaced in each phase.

Table 17.2.3-2 XB Switch Capacities to be Replaced

Replacement of XB	Phase-1	Phase-2	Phase-3	TOTAL
Local Switch (line) in BMA	234,824	109,550	0	344,374
Local Switch (line) in the Surrounding Area	10,426	0	0	10,426
Tandem Switch (Circuits)	1,505	4,158	0	5,663

17.2.4 Replacement Plan of PCM-30 Transmission System

1) Replacement Procedure

As described in Chapter 13, the replacement of the PCM-30 systems is carried out in accordance with the XB switching system replacement plan. As described in the previous section, the XB switches in the BMA are to be replaced as shown in Table 17.2.4-1.

Table 17.2.4-1 XB Switches Replacement Plan

	Phase - 1	Phase - 2	Phase - 3
Metro Area 1	7 offices (PNC, SRR, KKM, SRW, SMS, ASD, PTW)		
Metro Area 2	5 offices (KGC, STD, PSP, HAM, SPK)	6 offices (BNA, CYP, TMM, TNT, PKG, TKC)	
Metro Area 3	3 offices (TNB, PPG, BGT)	4 offices (BKE, DKN, PSN, CSW)	
Metro Area 4	7 offices (BGS, NWW, DNM, PYT, LKS, NTB, LTP1)	3 offices (ITM, BGN, LTP1)	
No. of Capacity	22 offices 234,824 lines	13 offices 109,550 lines	

The XB switching systems are completely replaced with new SPC switching systems by the end of the Phase-2 as shown in Table 17.2.4-1. The replacement of the PCM-30 transmission systems with fiber optical transmission systems (FOTS) is to be carried out as follows:

a) Phase-1

The PCM-30 systems in Krung Kasem, Phloen Chit, Lat Ya, Surawong, Asok Din Daeng, Phahonyothin, Lak Si will be replaced with FOTS so that necessary ducts and facility space in these areas will be secured. Routes connecting these switching offices have been already planned to be looped or double routed by FOTS.

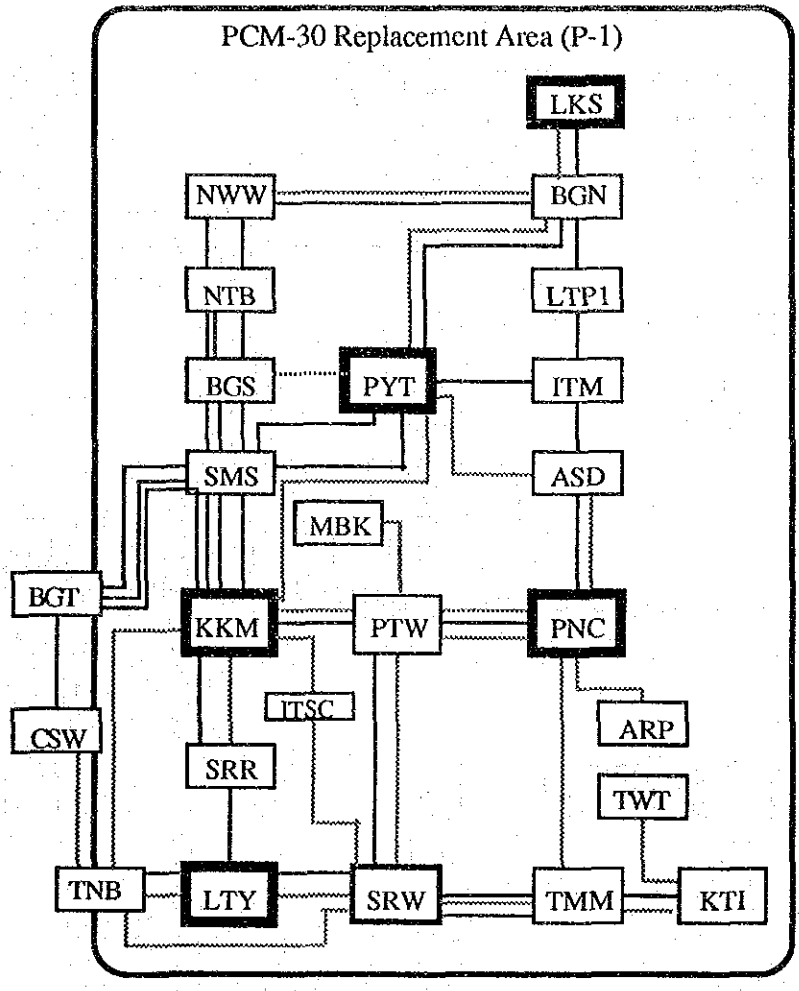
b) Phase-2

The PCM-30 systems in Sukhunwit, Phra Khanong, Bang Na, Chaeng Watthana, Ngam Wong Wan are replaced. Routes connecting these switching offices must be doubled or looped by FOTS.

c) Phase-3

In areas outside the BMA, some PCM-30 systems are still unreplaced; however, in the near future they should be reconsidered whether they should be replaced in the Phase-2 in view point of efficiency of operation and maintenance. Routes must be doubled or looped by FOTS.

A layout of the planned replacement routes in the Phase-1 and the Phase-2 are shown in Figure 17.2.4-1 and Figure 17.2.4-2.



LEGEND

——— Optical Fiber Transmission System

..... Metallic Cable PCM System

Figure 17.2.4-1 PCM-30 Replacement Areas in the Phase-1

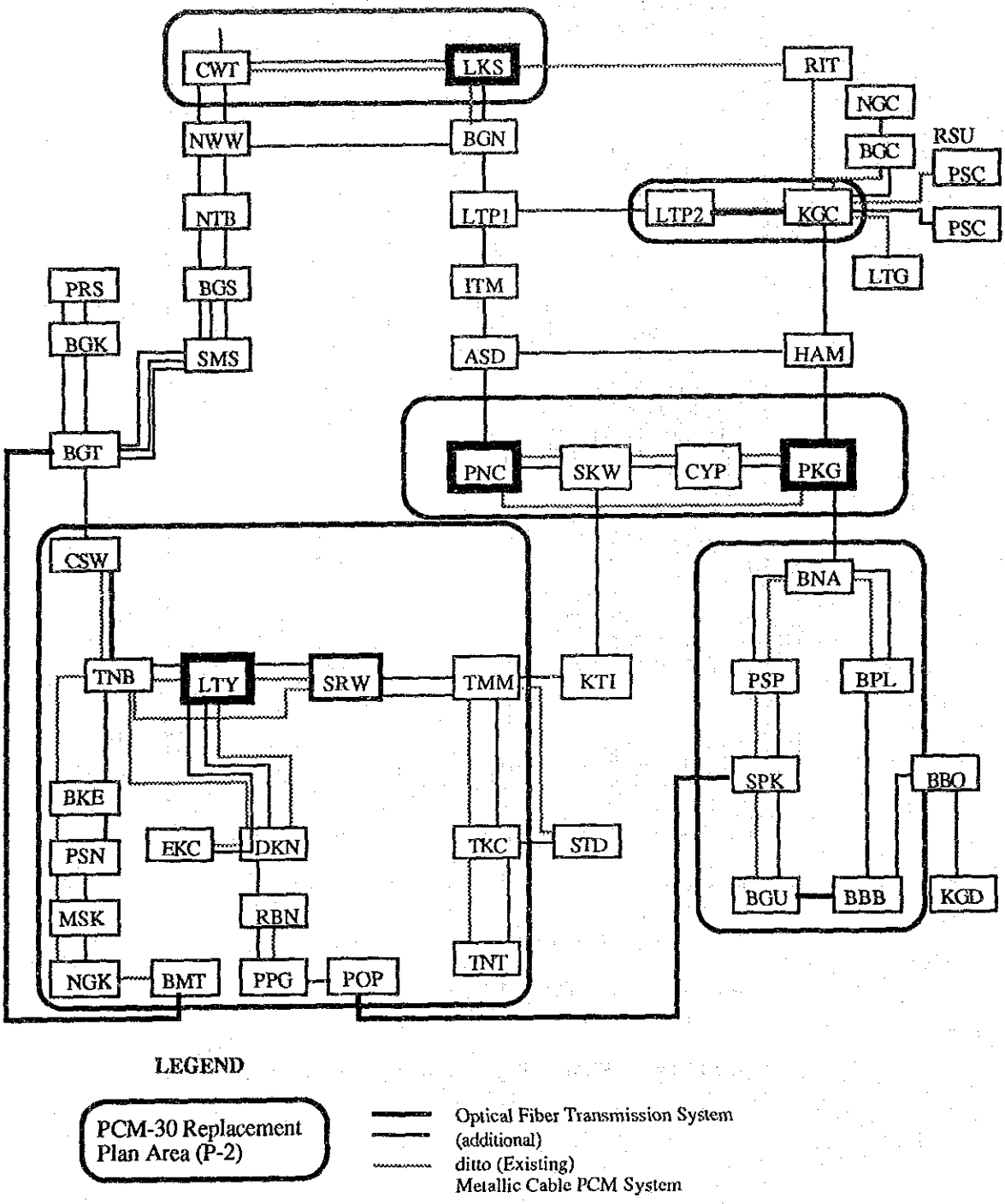


Figure 17.2.4-2 PCM-30 Replacement Areas in the Phase-2

2) Replacement Plan in Each Phase

The number of systems to be replaced in each Phase is estimated as shown in Table 17.2.4-2.

Table 17.2.4-2 PCM-30 Systems Replacement Plan

Phase-1		Phase-2		Phase-3	
Span	No. of Sys. (No. of DTI)	Span	No. of Sys. (No. of DTI)	Span	No. of Sys. (No. of DTI)
BGN - LKS	31	CWT - LKS	117	PTT - PKK	34
BGN - NWW	102	KGC - LTP2	86	PKK - CWT	65
BGN - PYT	3	PNC - SKW	86	SIK - DNM	2
NTB - BGS	3	PNC - PKG	15	LKS - RIT	92
BGS - PYT	69	SKW - CYP	72	RIT - KGC	72
PYT - KKM	23	CYP - PKG	8	NGC - BGC	2
PYT - ASD	3	TNB - CSW	81	BGC - KGC	34
PNC - KKM	62	PSP - BNA	18	KGC - LTG	10
PNC - PTW	104	PSP - SPK	5	TMM - TKC	113
PNC - TMM	109	SPK - BGU	20	TMM - STD	2
KKM - PTW	61	BNA - BPL	5	TKC - TNT	50
KKM - SRR	48	TNB - BKE	88	PKG - ONT	55
KKM - TNB	53	TNB - DKN	86	DNM - LKS	131
KKM - ITSC	40	BKE - PSN	9		
ITSC - SRW	35	PSN - MSK	72		
PTW - SRW	127	MSK - NGK	43		
SRW - LTY	40	NGK - BMT	2		
SRW - TNB	85	DKN - RBN	81		
SRW - TMM	122	RBN - PPG	60		
TMM - KTI	24	LTY - DKN	155		
TOTAL	1,144	TOTAL	1,109	TOTAL	662

In executing this replacement plan, the following guidelines should be considered.

a) Phase-1:
The PCM-30 systems related to International Switching Center (ITSC)

b) Phase-2:
Optical fiber systems should be installed in the following spans before the PCM-30 systems are replaced:
BMT - BGT, POP - SPK, BGU - BBB, LTP2 - KGC, TNB - CSW.

c) Phase-3:
Optical fiber systems should be installed in the following spans before the PCM-30 systems are replaced:
SKK - NWN, LKS - RIT, RIT - KGC, PKG - ONT, NGK - BMT,
RBN - TNT.

2) Replacement Plan in Phase-1

a) As shown in Table 17.2.4-2, total 1,144 PCM-30 systems are replaced in the Phase-1. They are located mainly in the telecommunication area 1.

b) In this time, a synchronous digital hierarchy (SDH) will be recommended to be introduced. As an introduction procedure of SDH is described in Chapter 13, SDH should be introduced in the routes which connect each tandem office. In this case, other PCM-30 routes such as Phra Khanong should be considered to be replaced.

c) Balance of investment cost is considered between the Phase-1 and the Phase-2.

17.2.5 Implementation Schedule of Replacement Projects

Figure 17.2.5 shows the implementation schedule of these replacement projects.

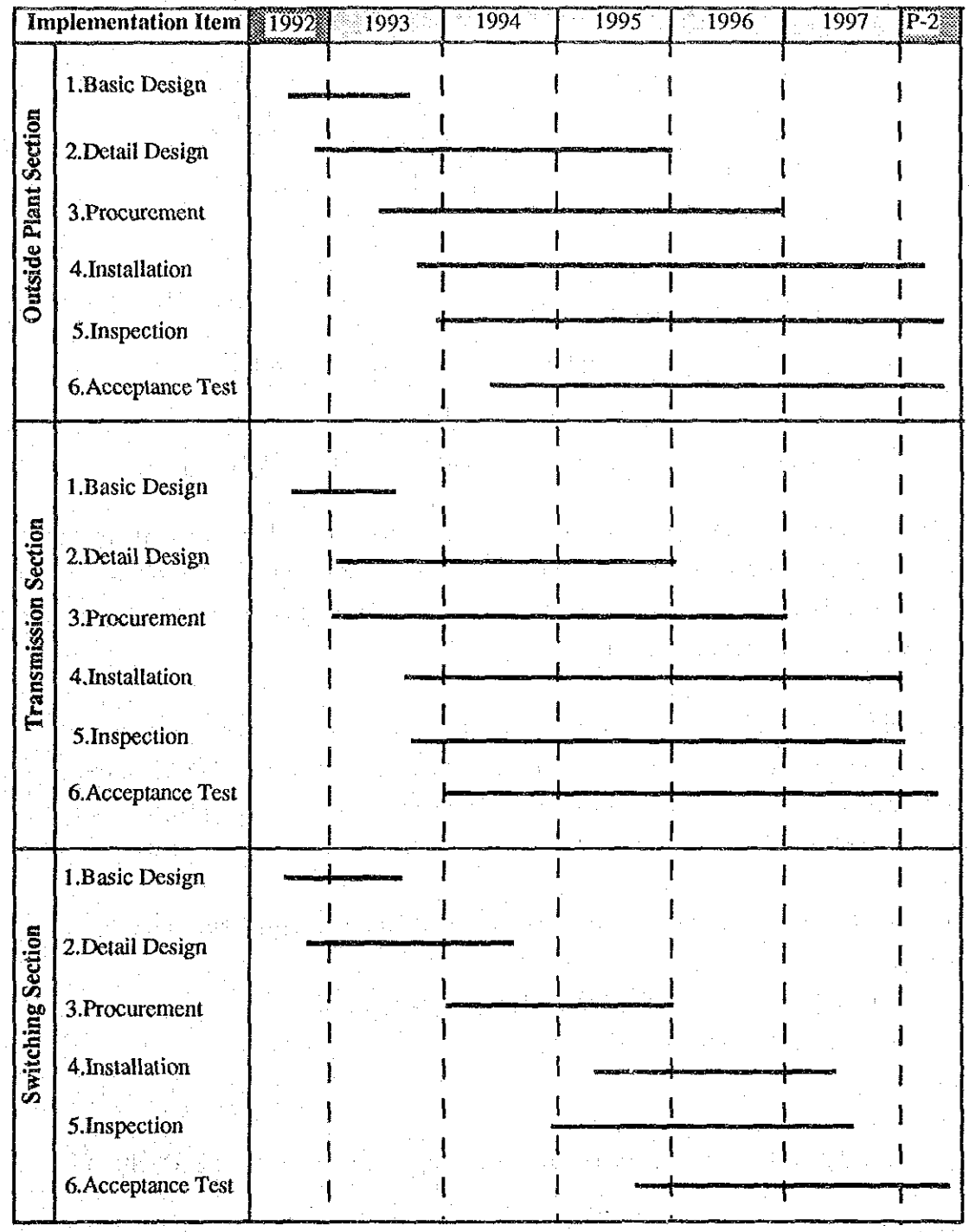


Figure 17.2.5 The Implementation Schedule

17.2.6 Investment Cost

The investment costs of the rehabilitation projects are shown in Table 17.2.6.

Table 17.2.6 Investment Cost of the Replacement Projects

(Unit : Million Baht)

Section	Volume	Cost
1. Outside Plant	179,000 pairs	2,269
2. Switching	247,000 lines	1,786
3. Transmission	34,320 circuits	912
Sub Total		4,967
4. Project Implementation (10% on Sub Total)		497
Grand Total		5,464

17.3 Establishment of Supporting Functions for O & M Work in Outside Plant

Replacement, rehabilitation, renewal, reformation, or modernization of the existing telecommunications systems and facilities are indispensable in order to keep the telecommunications networks and facilities in good operational conditions and provide better quality services to customers from the viewpoint of hardwares.

On the other side, upgrade and improvement of construction, installation, operation and maintenance activities are essential also from the viewpoint of softwares for O & M. Improvement of both hardwares and softwares are required. Daily works and activities to operate and maintain the networks and facilities are to be improved together with the networks and facilities.

In order to improve these daily works and activities, following two centers are selected to be established:

1) Outside Plant Technical Support & Research Center, and
2) Outside Plant Maintenance Center.

17.3.1 Establishment of Outside Plant Technical Support Research Center (OTSRC)

1) Background

Telecommunications services are playing an ever increasing crucial role in the society which has become increasingly dependent on information. It is vital that these services are made utterly reliable. In Thailand, it is expected that the number of telephone lines will reach to approximately four hundred millions in the BMA by the end of the TOT seventh ESDP project.

As the leading government enterprise in the telecommunications field, TOT must contribute to greater reliability, creating new technologies for design, construction and maintenance of telecommunications facilities. Particularly, outside plant facilities have to cover very wide areas because subscriber lines connect all customers to the telecommunication offices.

TOT has the "Test and Development Sector, (T&D sector)", which has Plant Standard Division, Research and Development Division, and Test and Calibration Division. The T&D sector has been developing telecommunication techniques since its establishment in 1969. However, the T&D sector should be entirely up-graded to meet the requirement of new telecommunications technology.

2) Necessity of Outside Plant Research and Development

As mentioned in Chapter 9, inside facilities such as switching and transmission are installed in air-conditioned rooms, which means that these facilities can be used in everywhere in the world. Because room conditioners control humidity and temperature inside the room at the favorable level.

However, outside plant is directly affected by environmental situations such as humidity, temperature, and rainfall. In addition, the recent issues is to distribute subscriber lines through under ground in urban areas to save road space and to protect landscape. Thus, distribution procedure of subscriber lines is moved from aerial technique to underground technique, which means that development of more economical excavation techniques will be required. Further more, in urban areas such as Bangkok a work that requires excavation is often difficult and costly. At present, the following issues are important in the outside plant field as Figure 17.3.1-1 shows.

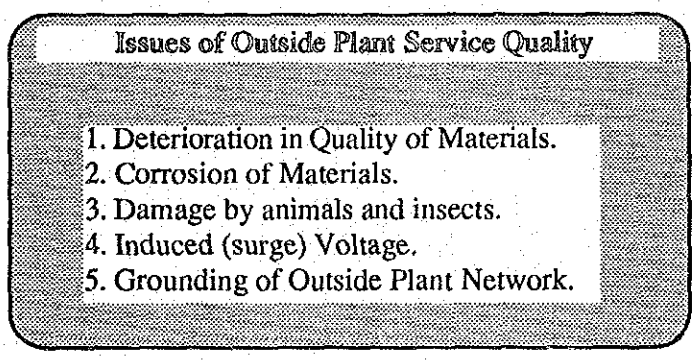


Figure 17.3.1-1 Issues of Outside Plant Service Quality

A necessary development plan for inside facilities will be considered in the next step of improvement of the T&D sector, which will be developed during the long-term plan period.

3) Objectives of Establishment of OTSRC (Outside Plant Technical and Support Center)

Technical improvement of the outside plant field is expected to grade-up telecommunication services in the country. Particularly, this field always faces problems caused by environmental conditions such as tropical weather. Therefore, the main theme of the OTSRC is to develop outside plant techniques economically and suitable for the Thailand environment.

Objectives of establishing the OTSRC are summarized in Figure 17.3.3. Five objectives are selected as follows:

i) Development of telecommunications infrastructure,
ii) Grade up of telecommunications services,
iii) Improvement of construction techniques,
iv) Development of new technology,
v) Development of R & D staff.

For achieving these objectives, development targets are established as shown in Figure 17.3.1-2. In the first step, necessary equipment and tools are estimated for the OTSRC as shown in Table 17.3.1.

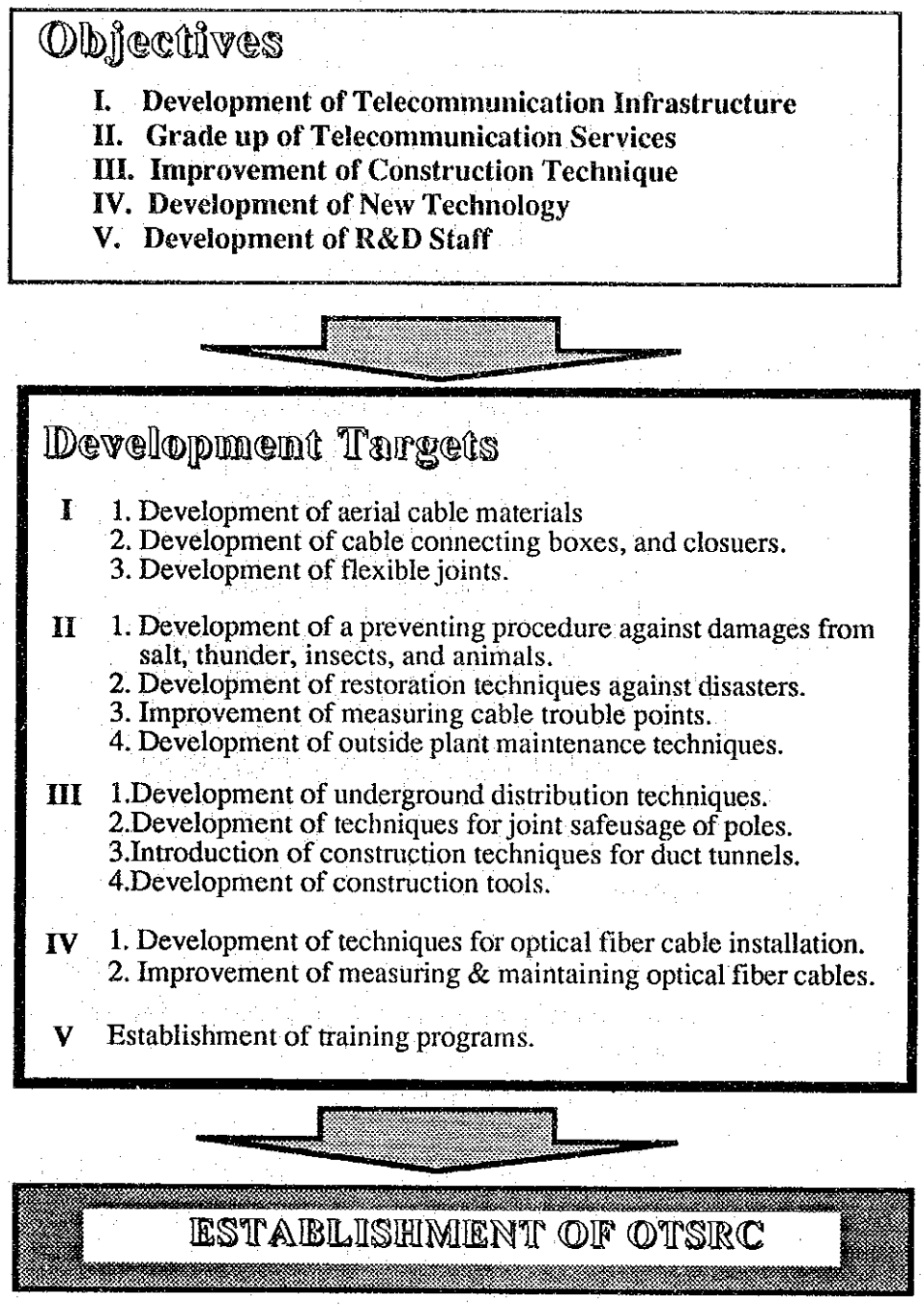


Figure 17.3.1-2 Objectives & Targets for Establishment of OTSRC

Table 17.3.1 Introduction of Facilities & Tools

Expansion Item	Experiment, Facility and Tool
1. Outside Plant Field	a. Cable tension measuring equipment, b. Thermostatic chamber, c. Cable vibration gauge, d. Long life weather meter, e. High voltage break down measuring equipment
2. Civil Work Field	a. Universal tension measuring equipment, b. Vibration fatigue of duct experiment equipment, c. Other measuring equipment for civil engineering.
3. Experiment Sites	a. Outside plant experiment sites, b. Civil engineering experiment sites, c. Experiment submersion tanks, d. Shield tunneling experiment equipment.
4. Experiment Buildings	a. Above-ground conduit experiment facility, b. Work safety technique experiment facility, c. Transmission line experiment facility.

4) Development Steps of OTSRC

Figure 17.3.1-3 sows the development steps of the OTSRC. The OTSRC for outside plant and civil engineering should be established in the Phase-1. They will be expanded in the Phase-2 and the Phase-3.

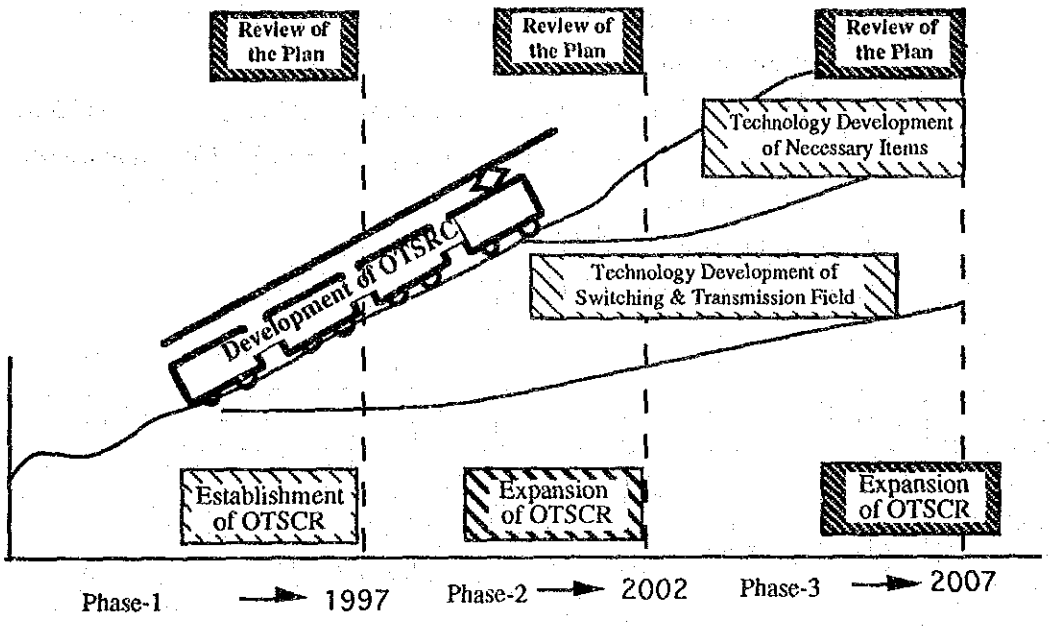


Figure 17.3.1-3 Development Steps of the OTSRC

Reviews on the OTSRC will be required at the end of each Phase. If necessary, a development plan in other field will be formulated in the Phase-2 and the Phase-3. Additional technology development plans in the switching field and the transmission field will be reviewed in the Phase-2. That in the software field will be reviewed in the Phase-3.

5) Implementation Plan for the OTSRC

a) Construction Schedule

The construction schedule of the OTSRC is shown in Figure 17.3.1-4.

b) Implementation of Master Plan Study for the OTSRC

i) Necessity of Master Plan Study

Before establishing the OTSRC, a master plan should be formulated. Because present problems of outside plant and civil engineering must be studied thoroughly and clearly, and then objectives and strategies of the OTSRC must be formulated. In the master plan study, the following goals will be achieved:

- the existing Test & Development centers will be reviewed,

- objectives of the OTSRC development should be discussed between consultants and TOT,
- targets and functions to be achieved by the OTSRC will be decided,
- necessary experiment sites and equipment will be decided in accordance with each target,
- investment cost will be estimated,
- a construction schedule will be made.

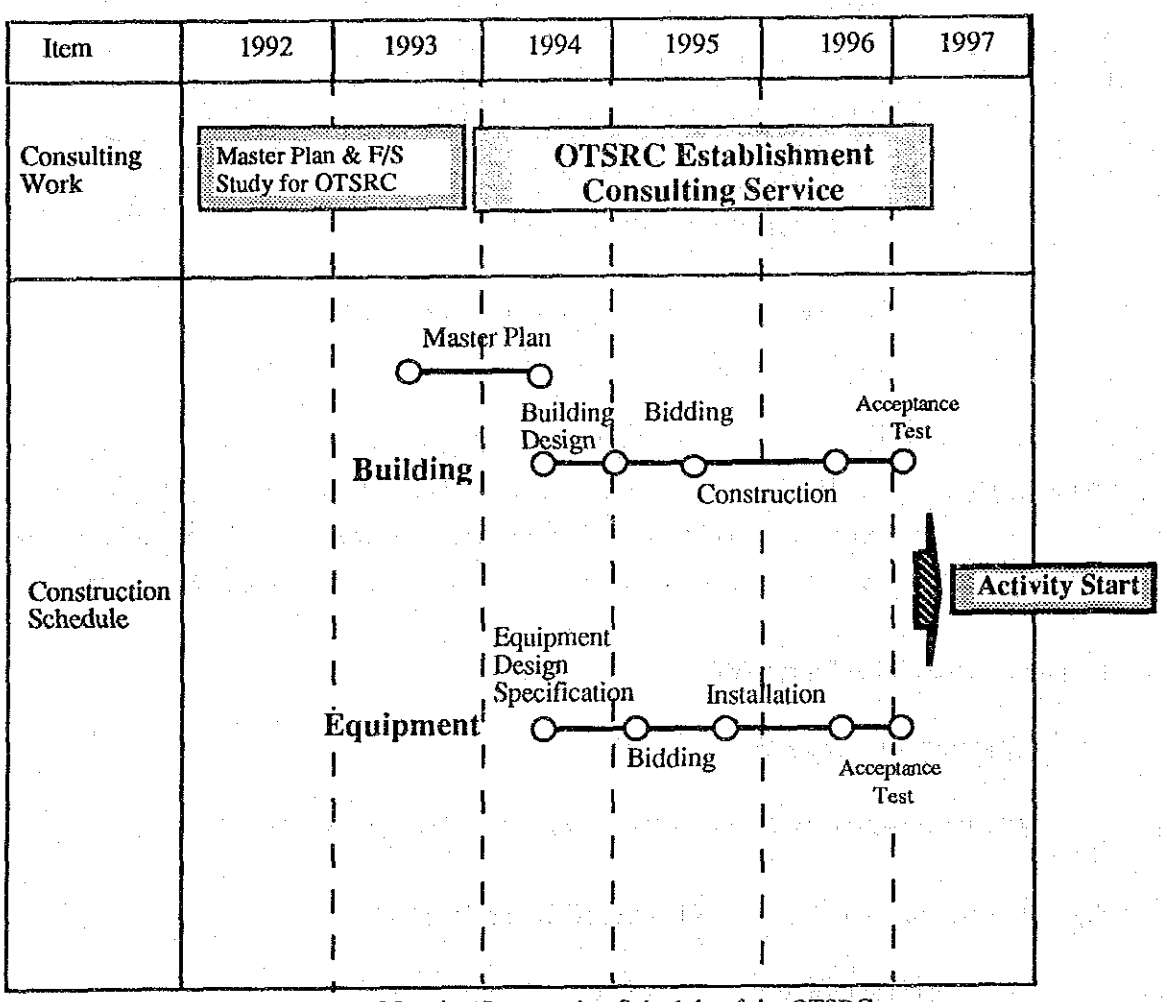


Figure 17.3.1-4 Construction Schedule of the OTSRC

17.3.2 Reinforcement of Outside Plant Maintenance Center (OPMC)

1) Necessity of Improvement of Outside Plant Maintenance Activity

As described in every chapter of this report, the number of subscriber lines will reach approximately 2.4 millions by the end of 1992.

On the other hand, as mentioned in Chapter 9 and 14, there is a scope to improve the present operation and maintenance works and activities in the outside plant field. For example, the fault rate, the number of fault occurrences per month, was 4.7 percent per 100 subscribers as of 1987. This means that every subscriber will have at least on average one fault over two years.

Outside plant facilities are usually exposed to various environmental conditions such as temperature, wind, moisture, salt, lightning, sunlight, birds, electric power lines, and road traffic. It is, therefore, difficult and important to keep them in a good condition. The effects of these external factors are summarized in Table 17.4.1.

Table 17.3.2 Natural and Social Influences on Outside Plant Facilities

Factor	Items	Influence
Natural Factors	Temperature,	Breakage and shrinkage due to temperature change .
	Winds (Sea winds),	Lines down or broken due to vibration and corrosion.
	Rain,	Corrosion of water penetration.
	Lightening,	Corrosion of dielectric break down.
	Topographical and soil conditions	Breaking of cable sheath and fusing cable pairs.
		cuts, fall due sinking
	Sun	Fading and degradation
	Mice, birds insects	Breaks.
Social Factors	Power supply lines	Induction
	Power distribution lines	Induction and corrosion
	Factory smoke	Dielectric breakdown and corrosion
	Construction works	Cut and breaking.
	Vehicles	

For alleviating these influences, establishment of total maintenance control systems is required in the outside plant field.

2) Features of OPMC

To improve the present service grades mentioned above and to utilize the existing facilities in a more efficient manner in the outside plant field, Outside Plant Maintenance

Centers (OPMCs) should be reinforced at all telecommunication areas, which have the following functions:

a) Outside Plant Maintenance Control System

As shown in Figure 17.3.2-1, the OPMCs should have an outside maintenance control system function. Introduction of maintenance control systems is indispensable to execute the rehabilitation plan.

In general, telecommunication maintenance activities start from corrective maintenance activities at first with the "repair when broken" principle and then move to preventive maintenance activities with the "prevent break-downs" principle. Finally controlled maintenance activities will be taken as many countries recently on the basis of Maintenance Control Systems. The system consists of service control, plant control value, deteriorated plant control and extraordinary failure control as shown in Figure 17.3.2-1.

In four maintenance controls, introduction of plant control value and deteriorated plant control is effective for the outside plant facilities when the present situation of the outside plant facilities is considered.

b) Training Plan

Training plans for maintenance personnel are formulated to make arrangements to give them necessary education and training on advanced maintenance techniques for newly introduced telecommunications facilities such as optical fiber cables.

c) Preparation of Advanced Measuring Equipment

The OPMCs provide necessary new equipment and tools such as optical fiber cable measuring equipment for outside plant facilities maintenance.

d) Improvement of Work Environment

The OPMCs are expected to improve work environment of O&M staff and arrange transportation for them.

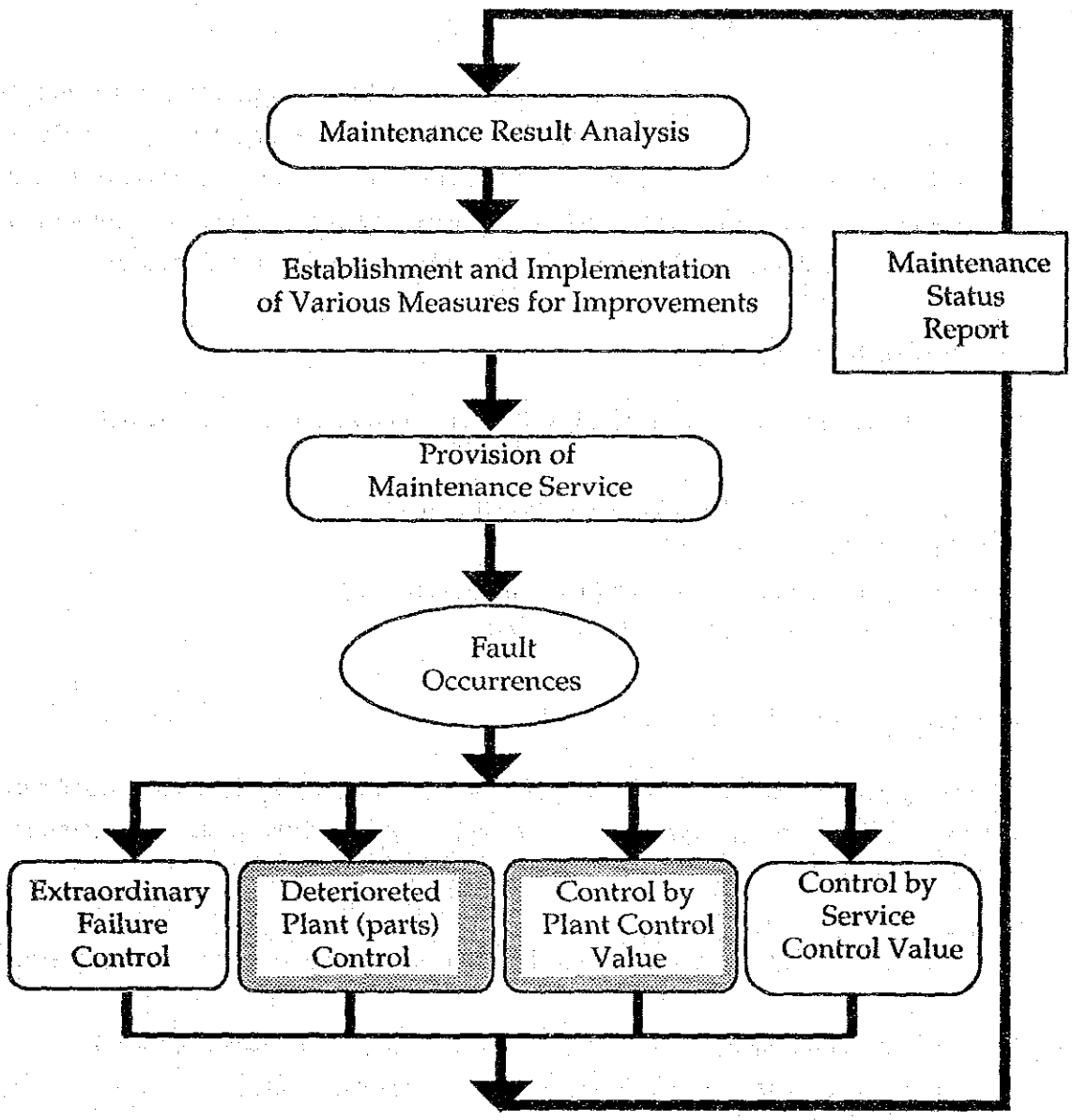


Figure 17.3.2-1 Maintenance Control System in OPMC

3) Reinforcement of OPMC

It is required to reinforce the OPMCs as early as possible for grade-up of telecommunications service quality; however, it is also necessary to establish the goals of the OPMCs.

An OPMC establishment procedure is proposed as follows.

a) Assignment of a Pilot Area

Initially, an OPMC should be reinforced in a model telecommunication area in the BMA. Metro-1 area will be assigned as the most suitable model area. A working office should be located at Asoke-Dindaeng. Because the maintenance center in this area covers commercial areas and high density areas. It is, therefore, required to improve telephone service quality more than other telecommunications areas.

b) Setting up of Targets

For establishing a pilot OPMC, the following features should be considered:

i) Introduction of Maintenance Control System,
ii) Training Plan,
iii) Preparation of Advanced Measuring Equipment,
iv) Improvement of Work Environment.

4) Increasing Plan of Reinforcement of OPMCs

Increasing Plan of reinforced OPMCs should be carried out in the following process by taking on-going expansion projects, the long-term plan and the present maintenance activities.

a) As the first stage, the project is to be implemented in each Metropolitan maintenance area,
b) As the second stage, it is to be implemented in Provincial Areas 1,4,6 and 7,
c) As the third stage, it is to be implemented in other provincial areas.

5) Implementation Schedule

The implementation schedule of the projects is shown in Figure 17.3.2-2. A preparation period for the project implementation is required because the OPMC establishment policy must be decided in the preparation period.

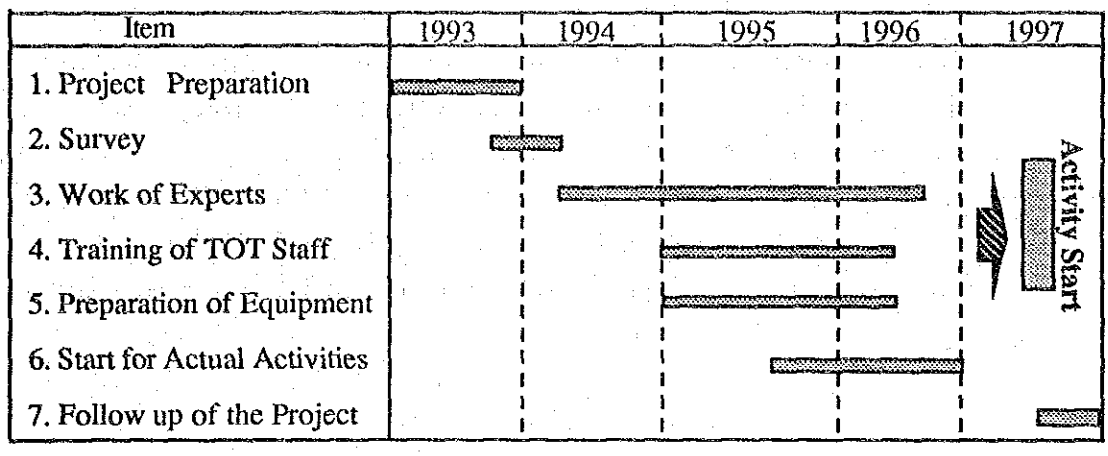


Figure 17.3.2-2 Implementation Schedule of OPMC

17.4 Selection of the Top Priority Project

During the Work in Thailand-II, the JICA Study Team made a presentation of the Interim Report for the long-term plan. Through meetings and discussions by TOT and the JICA Study Team, the top priority project to be studied for the second phase of the Study was decided. The title of the feasibility study is "An Implementation Plan to Upgrade the Telecommunications Services Quality".

While there are various aspects in terms of telecommunications services quality, the following two items have been selected as the study objectives:

1) Improvement of Fault Rate, and
2) Improvement of Call Completion Rate.

Improvement of fault rate and improvement of call completion rate are essential because they directly affect the quality of customer services, performance of telecommunications networks, utilization rate of facilities, and operating revenue. Therefore, for the second phase of the Study, these two objectives have been selected to upgrade telecommunications service quality and the concrete measures to achieve them will be established.

Toward upgrading the service quality, the concrete measures which directly contribute to the two objectives are studied from the following viewpoints:

1) replacement of deteriorated facilities,
2) maintenance management standards, and
3) installation and construction method.

This study analyzes the present situation of the faults and the call completion rate and finds the major causes of the high fault rate and the low call completion rate. The Study Team proposes various measures and selects the priority projects among them as the action plan. The proposed projects are planned to be implemented during the period from 1993 to 1997 (Phase-1). The results of the second phase of the Study are described in the main report titled "Final Report for a Feasibility Study on An Implementation Plan to Upgrade the Telecommunications Services Quality".

CHAPTER 18

EVALUATION OF THE LONG-TERM PLAN

CHAPTER 18 EVALUATION OF THE LONG-TERM PLAN

18.1 Significance of the Long-term Plan

Today is in the midst of drastic telecommunications technology revolution. Mobile telecommunications systems have been taking place of the existing local wired telecommunications. Satellite communications systems have been playing a greater role in both broadcasting and telecommunications. Fiber optical transmission systems have been breaking through the transmission limits in both distance and capacity. Plain old telephone services (POTS) are giving way to ISDN services. "Fiber to the Home" will realize visual information telecommunications services instead of normal voice telecommunications services

The demand for the telecommunications services, not only for POTS but also for the enhanced ones in the Bangkok Metropolitan area and its surrounding area, has been increasing more than ever before because of the special socioeconomic position that the BMR has now in Thailand. As Mr. Alvin Toffler writes in his latest book[1],"it is hard for those accustomed to decent telephone service to imagine operating an economy or a business without it, or to function in a country where the telephone company (usually the government) can deny even basic phone or delay its installation for years".

Taking geographical, economical, and political surroundings of Thailand into consideration, its significance will increase as the gateway to Laos, Kampuchea, and Viet Nam. Thailand will play a leading role for assisting the economic recoveries of the Indochina countries. Thailand becomes a production base for their economic recoveries. The Baths based trading zone will penetrate into the Indochina countries. The Bangkok Metropolitan region becomes an information hub of the Indochina region if it can provide many, good quality telecommunications services.

The long-term telecommunications network development plan formulated in this study covers the coming fifteen (15) years up to the year of 2007 and the areas of the BMA and the Surrounding Area, i.e., Nakhon Pathom, Samut Sakhon, and Ayutthaya in order to develop their telecommunications services. The Study Team believes that the long-term plan and its projects contribute greatly to the growth of not only the Study Area but also the whole Kingdom from not only the telecommunications development viewpoint but also the both economic and social development viewpoints.

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[1] Alvin Toffler, POWER SHIFT, (New York: Bantam Books, 1990), p. 111

In order to achieve the objectives and targets of the long-term plan, the Study Team proposes the telecommunications network and facility expansion projects as well as replacement, renewal, rehabilitation, reformation, and modernization of the existing networks and facilities as high priority projects.

The proposed projects should be implemented completely during the long-term plan period because the provision of sufficient, efficient, and better quality telecommunications services becomes indispensable for the information-oriented society.

18.2 Benefit and Effect of the Long-term Plan

18.2.1 Financial Benefit of the Long-term Plan

The investment cost for the long-term plan is estimated to be approximately 198,000 million Baht in total: 92,000 million Baht for Phase-1, 59,000 million Baht for Phase-2, and 47,000 million Baht for Phase-3. The investment programs of the long-term plan include not only the network and facility expansion projects to meet the increasing demand for the telecommunications services, but also rehabilitation, replacement, renewal, reformation, and modernization of the existing telecommunications networks and facilities to provide better quality services.

The financial internal rate of return (FIRR) of the long-term plan is estimated to be 10.05% if the plan is carried out by one operating entity, i.e., TOT.

The estimated FIRR indicates that the plan is feasible from the financial viewpoint of the state-owned operating entity when the required amount of the investment cost is financed according to financing assumptions.

The financing assumptions and conditions to implement the long-term plan are as follows:

1) in total 42,000 million Baht are financed from own fund of the operating entity during the first eleven (11) years,
2) in total 73,100 million Baht are debt financed during the first ten (10) years with the 12% loan interest and the 10 year-long repayment including the 3 year-long grace period,
3) the remaining portion of the required fund will be covered by the internal cash generation, i.e., the revenues from the future subscribers.

The soft-loan financing[2], such as ADB (Asian Development Bank) loan, OECF (The Overseas Economic Cooperation Fund) loan, and the EXIM Bank (Export-Import Bank) credits should be considered at least for the Phase-1 period. It is indispensable to expand the networks and facilities for fulfillment of the telephone demand and elimination of the waiting applicants and to renew the deteriorated telecommunications systems and facilities and to modernize out-of-date systems and facilities for upgrading the service quality during the Phase-1 period.

It should be noted that the estimated call revenues in the financial analysis takes only the revenues from the subscribers in the Study Area into consideration. When the number of subscribers increase in one area, not only the originating traffic from the area but also the terminating traffic from the other areas increases. Therefore, long-distance calls terminating in the Study Area from the rest of the Kingdom are expected to increase as the number of subscribers in the Study Area increases. This means that although the long-term plan provides subscriber line installation projects only for the Study Area, the revenue increase with the projects can be expected not only in the Study Area but also in all areas in the Kingdom.

One more thing should be noted that the call revenue estimation in the financial analysis takes only the domestic call revenue into account. The international call revenue is also expected to increase by increse of both incoming and outgoing international calls from the Study Area, which benefits CAT (The Communications Authority of Thailand) that operates both postal service and international telecommunications service exclusively in Thailand. The telecommunications services revenue for CAT is 10,382 million Baht in FY 1990 and most of the revenue is generated from the Study Area.

The revenue increase for both domestic and international telecommunications operators indicates that the FIRR must be higher than the estimated figure and the implementation of the long-term plan is not only feasible from the financial viewpoint of the operating entity, i.e., TOT, but also beneficial to the whole Kingdom from the economic viewpoint.

[2] The long-term soft-loan conditions applied to TOT are as follows:

	Term Period	Grace Period	Interest Rate
ADB :	23 year	4 year	10.25%
OECF	30 year	10 year	3.00%
EXIM Bank:	13 year	5 year	5.00%

18.2.2 Socioeconomic Effect of the Long-Term Plan

1) Realization of ISDN Era

Providing sufficient POTS (Plain Old Telephone Service) is the first objective of the long-term plan. With the implementation of the long-term plan, the increasing telephone demand is expected to be fulfilled during the Phase-1 and the waiting applicants in the Study Area will be eliminated. Thailand is able to participate in the ISDN era in earnest after the completion of sufficient and efficient POTS. The long-term plan contributes to the society which needs enhanced info-communications methods. Therefore, the implementation of the proposed projects in the BMA during the Phase-1 has the key to enter into the ISDN era.

2) Realization of Information Society

Telecommunications systems can become strategic resources in the following business practices:

a) To increase competitive advantages in market place,
   i) by grasping market trends in more accurate and faster manners and satisfying customer needs in better ways,
   ii) by differentiating products through integrating information and services,
   iii) by providing more satisfactions to customers through improving customer accessibility, handling complaints in better ways, and providing more and better information,
   iv) by reducing lost opportunities in sale of timing critical products such as seat reservations, currency dealings, financial dealings through improving successful calling rates;

b) To improve managerial efficiency,
   i) by reducing amount of inventory through decentralized inventory management,
   ii) by collecting and providing more adequate information from and to field operators through establishing direct communications links,
   iii) by improving communications within organizations,
   iv) by obtaining a wide range of necessary and real time information for top management to make strategic decisions;

c) To discover innovations,
   i) by creating new businesses, products and services through integrating and restructuring existing businesses, products and services,
   ii) by lowering or eliminating existing boundaries of businesses,
   iii) by creating advantages that others have difficulty in catching up through establishing information networks.

Telecommunications systems will become critical strategic management resources in the following industries:

- Financial service businesses,
- Manufacturers, especially subcontractor depending businesses, export oriented businesses, multi-national businesses,
- Airlines, Travel agents, Tourism business, Surface carriers,
- Distribution businesses,
- Retail businesses,
- Printing and publishing businesses.

In the implementation course of the long-term telecommunications development plan, the telecommunications sector is expected to change from "Plain Simple Voice Messages Transmission Business" to more complex and value-added "Information Carrier Business" and "Coordination and Integration Supporting Service Business" to support the above mentioned business practices and industries.

The long-term plan also urges that telecommunications operating entities should change their management styles from "engineering oriented management" to "customer service oriented management". In case of "engineering oriented management", the management policy is to develop the technically most adequate system and to utilize it in the most efficient manner to fulfil the social responsibilities of a public enterprise. In case of "customer service oriented management", the management policy is to provide rich services in competitive prices that customers demand and to become a leader to create an intelligent society.

Figure 18.2.2 illustrates social development stages and the relationship between development stages and the roles of telecommunications.

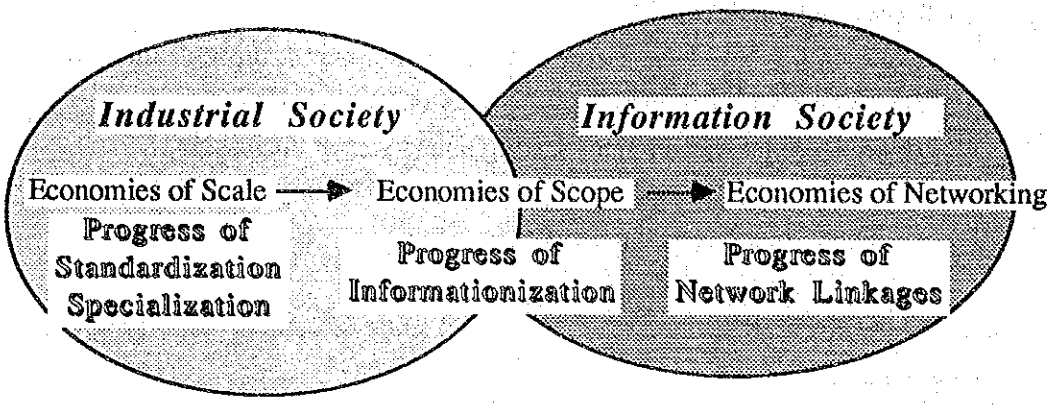

Figure 18.2.2 Social Development Stages and the Roles of Telecommunications (1/3)

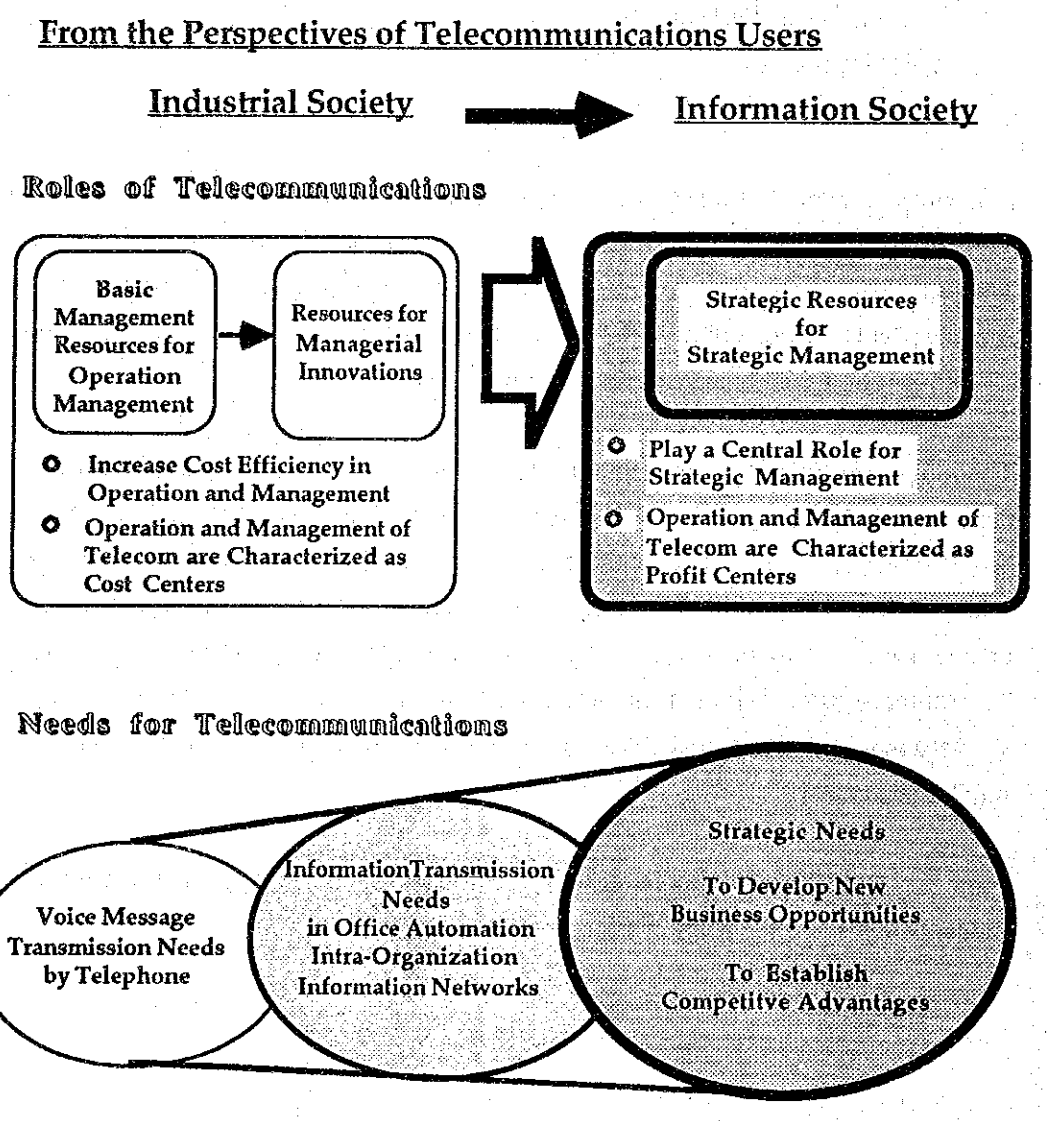

Figure 18.2.2 Social Development Stages and the Roles of Telecommunications (2/3)