

9.5 Sensitivity Analyses

The financial internal rate of return of the Project is 13.87% without borrowings and 14.89% with 75% borrowings, when the Project is implemented on the conditions set in the previous sections of this chapter. In general, these conditions and assumptions could be changed in the long term plan. Therefore, we set assumptions of fluctuation ranges of the operating revenue, installation cost, and the working cost, which are main constituent parts of calculating FIRR, and examine sensitivities how these items' fluctuations affect on the financial internal rate of return. We analyze FIRR without borrowings here.

We consider following cases:

- 1) The operating revenue (the local and trunk revenues of ordinary subscribers):
 - a) 10% increase,
 - b) 10% decrease.

- 2) The installation cost due to the outside plant cost fluctuations:
 - a) 30% increase,
 - b) 50% increase.

- 3) Operating cost increases because the number of employees increase by more than 2% per year and becomes 32,000 at the end of FY 2007.

1) The Operating Revenue Fluctuations' Case

When the local and the trunk call revenues increase by 10%, which is almost close to the case that the average revenue per subscriber is fixed at the 1988 level and continues through the project life, FIRR becomes 15.57%. When the revenues decrease 10% on the other hand, FIRR becomes 12.08%. Figure 9.5-1 shows net present value curves of these cases.

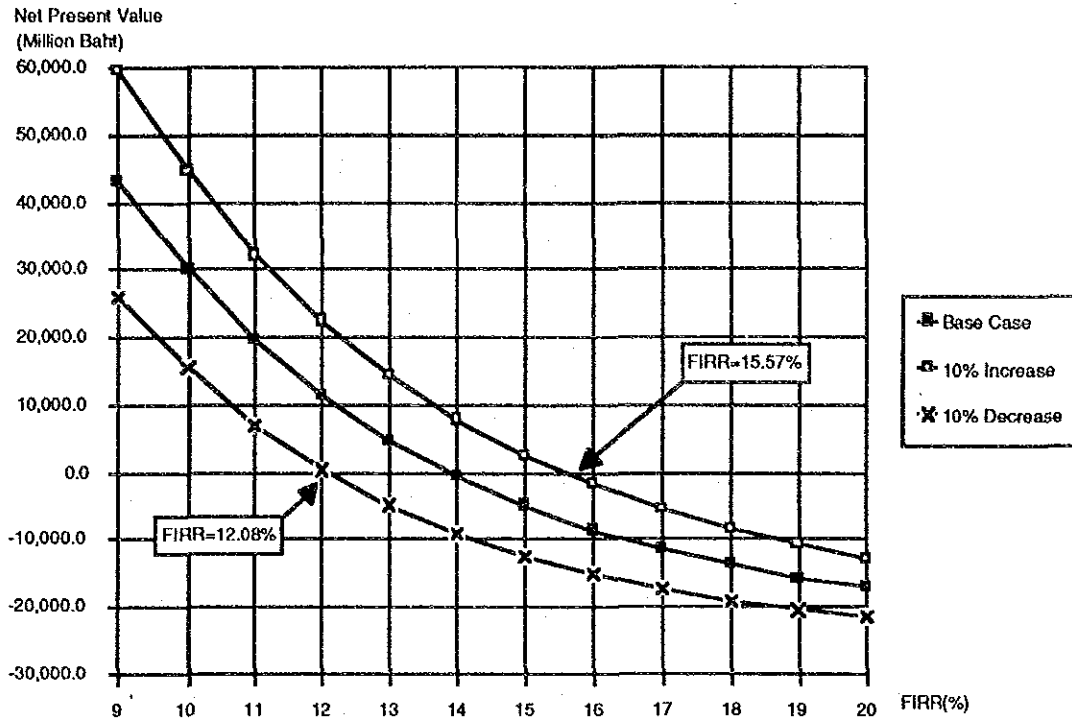


Figure 9.5-1 Net Present Values of Revenue Fluctuation Cases

2) The Outside Plant Installation Cost Increase Case

Since the Thai economy is now experiencing high growth and an investment boom, constructions costs may rapidly increase. This will especially affect the outside plant installation costs. They contain metallic cables, which price fluctuates with the world copper market conditions, and civil plants which requires a large quantity of cement. Cement cost increased rapidly in the recent years. On the other hand, the installation costs for inside facilities such as switching equipment and transmission equipment can become lower because of technology advancement and decreasing prices of electronic devices such as LSI, microprocessors, and memory chips.

Therefore, we examine two cases in which the total outside installation cost increase by 30% and 50%.

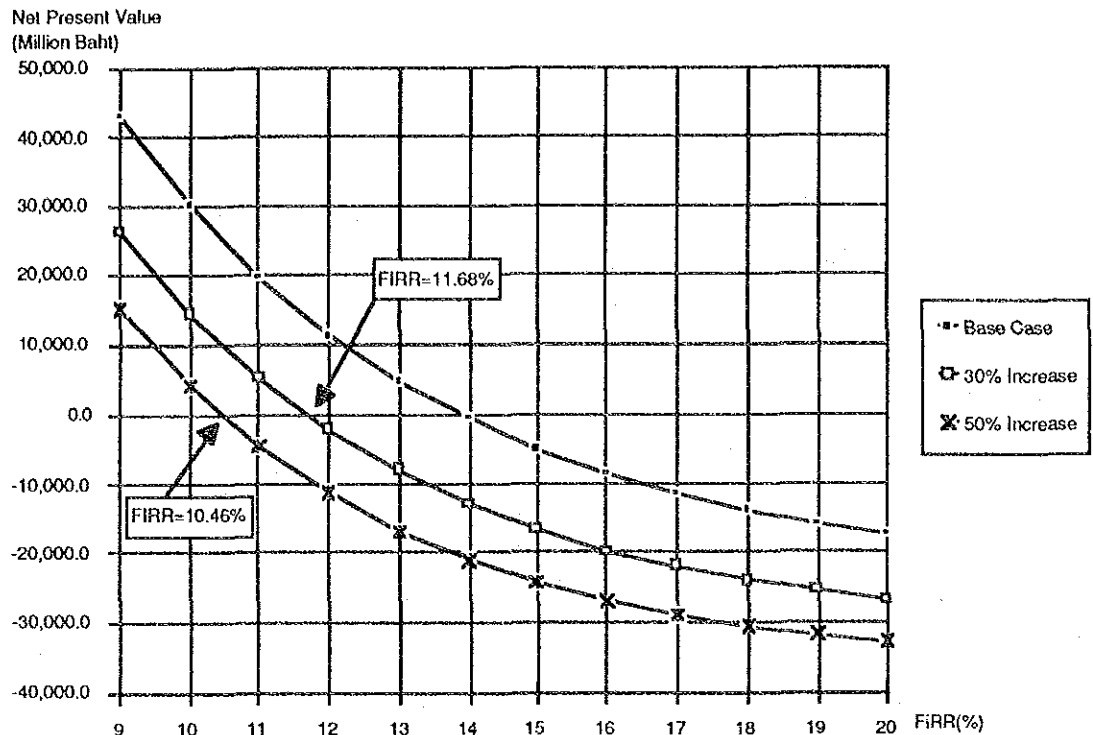


Figure 9.5-2 Net Present Values of Outside Plant Cost Increase Cases

When the outside plant installation cost increases by 30% and 50%, FIRR becomes 11.68% and 10.46% respectively.

3) Alternative of the Number of Employees

The required number of employees is analyzed in Chapter 12. The first estimation is 2% increase per year for the future required employees as a whole (Case A). The number of line per employee will be 235 at FY 2007, which is quite efficient compared with those of advanced countries (See Figure 12.1.1-2 in page 12 - 5). This estimation is appropriate for one of the management targets to be achieved in order to reduce the working cost.

The second alternative is based on the micro-analysis which uses the average efficiency increase ratio of the past years (Case B). In this case, the number of employees will increase until FY 1998 and reaches at approximately 36,300 staff. Then, it turns to decrease and comes down to approximately 32,700 staff.

Table 9.5-1 and Figure 9.5-3 show the difference between these 2 cases.

Table 9.5-1 The Number of Employee Estimation Cases

Year	Main Tel. Line	Case A		Case B	
		The Number of Employee	Line per Employee	The Number of Employee	Line per Employee
1989	1,166,872	18,315	63.7	19,540	59.7
1990	1,317,872	18,681	70.5	20,703	63.7
1991	1,556,872	19,055	81.7	22,943	67.9
1992	1,821,872	19,436	93.7	25,186	72.3
1993	2,180,147	19,825	110.0	28,273	77.1
1994	2,538,422	20,221	125.5	30,881	82.2
1995	2,896,696	20,626	140.4	33,057	87.6
1996	3,254,971	21,038	154.7	34,846	93.4
1997	3,613,246	21,459	168.4	36,287	99.6
1998	3,851,867	21,888	176.0	36,288	106.1
1999	4,090,487	22,326	183.2	36,150	113.2
2000	4,329,108	22,773	190.1	35,890	120.6
2001	4,567,728	23,228	196.6	35,524	128.6
2002	4,806,349	23,693	202.9	35,066	137.1
2003	5,078,612	24,166	210.2	34,758	146.1
2004	5,350,876	24,650	217.1	34,354	155.8
2005	5,623,139	25,143	223.6	33,867	166.0
2006	5,895,403	25,646	229.9	33,308	177.0
2007	6,167,666	26,159	235.8	32,689	188.7

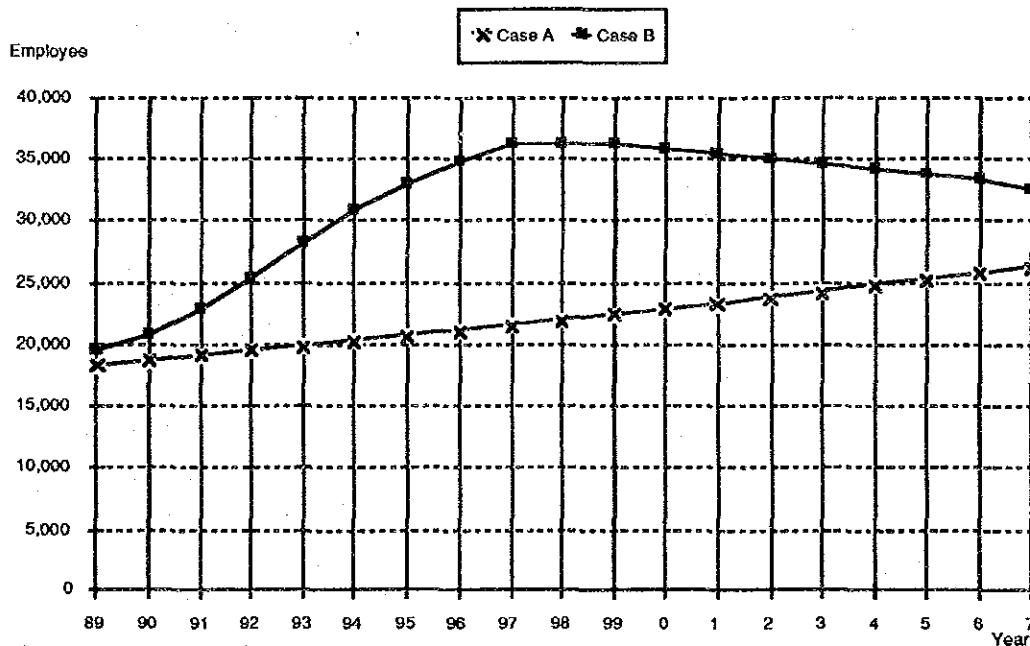


Figure 9.5-3 Two Cases for the Estimation of the Number of Employee

Figure 9.5-4 indicates that FIRR of case B is 13.33% while that of the base case is 13.87%.

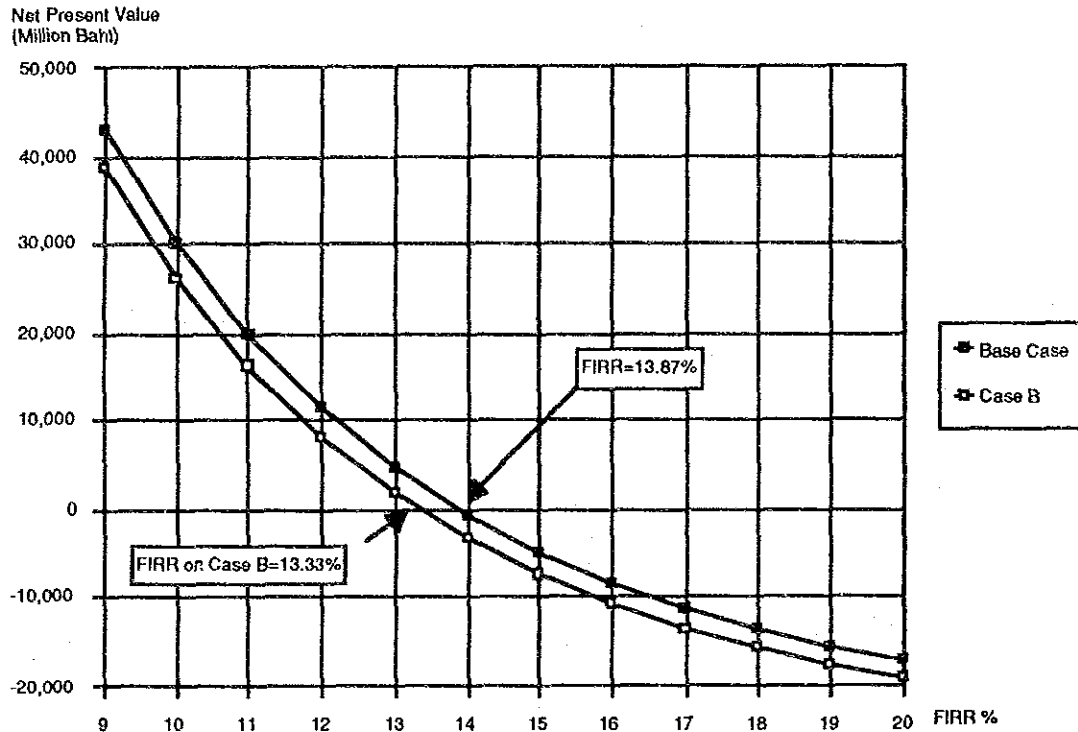


Figure 9.5-4 Net Present Value of the Number of Employee Case B

4) The Financial Evaluation of the Project

Table 9.5-2 shows the results of the sensitivity analyses. This Project has the FIRR of 13.87% as the base case and 14.89% with 75% borrowings. When the operating revenue from the normal subscribers decreases by 10%, the FIRR goes down to be 12.08%. When the outside plant installation cost increases by 50%, the FIRR becomes 10.46% which is slightly low compared with current interest rate. However, the Project is feasible even in this situation when the revenue increase activities such as sales and traffic promotions are implemented and the operating revenue can be gained thoroughly.

The sensitivity analyses indicate that this Project is feasible enough from a financial point of view.

Table 9.5-2 Summary of Financial Analyses of the Project

(Unit: percent)

Case	Financial Internal Rate of Return (FIRR)
Base Case	13.87
Base Case with Borrowings	14.89
Sensitivity Analyses	
10% Revenue Increase	15.57
10% Revenue Decrease	12.08
30% Outside Plant Cost Increase	11.68
50% Outside Plant Cost Increase	10.46
Employee Increase Case	13.33

CHAPTER 10

ECONOMIC ANALYSIS

CHAPTER 10. ECONOMIC ANALYSIS

10.1 Estimation of Economic Benefits by Production Functions

Chapter 9 examined the financial profitability and fund management plans of the Master Plan. Chapter 10 estimates how much nation-wide economic benefits the Master Plan can generate. To do so, the sectoral production functions developed and estimated in Chapter 3 are used as basic analytical tools.

The premises of the analysis are the same as those made in the financial analysis in Chapter 9. The economic benefits of the Master Plan will be estimated by the following steps:

- 1) The variables, K, E, ELECK, and TRANK, were forecasted for the years between 1987 and 2027 by simple time trend extrapolation methods,
- 2) The amounts of investment with the Master Plan and without the Master Plan were added to the projected figures of the variable, TRANK, to create two cases of the transportation and communications capital stock series, and to be considered that the Master Plan would increase the transportation and communications capital stock; hence, they would increase the sectoral outputs through the increased transportation and communications capital stock,
- 3) The three sectoral outputs with the Master Plan and without the Master Plan were estimated for the years between 1987 and 2027 by Eq.3 in Chapter 3.
- 4) The difference between the outputs with and without the Master Plan was obtained as the economic benefit of the Master Plan.

Table 10.1-1, 10.1-2, and 10.1-3 show the results of the above estimation. Since the data used for the estimation and the estimation results were all expressed at 1972 prices, the *economic benefits of the Master Plan were converted into the figures expressed at 1989 prices* to be consistent with the analytical conditions made in Chapter 9. Table 10.1-4 show the results.

It was estimated that the telecommunications investment by the Master Plan Projects would contribute to increase the output of the agricultural sector by at least 0.34% and at most 4.77%, the output of the manufacturing sector by at least 0.25% and at most 3.72%, and the output of the remaining sector by at least 0.12% and at most 1.67% between 1987 and 2027.

10.2 Evaluation of Economic Benefits

The economic benefits of the Master Plan were estimated as the sum of the increment of the three sectoral outputs for the years between 1992 and 2027. The Economic Internal Rate of Return (EIRR) of the Master Plan was calculated as 24.17% by using the economic benefit figures obtained in the previous section and the investment and operation costs figures obtained in Chapter 9. The EIRR is higher than the FIRR, 13.87%; therefore, the Master Plan is proved to be not only profitable and feasible from the operating entity's point of view but also quite beneficial to the society.

Table 10.2-1 shows the data of the EIRR calculation.

Table 10.1-1 Agricultural Sector

(Unit : Million Baht, 1972 Prices)

YEAR	KA	EA	ELECK	TRANK	TOT K/wo	TOT K/w	Yw/o	Yw	IncY	Out Ela
1987	132,319	18,807	48,546	112,050	5,316	5,316	99,685	99,685	0	
1988	139,115	19,168	50,631	116,684	7,541	7,541	102,977	102,977	0	
1989	145,911	19,529	52,715	121,319	8,579	8,579	105,983	105,983	0	
1990	152,707	19,890	54,800	125,953	10,823	10,823	109,285	109,285	0	
1991	159,504	20,251	56,884	130,588	13,713	13,713	112,743	112,743	0	
1992	166,300	20,612	58,969	135,222	17,039	17,039	116,304	116,304	0	
1993	173,096	20,973	61,053	139,857	24,184	26,015	120,760	121,191	431	
1994	179,892	21,333	63,138	144,491	24,899	30,396	123,545	123,971	426	0.272
1995	186,688	21,694	65,222	149,126	24,234	33,343	126,511	127,780	1,269	0.272
1996	193,484	22,055	67,307	153,760	23,621	36,126	129,177	131,260	2,084	0.272
1997	200,280	22,416	69,391	158,395	23,053	38,758	131,873	134,709	2,837	0.272
1998	207,076	22,777	71,476	163,029	22,530	40,909	134,596	138,131	3,535	0.273
1999	213,872	23,138	73,560	167,664	22,045	42,615	137,347	141,452	4,105	0.273
2000	220,668	23,499	75,645	172,298	21,590	44,235	140,121	144,681	4,560	0.273
2001	227,465	23,860	77,729	176,933	21,160	45,773	142,916	147,902	4,985	0.273
2002	234,261	24,220	79,814	181,567	20,753	47,236	145,731	151,115	5,383	0.273
2003	241,057	24,581	81,898	186,202	20,368	49,306	148,565	154,322	5,757	0.272
2004	247,853	24,942	83,983	190,836	20,004	51,942	151,417	157,674	6,257	0.273
2005	254,649	25,303	86,067	195,471	19,657	54,457	154,285	161,160	6,875	0.273
2006	261,445	25,664	88,152	200,105	19,328	56,859	157,170	164,629	7,458	0.273
2007	268,241	26,025	90,236	204,740	19,328	56,859	160,071	168,081	8,011	0.273
2008	275,037	26,386	92,321	209,374	19,328	56,859	163,051	171,021	7,970	0.273
2009	281,833	26,747	94,405	214,009	19,328	56,859	166,042	173,974	7,932	0.272
2010	288,629	27,108	96,490	218,643	19,328	56,859	169,044	176,940	7,896	0.272
2011	295,425	27,468	98,575	223,278	19,328	56,859	172,056	179,919	7,862	0.272
2012	302,222	27,829	100,659	227,913	19,328	56,859	175,079	182,910	7,831	0.272
2013	309,018	28,190	102,744	232,547	19,328	56,859	178,112	185,913	7,802	0.271
2014	315,814	28,551	104,828	237,182	19,328	56,859	181,155	188,929	7,774	0.271
2015	322,610	28,912	106,913	241,816	19,328	56,859	184,207	191,958	7,749	0.271
2016	329,406	29,273	108,997	246,451	19,328	56,859	187,270	194,994	7,725	0.271
2017	336,202	29,634	111,082	251,085	19,328	56,859	190,342	198,044	7,702	0.271
2018	342,998	29,995	113,166	255,720	19,328	56,859	193,424	201,105	7,681	0.271
2019	349,794	30,355	115,251	260,354	19,328	56,859	196,515	204,176	7,661	0.270
2020	356,590	30,716	117,335	264,989	19,328	56,859	199,615	207,258	7,643	0.270
2021	363,386	31,077	119,420	269,623	19,328	56,859	202,725	210,350	7,625	0.270
2022	370,182	31,438	121,504	274,258	19,328	56,859	205,844	213,453	7,609	0.270
2023	376,979	31,799	123,589	278,892	19,328	56,859	208,972	216,566	7,594	0.270
2024	383,775	32,160	125,673	283,527	19,328	56,859	212,108	219,688	7,580	0.270
2025	390,571	32,521	127,758	288,161	19,328	56,859	215,254	222,820	7,566	0.270
2026	397,367	32,882	129,842	292,796	19,328	56,859	218,408	225,962	7,554	0.270
2027	404,163	33,242	131,927	297,430	19,328	56,859	221,571	229,114	7,542	0.270

KA : Agricultural Sector Capital Stock
 EA : Agricultural Sector Employment
 ELECK : Electricity Sector Capital Stock
 TRANK : Transportation & Communications Sector Capital Stock
 TOTK/wo : Telecom. Sector Capital Stock without the Project
 TOTK/w : Telecom. Sector Capital Stock with the Project
 Yw/o : Agricultural Sector Total Output without the Project
 Yw : Agricultural Sector Total Output with the Project
 IncY : Yw-Yw/o
 OutEla : Output Elasticity of Telecom. Capital Stock in the Agricultural Sector

Table 10.1-2 Manufacturing Sector

(Unit: Million Baht, 1972 Prices)

YEAR	KM	EM	ELECK	TRANK	TOT K/wo	TOT K/w	Yw/o	Yw	IncY	Out Ela
1987	211,525	2,436	48,546	112,050	5,316	5,316	86,937	86,937	0	
1988	218,970	2,523	50,631	116,684	7,541	7,541	91,319	91,319	0	
1989	226,415	2,609	52,715	121,319	8,579	8,579	95,573	95,573	0	
1990	233,860	2,695	54,800	125,953	10,823	10,823	100,042	100,042	0	
1991	241,305	2,782	56,884	130,588	13,713	13,713	104,650	104,650	0	
1992	248,750	2,868	58,969	135,222	17,039	17,039	109,368	109,368	0	
1993	256,195	2,954	61,053	139,857	24,184	26,015	114,724	115,010	285	0.190
1994	263,640	3,041	63,138	144,491	24,899	30,396	119,127	119,996	869	0.192
1995	271,085	3,127	65,222	149,126	24,234	33,343	123,342	124,798	1,456	0.193
1996	278,530	3,214	67,307	153,760	23,621	36,126	127,591	129,613	2,021	0.195
1997	285,975	3,300	69,391	158,395	23,053	38,758	131,875	134,440	2,565	0.196
1998	293,420	3,386	71,476	163,029	22,530	40,909	136,191	139,223	3,032	0.197
1999	300,865	3,473	73,560	167,664	22,045	42,615	140,539	143,965	3,426	0.199
2000	308,310	3,559	75,645	172,298	21,590	44,235	144,917	148,723	3,806	0.200
2001	315,755	3,645	77,729	176,933	21,160	45,773	149,324	153,497	4,173	0.201
2002	323,200	3,732	79,814	181,567	20,753	47,236	153,759	158,287	4,528	0.202
2003	330,645	3,818	81,898	186,202	20,368	49,306	158,222	163,213	4,991	0.203
2004	338,090	3,904	83,983	190,836	20,004	51,942	162,712	168,269	5,557	0.204
2005	345,535	3,991	86,067	195,471	19,657	54,457	167,228	173,335	6,106	0.205
2006	352,980	4,077	88,152	200,105	19,328	56,859	171,771	178,410	6,640	0.206
2007	360,425	4,163	90,236	204,740	19,328	56,859	176,393	183,079	6,686	0.207
2008	367,870	4,250	92,321	209,374	19,328	56,859	181,039	187,770	6,732	0.207
2009	375,315	4,336	94,405	214,009	19,328	56,859	185,707	192,484	6,776	0.208
2010	382,760	4,422	96,490	218,643	19,328	56,859	190,398	197,219	6,821	0.209
2011	390,206	4,509	98,575	223,278	19,328	56,859	195,111	201,975	6,864	0.209
2012	397,651	4,595	100,659	227,913	19,328	56,859	199,845	206,752	6,907	0.210
2013	405,096	4,681	102,744	232,547	19,328	56,859	204,601	211,550	6,950	0.210
2014	412,541	4,768	104,828	237,182	19,328	56,859	209,378	216,369	6,991	0.211
2015	419,986	4,854	106,913	241,816	19,328	56,859	214,175	221,208	7,033	0.212
2016	427,431	4,940	108,997	246,451	19,328	56,859	218,993	226,067	7,073	0.212
2017	434,876	5,027	111,082	251,085	19,328	56,859	223,832	230,946	7,114	0.213
2018	442,321	5,113	113,166	255,720	19,328	56,859	228,690	235,844	7,153	0.213
2019	449,766	5,199	115,251	260,354	19,328	56,859	233,568	240,761	7,192	0.214
2020	457,211	5,286	117,335	264,989	19,328	56,859	238,466	245,697	7,231	0.214
2021	464,656	5,372	119,420	269,623	19,328	56,859	243,383	250,652	7,269	0.215
2022	472,101	5,458	121,504	274,258	19,328	56,859	248,318	255,626	7,307	0.215
2023	479,546	5,545	123,589	278,892	19,328	56,859	253,273	260,617	7,344	0.215
2024	486,991	5,631	125,673	283,527	19,328	56,859	258,246	265,627	7,381	0.216
2025	494,436	5,717	127,758	288,161	19,328	56,859	263,237	270,655	7,418	0.216
2026	501,881	5,804	129,842	292,796	19,328	56,859	268,247	275,701	7,454	0.217
2027	509,326	5,890	131,927	297,430	19,328	56,859	273,274	280,763	7,490	0.217

KM : Manufacturing Sector Capital Stock

EM : Manufacturing Sector Employment

ELECK : Electricity Sector Capital Stock

TRANK : Transportation & Communications Sector Capital Stock

TOTK/wo : Telecom. Sector Capital Stock without the Project

TOTK/w : Telecom. Sector Capital Stock with the Project

Yw/o : Manufacturing Sector Total Output without the Project

Yw : Manufacturing Sector Total Output with the Project

IncY : Yw-Yw/o

OutEla : Output Elasticity of Telecom. Capital Stock in the Manufacturing Sector

Table 10.1-3 Other Remaining Sectors

(Unit :Million Baht, 1972 Prices)

YEAR	KS	ES	ELECK	TRANK	TOT K/wo	TOT K/w	Yw/o	Yw	IncY	Out Ela
1987	417,002	5,212	48,546	112,050	5,316	5,316	156,864	156,864	0	
1988	439,643	5,429	50,631	116,684	7,541	7,541	165,045	165,045	0	
1989	462,285	5,646	52,715	121,319	8,579	8,579	173,138	173,138	0	
1990	484,926	5,863	54,800	125,953	10,823	10,823	181,467	181,467	0	
1991	507,567	6,080	56,884	130,588	13,713	13,713	189,955	189,955	0	
1992	530,208	6,296	58,969	135,222	17,039	17,039	198,573	198,573	0	
1993	552,850	6,513	61,053	139,857	24,184	26,015	207,788	208,042	254	0.093
1994	575,491	6,730	63,138	144,491	24,899	30,396	216,178	216,944	766	0.093
1995	598,132	6,947	65,222	149,126	24,234	33,343	224,439	225,712	1,273	0.093
1996	620,774	7,163	67,307	153,760	23,621	36,126	232,766	234,519	1,753	0.093
1997	643,415	7,380	69,391	158,395	23,053	38,758	241,157	243,366	2,208	0.092
1998	666,056	7,597	71,476	163,029	22,530	40,909	249,612	252,204	2,592	0.092
1999	688,698	7,814	73,560	167,664	22,045	42,615	258,127	261,037	2,910	0.092
2000	711,339	8,031	75,645	172,298	21,590	44,235	266,700	269,914	3,214	0.092
2001	733,980	8,247	77,729	176,933	21,160	45,773	275,330	278,834	3,504	0.091
2002	756,621	8,464	79,814	181,567	20,753	47,236	284,014	287,796	3,782	0.091
2003	779,263	8,681	81,898	186,202	20,368	49,306	292,752	296,899	4,147	0.091
2004	801,904	8,898	83,983	190,836	20,004	51,942	301,542	306,136	4,594	0.091
2005	824,545	9,115	86,067	195,471	19,657	54,457	310,384	315,407	5,023	0.091
2006	847,187	9,331	88,152	200,105	19,328	56,859	319,275	324,712	5,437	0.091
2007	869,828	9,548	90,236	204,740	19,328	56,859	328,260	333,714	5,454	0.091
2008	892,469	9,765	92,321	209,374	19,328	56,859	337,292	342,763	5,471	0.090
2009	915,110	9,982	94,405	214,009	19,328	56,859	346,369	351,857	5,488	0.090
2010	937,752	10,198	96,490	218,643	19,328	56,859	355,490	360,998	5,505	0.090
2011	960,393	10,415	98,575	223,278	19,328	56,859	364,655	370,178	5,523	0.090
2012	983,034	10,632	100,659	227,913	19,328	56,859	373,864	379,404	5,540	0.090
2013	1,005,676	10,849	102,744	232,547	19,328	56,859	383,114	388,672	5,558	0.090
2014	1,028,317	11,066	104,828	237,182	19,328	56,859	392,406	397,981	5,575	0.090
2015	1,050,958	11,282	106,913	241,816	19,328	56,859	401,739	407,332	5,593	0.090
2016	1,073,599	11,499	108,997	246,451	19,328	56,859	411,113	416,723	5,611	0.090
2017	1,096,241	11,716	111,082	251,085	19,328	56,859	420,526	426,154	5,628	0.090
2018	1,118,882	11,933	113,166	255,720	19,328	56,859	429,978	435,624	5,646	0.089
2019	1,141,523	12,150	115,251	260,354	19,328	56,859	439,469	445,133	5,664	0.089
2020	1,164,165	12,366	117,335	264,989	19,328	56,859	448,998	454,679	5,681	0.089
2021	1,186,806	12,583	119,420	269,623	19,328	56,859	458,565	464,264	5,699	0.089
2022	1,209,447	12,800	121,504	274,258	19,328	56,859	468,169	473,885	5,716	0.089
2023	1,232,088	13,017	123,589	278,892	19,328	56,859	477,809	483,543	5,734	0.089
2024	1,254,730	13,234	125,673	283,527	19,328	56,859	487,485	493,236	5,751	0.089
2025	1,277,371	13,450	127,758	288,161	19,328	56,859	497,197	502,966	5,769	0.089
2026	1,300,012	13,667	129,842	292,796	19,328	56,859	506,944	512,730	5,786	0.089
2027	1,322,654	13,884	131,927	297,430	19,328	56,859	516,726	522,529	5,803	0.089

KS : Service Sector Capital Stock
 ES : Service Sector Employment
 ELECK : Electricity Sector Capital Stock
 TRANK : Transportation & Communications Sector Capital Stock
 TOTK/wo : Telecom. Sector Capital Stock without the Project
 TOTK/w : Telecom. Sector Capital Stock with the Project
 Yw/o : Service Sector Total Output without the Project
 Yw : Service Sector Total Output with the Project
 IncY : Yw-Yw/o
 OutEla : Output Elasticity of Telecom. Capital Stock in the Service Sector

Table 10.1-4 Total Incremental Output

(Unit: Million Baht, 1989 Price)

Year	Agricultural Sector		Manufacturing Sector		Service Sector		Total	
	Contri- bution to GDP (%)	Output	Contri- bution to GDP (%)	Output	Contri- bution to GDP (%)	Output	Contri- bution to GDP (%)	Output
1993	0.36	1,428	0.25	946	0.12	842	0.22	3,216
1994	0.34	1,410	0.72	2,878	0.35	2,538	0.45	6,826
1995	0.99	4,203	1.17	4,825	0.56	4,218	0.84	13,246
1996	1.59	6,904	1.56	6,697	0.75	5,808	1.18	19,409
1997	2.11	9,399	1.91	8,499	0.91	7,316	1.48	25,214
1998	2.56	11,711	2.18	10,045	1.03	8,588	1.73	30,344
1999	2.90	13,600	2.38	11,349	1.11	9,642	1.91	34,590
2000	3.15	15,109	2.56	12,608	1.19	10,647	2.06	38,364
2001	3.37	16,517	2.72	13,825	1.26	11,609	2.18	41,951
2002	3.56	17,835	2.86	15,002	1.31	12,531	2.29	45,369
2003	3.73	19,072	3.06	16,536	1.40	13,740	2.42	49,348
2004	3.97	20,730	3.30	18,411	1.50	15,219	2.60	54,360
2005	4.27	22,776	3.52	20,230	1.59	16,642	2.77	59,648
2006	4.53	24,710	3.72	21,997	1.67	18,012	2.93	64,719
2007	4.77	26,540	3.65	22,151	1.63	18,068	2.94	66,759
2008	4.66	26,405	3.58	22,302	1.60	18,124	2.88	66,831
2009	4.56	26,278	3.52	22,451	1.56	18,182	2.81	66,910
2010	4.46	26,159	3.46	22,597	1.53	18,239	2.75	66,995
2011	4.37	26,048	3.40	22,742	1.49	18,297	2.69	67,087
2012	4.28	25,944	3.34	22,884	1.46	18,355	2.64	67,183
2013	4.20	25,847	3.29	23,024	1.43	18,413	2.58	67,285
2014	4.11	25,756	3.23	23,163	1.40	18,471	2.53	67,391
2015	4.04	25,671	3.18	23,300	1.37	18,530	2.48	67,501
2016	3.96	25,592	3.13	23,434	1.35	18,588	2.44	67,614
2017	3.89	25,517	3.08	23,568	1.32	18,647	2.39	67,731
2018	3.82	25,447	3.03	23,699	1.30	18,705	2.35	67,851
2019	3.75	25,381	2.99	23,829	1.27	18,763	2.31	67,974
2020	3.69	25,320	2.94	23,957	1.25	18,822	2.26	68,099
2021	3.63	25,263	2.90	24,084	1.23	18,880	2.23	68,226
2022	3.56	25,209	2.86	24,209	1.21	18,938	2.19	68,356
2023	3.51	25,159	2.82	24,332	1.19	18,996	2.15	68,487
2024	3.45	25,112	2.78	24,455	1.17	19,054	2.12	68,620
2025	3.40	25,068	2.74	24,576	1.15	19,111	2.08	68,755
2026	3.34	25,027	2.70	24,695	1.13	19,169	2.05	68,890
2027	3.29	24,988	2.67	24,813	1.11	19,226	2.02	69,028

Table 10.2-1 Economic Internal Rate of Return

(Unit: Million Baht , 1989 Price)

Year	COST	BENEFIT	NET BENEFIT
1992	13,931	0	-13,931
1993	15,976	3,216	-12,760
1994	17,600	6,826	-10,774
1995	18,684	13,246	-5,438
1996	19,711	19,409	-302
1997	17,935	25,214	7,279
1998	18,108	30,344	12,236
1999	18,730	34,590	15,860
2000	19,396	38,364	18,968
2001	20,059	41,951	21,892
2002	26,914	45,369	18,455
2003	27,846	49,348	21,502
2004	28,659	54,360	25,701
2005	29,414	59,648	30,234
2006	30,167	64,719	34,552
2007	20,011	66,759	46,748
2008	18,779	66,831	48,052
2009	18,509	66,910	48,401
2010	18,509	66,995	48,486
2011	18,509	67,087	48,578
2012	31,177	67,183	36,006
2013	31,177	67,285	36,108
2014	31,177	67,391	36,214
2015	31,177	67,501	36,324
2016	31,177	67,614	36,437
2017	23,472	67,731	44,259
2018	23,472	67,851	44,379
2019	23,472	67,974	44,502
2020	23,472	68,099	44,627
2021	23,472	68,226	44,754
2022	28,569	68,356	39,787
2023	28,569	68,487	39,918
2024	28,569	68,620	40,051
2025	28,569	68,755	40,186
2026	28,569	68,890	40,321
2027	-87,784	69,028	156,812

EIRR=24.17%

CHAPTER 11

FINANCIAL MANAGEMENT

CHAPTER 11. FINANCIAL MANAGEMENT

The objective of this chapter is to examine how the total financial situation of TOT will change when the Project is implemented with various financing schemes. Then, this chapter proposes possible measures to improve the financial position.

11.1 Financial Forecasts

This section presents three kinds of estimated financial statements, i.e., Income Statement, Balance Sheet, and Statement of Cash Flow, from FY 1993 until 2007. Future financial situations depend on many external and internal factors. The study selects three financial cases for considerations at first as shown in Table 11.1-1.

Table 11.1-1 Conditions and Assumptions of Three Financial Cases

	Case A: Low Profit	Case B: High Profit	Case C: Moderate Profit
1. Operating Revenue* ¹ (Local & Trunk Rev. from Priv. & Gov. Sub.)	10% Decrease	10% Increase	Original* ⁸
2. Project Investment Cost* ² (Outside Plant Cost)	50% Increase	Original* ⁸	30% Increase
3. Depreciation Procedure Improvement* ³	2nd Year: 70% 3rd Year: 30%	2nd Year: 50% 3rd Year: 50%	2nd Year: 60% 3rd Year: 40%
4. Operating Expenses* ⁴	Past Trend with Additional Inflation (2% Increase/year)	Past Trend without Additional Inflation	Past Trend with Additional Inflation (2% Increase/year)
5. The Number of Employees	Past Trend* ⁵	2% Increase/year	Past Trend* ⁵
6. Salary Increase Ratio* ⁶	5% Increase/year	3% Increase/year	3% Increase/year
7. Long-term Loan* ⁷	75%	75%	75%

Note:1. Increase or decrease of the operating revenue is only for the local and trunk revenue from normal private and government subscribers excluding public telephones.

2. Only outside plant installation cost of the Project investment cost is increased here.

3. Depreciation Procedure Improvement indicates how much annual investment volume is transferred into the fixed assets in the following year.
4. Operating expenses here mean maintenance expenses and operating & administration expenses.
5. The past trend is the past average increase ratio of (line/employee).
6. Salary increase ratio means average staff remuneration per employee increase ratio.
7. The percentage of long-term loan shows how much the percentage share of the project investment cost will be borrowed as long-term debt.
8. "Original" means the estimation which is studied in Chapter 9.

After estimating the future financial situations of these three cases, another three additional cases are considered from the viewpoint of improving the negative cash flow of Case C. In order to keep cash flow positive, short-term loans, five year postponement of the replacements and rehabilitations schedule, and a monthly charges increase are considered in addition to borrowing long-term loan. Table 11.1-2 shows the conditions and assumptions of the revised Case C, Case D, and Case E.

Table 11.1-2 Conditions and Assumptions of Three Additional Financial Cases

	The Revised Case C (Short Term Loan)	Case D: Postponed Replacement Schedule	Case E: Tariff Increase
1. Operating Revenue	Original	Original	Doubled Monthly Charge from FY 1993
2. Project Investment Cost (Outside Plant Cost)	30% Increase	30% Increase 5 year's Delay of Replacements and Rehabilitation Schedule	30% Increase
3. Depreciation Procedure Improvement	Same as Case C	Same as Case C	Same as Case C
4. Operating Expenses	Same as Case C	Same as Case C	Same as Case C
5. The Number of Employees	Same as Case C	Same as Case C	Same as Case C
6. Salary Increase Ratio	Same as Case C	Same as Case C	Same as Case C
7. Long-term Loan	Same as Case C	Same as Case C	Same as Case C
8. Short-term Loan	1990: 1,000 M B 1991: 3,000 M B 1992: 6,000 M B 1993: 8,100 M B 1994: 11,000 M B 1995: 14,000 M B 1996: 14,000 M B 1997: 10,000 M B 1998: 9,000 M B 1999: 9,000 M B 2000: 6,500 M B 2001: 3,000 M B	1990: 1,000 M B 1991: 3,000 M B 1992: 6,000 M B 1993: 8,000 M B 1994: 10,000 M B 1995: 12,000 M B 1996: 12,000 M B 1997: 6,500 M B 1998: 4,500 M B 1999: 3,000 M B	1990: 1,000 M B 1991: 3,000 M B 1992: 6,000 M B 1993: 6,500 M B 1994: 7,500 M B 1995: 8,000 M B 1996: 5,000 M B

11.1.1 Case A: Pessimistic Future

1) The following are the conditions and assumptions for estimating the future financial situation of Case A.

- a) Operating revenue (local and trunk revenues from normal subscribers):
10% decrease
- b) Project investment cost (outside plant installation cost): 50% increase
- c) Depreciation procedure: 2nd year: 70%; 3rd year: 30%
- d) Operating expenses: Additional increase by 2%
- e) The number of employee: 6.6% efficiency increase per year of
(line/employee)
- f) Staff remuneration per employee: 5% increase per year
- g) Long-term Loan:
75% of the Project initial investment cost from 1992 to 2006
 - i) Foreign Loan: 5 year grace period and 10 year repayment period,
10% as interest rate.
 - ii) Local Loan: 3 year grace period and 7 year repayment period,
12% as interest rate.

2) Table 11.1.1-1 shows the summary of the estimated financial statements under the above conditions.

Table 11.1.1-1 Summary of Case A

(Unit: Million Baht)

Year	Income Statement			Cash Flow			Balance Sheet		
	Total Revenue	Total Expenses	Net Income before Remitt.	Receipt	Disburse-ments	Cash Balance	Assets	Liabilities	Equities
1987	9,553.4	7,339.6	2,213.8	11,855.9	12,369.5	544.9	34,535.9	30,408.9	4,127.0
1988	11,290.8	8,907.0	2,383.8	18,852.3	18,215.4	1,181.8	40,157.5	34,260.9	5,896.6
1989	11,606.5	9,222.4	2,384.2	16,398.6	17,954.5	-374.1	46,418.4	38,713.9	7,704.5
1990	13,225.4	10,758.6	2,466.8	24,063.8	25,272.1	-1,582.4	58,631.0	49,124.7	9,506.3
1991	15,639.5	12,508.4	3,131.1	28,961.9	31,468.8	-4,089.4	69,411.4	57,680.2	11,731.1
1992	18,224.4	15,295.7	2,928.7	29,487.4	32,896.7	-7,498.6	81,566.8	67,859.2	13,707.7
1993	21,674.7	18,815.0	2,859.7	37,784.7	40,562.1	-10,276.0	97,793.1	82,261.0	15,532.0
1994	25,079.6	22,704.7	2,374.9	41,188.7	44,832.3	-13,919.7	110,484.6	93,564.3	16,920.3
1995	28,511.7	26,566.7	1,945.0	44,654.6	48,082.3	-17,347.4	123,704.3	105,816.0	17,888.3
1996	31,943.8	30,262.9	1,680.9	45,477.0	46,300.8	-18,171.2	134,625.9	116,168.2	18,457.6
1997	35,375.8	33,570.1	1,805.8	39,709.7	37,116.0	-15,577.5	134,684.7	115,615.8	19,068.9
1998	37,822.3	35,801.5	2,020.8	50,059.7	51,117.4	-16,635.2	141,112.3	121,709.8	19,402.5
1999	40,205.9	37,941.1	2,264.8	52,478.0	55,349.4	-19,506.7	144,898.3	124,914.6	19,983.7
2000	42,589.5	40,200.6	2,388.9	54,864.8	55,291.2	-19,933.1	149,008.1	128,265.3	20,742.8
2001	44,973.1	42,344.6	2,628.5	55,251.1	55,030.4	-19,712.5	150,963.6	128,922.9	22,040.7
2002	47,356.6	43,828.8	3,527.8	52,030.6	50,047.1	-17,729.0	148,155.5	123,270.1	24,885.4
2003	50,095.7	46,130.4	3,965.3	63,574.5	67,370.1	-21,524.7	154,698.2	127,623.1	27,075.1
2004	52,935.4	48,648.7	4,286.7	66,389.4	68,647.2	-23,782.4	161,731.5	132,174.9	29,556.6
2005	55,775.1	51,680.6	4,094.4	69,228.8	70,104.4	-24,658.0	168,562.2	136,593.8	31,968.4
2006	58,614.7	54,628.6	3,986.1	69,872.5	67,852.1	-22,637.6	172,523.3	137,916.1	34,607.1
2007	61,454.2	56,361.1	5,093.1	61,736.0	68,489.5	-29,391.1	165,953.3	126,710.6	39,242.8

Table 11.1.1-1 indicates that:

- Net income decreases from FY 1991 to FY 1996 and then increases again.
- Cash balance becomes minus from FY 1989. This situation continues until FY 2007.

The following figures show the estimated revenues and expenses, net income, liabilities and equities, cash flow, and cash balance of Case A.

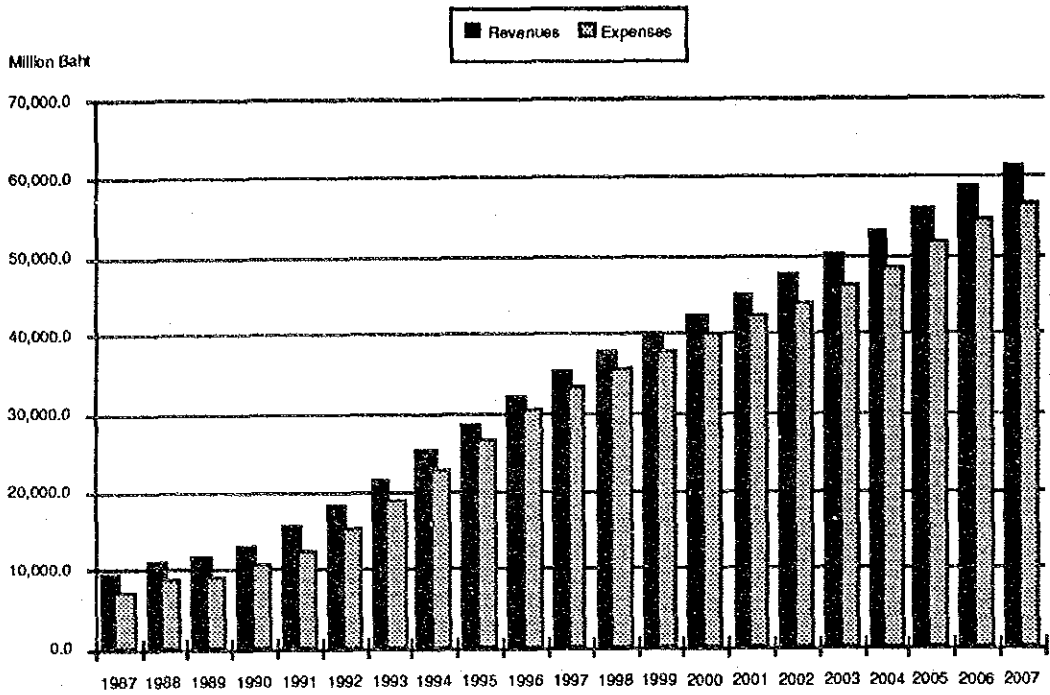


Figure 11.1.1-1 Estimated Revenues and Expenses of Case A

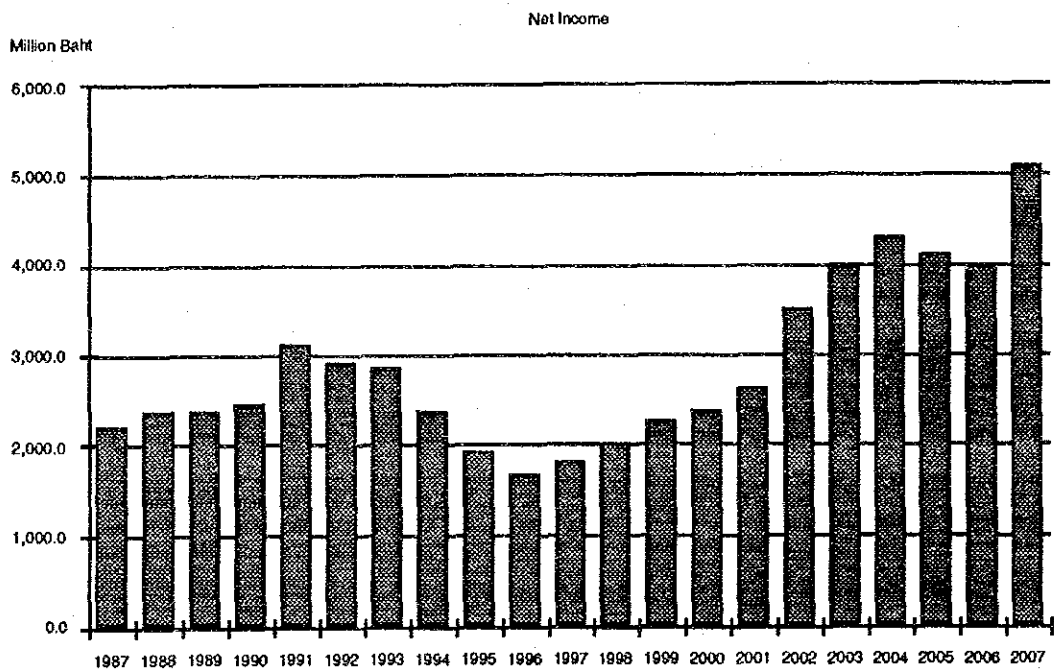


Figure 11.1.1-2 Estimated Net Income before Remittance to the Treasury of Case A

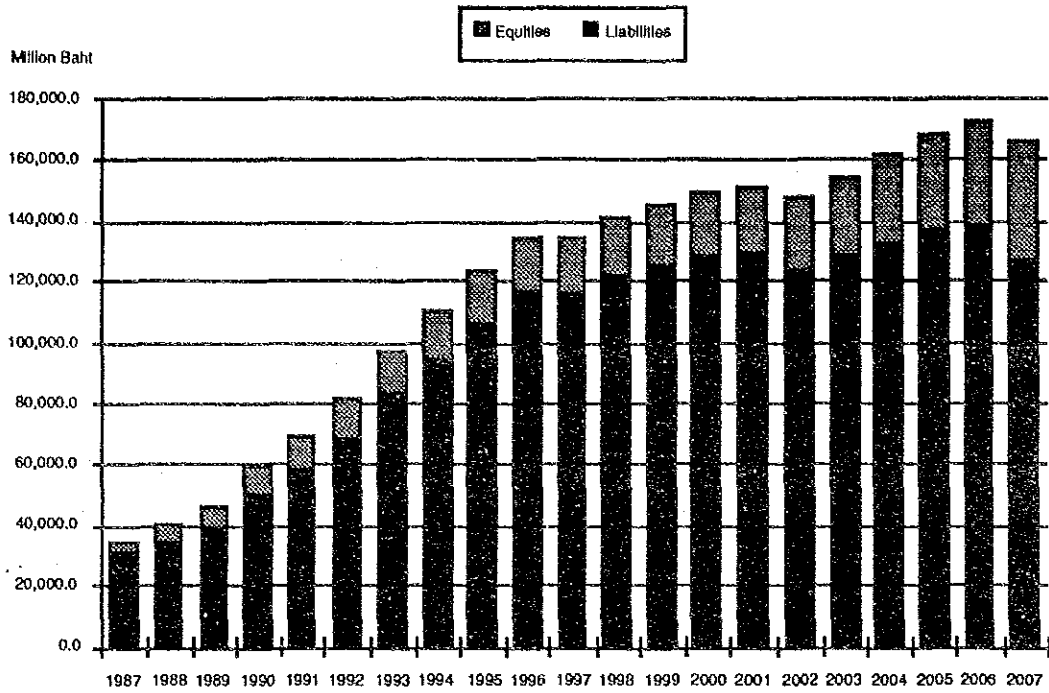


Figure 11.1.1-3 Estimated Liabilities and Equities of Case A

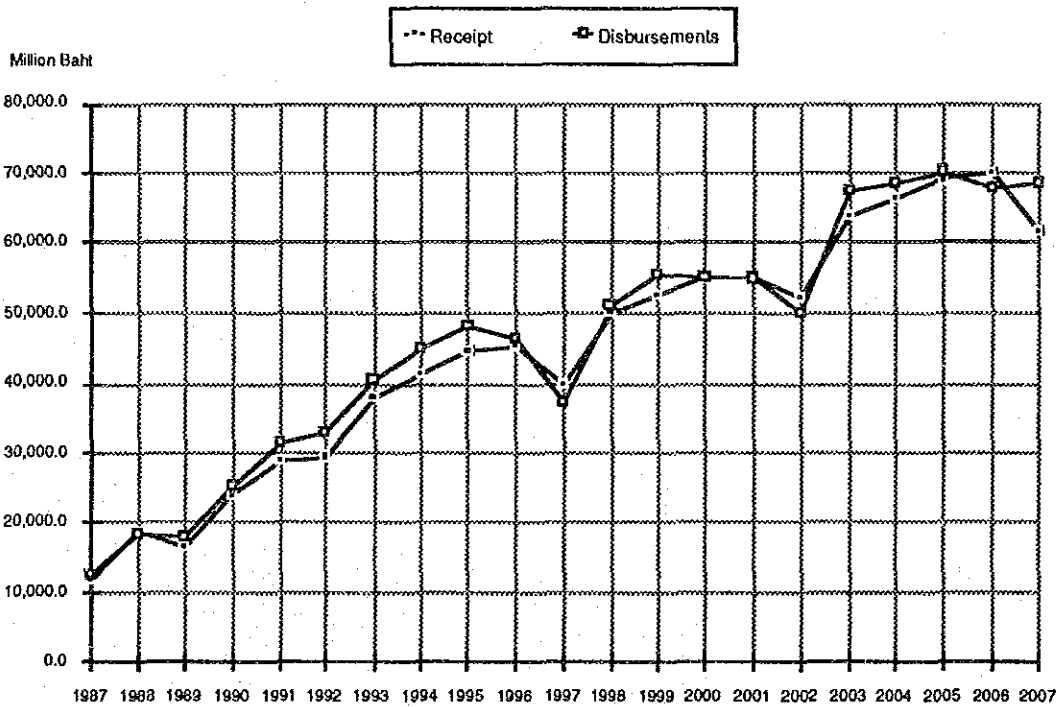


Figure 11.1.1-4 Estimated Cash Flow of Case A

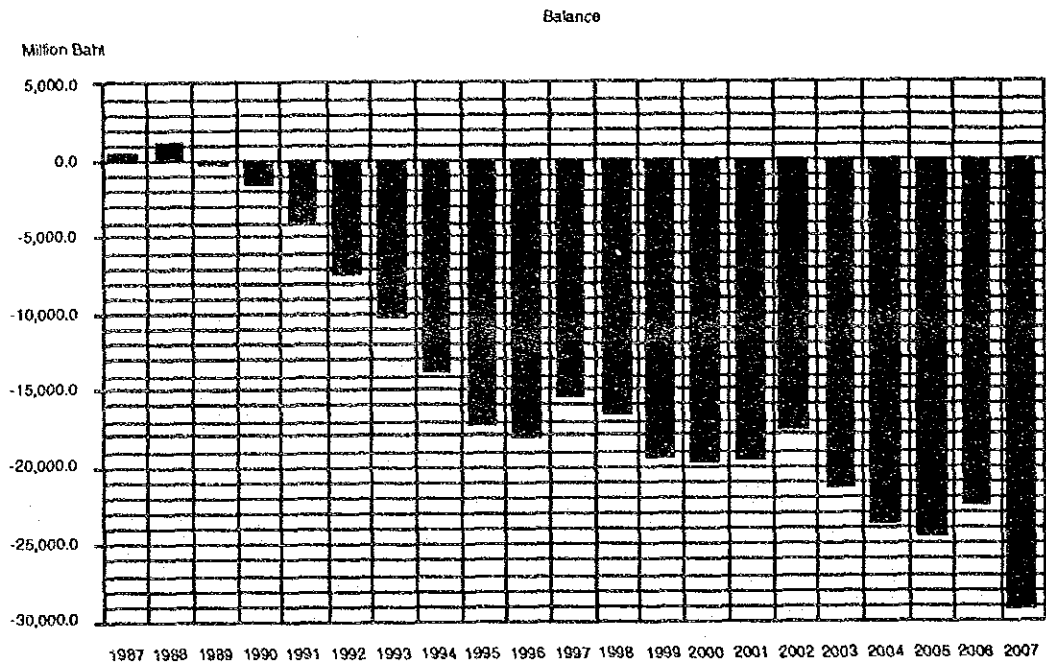


Figure 11.1.1-5 Estimated Cash Balance of Case A

Table 11.1.1-2 Management Indexes of Case A

Year	Total Capital Profit Ratio	Liquidity Ratio	Revenue per Head (Baht)	Ratio of Interest Expenses to OP. Revenue	Ratio of Depreciation Expenses to OP. Revenue	Ratio of Accumulated Depreciation to Total Fixed Assets	Staff Remuneration per OP. Revenue	Line/Head
1987	6.6%	114.4%	133,820	22.5%	18.2%	17.4%	15.5%	50.81
1988	6.4%	117.6%	154,589	19.9%	15.0%	18.7%	14.3%	56.02
1989	5.5%	70.5%	151,055	18.7%	19.5%	19.7%	15.9%	59.72
1990	4.7%	43.6%	161,558	18.3%	21.9%	19.6%	15.4%	63.66
1991	4.9%	14.3%	176,629	17.8%	24.1%	20.1%	15.1%	67.86
1992	3.9%	-19.9%	188,703	19.9%	26.5%	21.2%	14.8%	72.34
1993	3.2%	-41.7%	202,160	22.4%	27.8%	22.1%	14.7%	77.11
1994	2.3%	-55.9%	211,477	24.9%	29.5%	23.6%	14.5%	82.20
1995	1.7%	-79.9%	222,490	26.2%	31.5%	25.6%	14.4%	87.63
1996	1.3%	-66.6%	234,769	26.9%	33.2%	28.4%	14.2%	93.41
1997	1.3%	-37.5%	248,234	25.7%	34.4%	33.4%	14.0%	99.57
1998	1.5%	-34.0%	260,156	25.4%	35.3%	36.6%	13.7%	106.15
1999	1.6%	-46.7%	277,099	24.6%	35.6%	39.6%	13.5%	113.15
2000	1.6%	-44.9%	295,172	23.6%	36.5%	42.6%	13.3%	120.62
2001	1.8%	-40.8%	314,449	22.1%	37.6%	46.2%	13.1%	128.58
2002	2.4%	-28.1%	335,005	19.5%	38.5%	50.6%	12.9%	137.07
2003	2.6%	-43.7%	358,296	18.9%	38.5%	52.3%	12.7%	146.11
2004	2.7%	-51.0%	382,529	18.4%	38.9%	54.0%	12.5%	155.76
2005	2.5%	-50.4%	408,338	18.0%	40.1%	55.9%	12.2%	166.04
2006	2.3%	-37.2%	435,831	17.2%	41.5%	58.6%	12.0%	177.00
2007	3.0%	-61.7%	465,121	14.4%	42.7%	61.4%	11.8%	188.68

11.1.2 Case B: Optimistic Future

1) The following are the conditions and assumptions for estimating the future financial situation of Case B.

- a) Operating revenue (local and trunk revenues from normal subscribers):
10% Increase
- b) Project investment cost: Original
- c) Depreciation procedure: 2nd year: 50%; 3rd year: 50%
- d) Operating expenses: No additional increase
- e) The number of employee: 2% increase of staff per year
- f) Staff remuneration per employee: 3% increase per year
- g) Long-term Loan:
75% of the Project initial investment cost from 1992 to 2006
 - i) Foreign Loan: 5 year grace period and 10 year repayment period,
10% as interest rate.
 - ii) Local Loan: 3 year grace period and 7 year repayment period,
12% as interest rate.

2) Table 11.1.2-1 shows the summary of the estimated financial statements under the above conditions.

Table 11.1.2-1 Summary of Case B

(Unit: Million Baht)

Year	Income Statement			Cash Flow			Balance Sheet		
	Total Revenue	Total Expenses	Net Income before Remitt.	Receipt	Disburse-ments	Cash Balance	Assets	Liabilities	Equities
1987	9,553.4	7,339.6	2,213.8	11,855.9	12,369.5	544.9	34,535.9	30,408.9	4,127.0
1988	11,290.8	8,907.0	2,383.8	18,852.3	18,215.4	1,181.8	40,157.5	34,260.9	5,896.6
1989	12,668.6	9,146.5	3,522.0	17,258.8	17,838.3	602.3	47,596.6	39,129.4	8,467.2
1990	14,477.8	10,548.8	3,929.0	25,298.6	25,471.5	429.4	60,862.2	49,813.1	11,249.2
1991	17,109.6	11,937.4	5,172.1	30,410.2	31,551.3	-711.7	73,132.9	58,290.7	14,842.2
1992	19,838.9	14,251.1	5,587.7	29,953.6	31,330.2	-2,088.3	86,073.2	67,472.0	18,601.2
1993	23,494.6	17,054.5	6,440.1	36,201.2	35,569.6	-1,456.7	101,527.9	78,702.4	22,825.6
1994	27,371.7	20,036.9	7,334.8	40,064.9	39,343.9	-735.6	114,570.7	87,032.1	27,538.6
1995	31,117.2	22,873.0	8,244.2	43,845.7	42,364.4	745.6	128,962.0	96,232.9	32,729.0
1996	35,098.9	25,591.4	9,507.5	45,777.8	40,671.8	5,851.5	143,127.6	104,582.9	38,544.7
1997	39,443.0	28,122.8	11,320.2	43,075.1	33,982.7	14,944.0	150,145.5	104,611.6	45,533.9
1998	43,085.0	29,979.0	13,106.0	53,334.9	46,049.7	22,229.1	163,754.4	110,208.1	53,546.3
1999	46,488.3	31,752.1	14,736.2	56,783.3	50,204.1	28,808.3	175,954.2	113,234.7	62,719.5
2000	49,821.0	33,578.1	16,242.8	60,119.1	50,234.8	38,692.5	189,571.1	116,589.9	72,981.2
2001	53,378.1	35,401.7	17,976.4	62,003.1	50,504.2	50,191.4	202,625.1	117,899.1	84,726.0
2002	57,202.6	36,711.0	20,491.6	61,073.2	47,069.9	64,194.7	212,960.7	114,013.9	98,946.8
2003	61,627.4	38,712.9	22,914.5	72,762.2	62,744.7	74,212.2	232,472.8	118,501.3	113,971.4
2004	65,748.5	40,772.7	24,975.8	76,859.6	64,540.0	86,531.9	253,446.3	123,005.1	130,441.2
2005	70,099.7	43,268.1	26,831.6	81,210.6	66,412.4	101,330.1	275,610.5	127,409.0	148,201.4
2006	74,698.7	45,806.5	28,892.2	83,999.1	65,099.8	120,229.3	296,847.6	129,251.0	167,596.6
2007	79,707.8	47,396.6	32,311.2	79,959.2	66,315.6	133,872.9	311,269.9	120,907.3	190,362.6

Table 11.1.2-1 indicates that:

- a) Net income continuously increases each year,
- b) Cash balance becomes negative in FY 1992 and 1993, but becomes positive again from FY 1994. After FY 1994, cash balance continuously increases.

The following figures show estimated revenues and expenses, net income, liabilities and equities, cash flow, and cash balance of Case B.

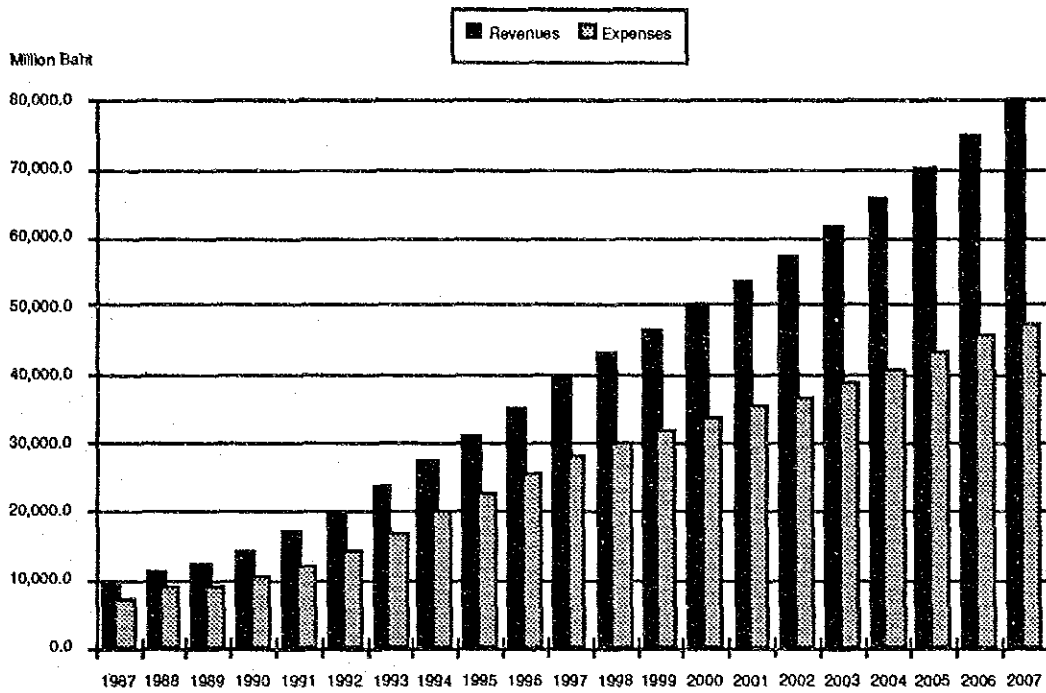


Figure 11.1.2-1 Estimated Revenues and Expenses of Case B

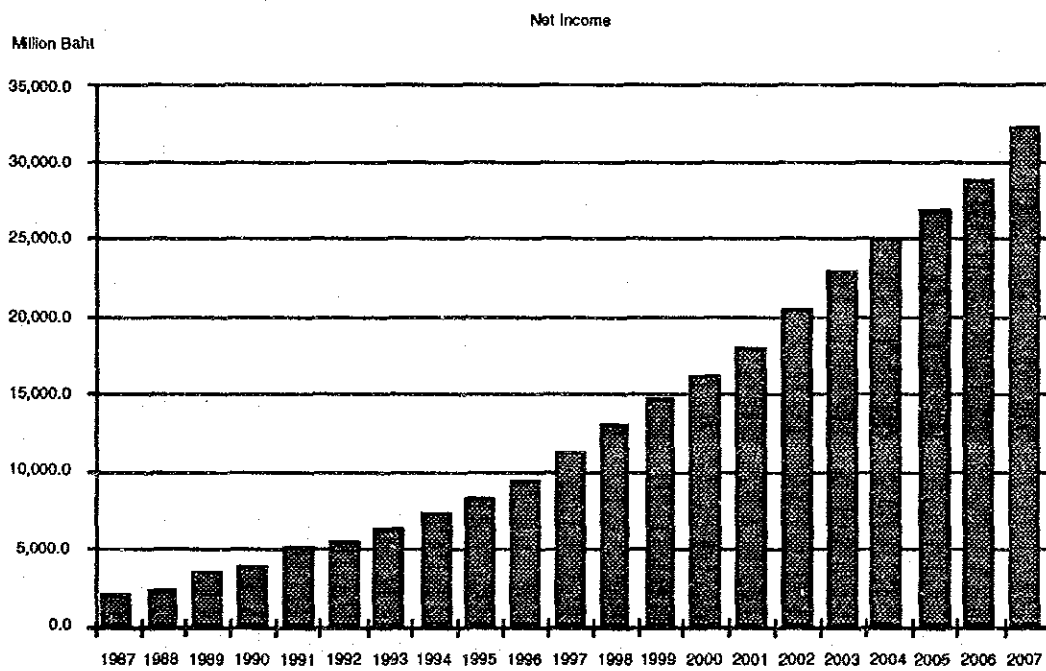


Figure 11.1.2-2 Estimated Net Income before Remittance to the Treasury of Case B

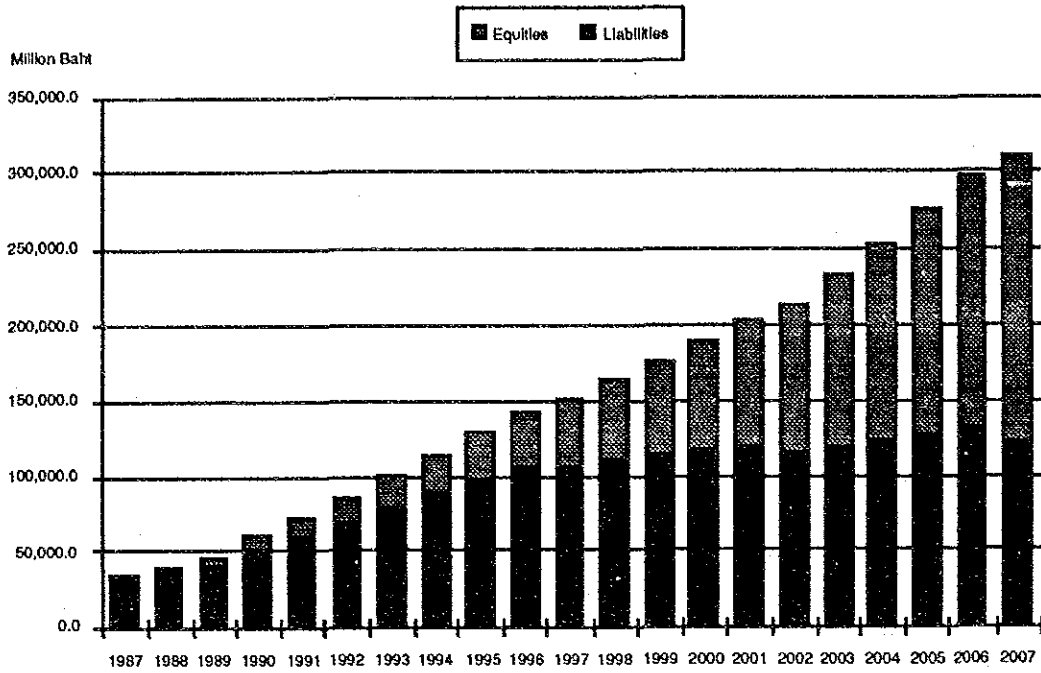


Figure 11.1.2-3 Estimated Liabilities and Equities of Case B

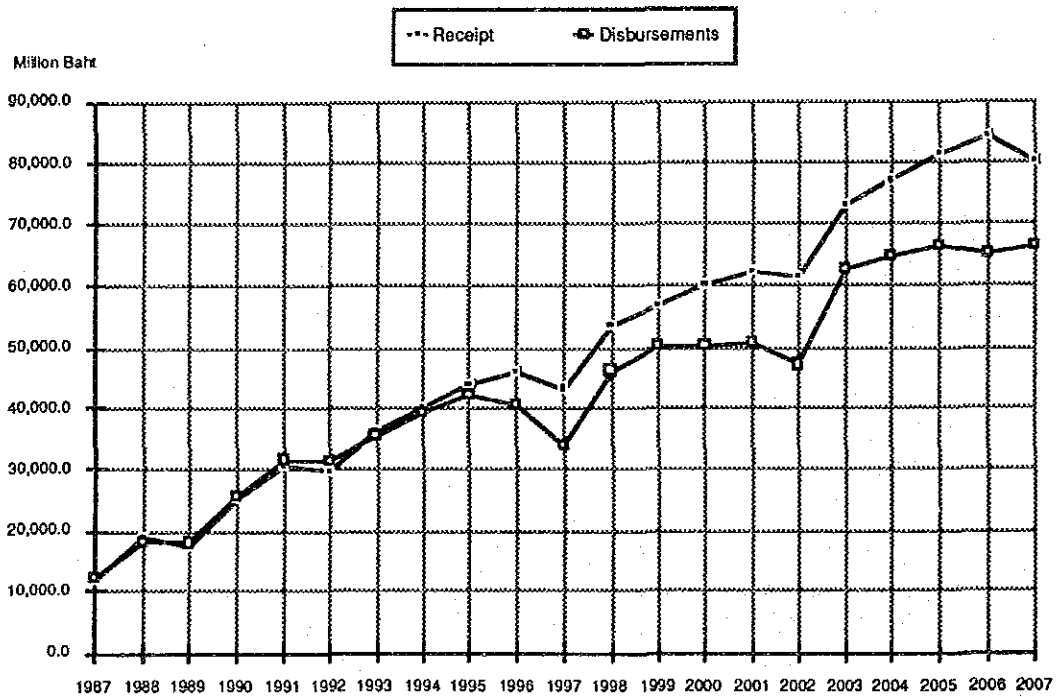


Figure 11.1.2-4 Estimated Cash Flow of Case B

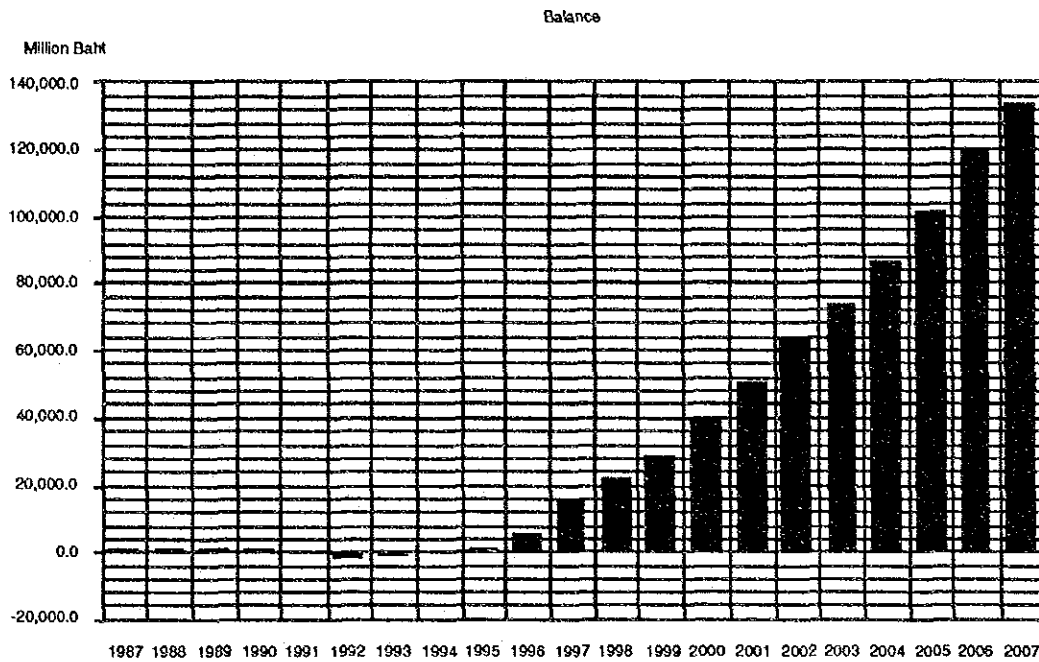


Figure 11.1.2-5 Estimated Cash Balance of Case B

Table 11.1.2-2 Management Indexes of Case B

Year	Total Capital Profit Ratio	Liquidity Ratio	Revenue per Head (Baht)	Ratio of Interest Expenses to OP. Revenue	Ratio of Depreciation Expenses to OP. Revenue	Ratio of Accumulated Depreciation to Total Fixed Assets	Staff Remuneration per OP. Revenue	Line/Head
1987	6.6%	114.4%	133,820	22.5%	18.2%	17.4%	15.5%	50.81
1988	6.4%	117.6%	154,589	19.9%	15.0%	18.7%	14.3%	56.02
1989	8.0%	86.1%	170,797	17.1%	17.9%	19.7%	13.4%	63.71
1990	7.2%	71.6%	191,341	16.8%	20.1%	19.6%	12.3%	70.54
1991	7.7%	59.9%	221,098	16.5%	21.6%	20.0%	11.0%	81.70
1992	7.0%	43.2%	254,347	18.2%	23.4%	21.2%	9.8%	93.74
1993	6.9%	57.4%	296,140	19.5%	24.6%	22.7%	8.7%	109.97
1994	6.8%	56.3%	336,453	20.5%	25.8%	24.7%	7.9%	125.53
1995	6.8%	76.5%	375,312	20.9%	26.8%	27.0%	7.3%	140.44
1996	7.0%	104.2%	412,518	20.9%	27.7%	29.9%	6.8%	154.72
1997	7.7%	152.7%	448,119	19.8%	28.4%	34.7%	6.5%	168.38
1998	8.4%	165.4%	470,162	19.5%	29.1%	37.9%	6.3%	175.98
1999	8.7%	195.8%	489,834	18.9%	29.3%	40.9%	6.3%	183.22
2000	8.9%	234.5%	508,553	18.1%	29.9%	43.8%	6.2%	190.10
2001	9.2%	279.0%	526,349	17.0%	30.7%	47.3%	6.2%	196.65
2002	9.9%	327.4%	543,251	15.1%	31.4%	51.6%	6.2%	202.86
2003	10.3%	355.8%	562,943	14.6%	31.5%	53.1%	6.1%	210.15
2004	10.3%	389.9%	582,625	14.3%	31.8%	54.7%	6.1%	217.08
2005	10.1%	422.4%	601,318	14.0%	32.7%	56.4%	6.1%	223.65
2006	10.1%	465.6%	619,053	13.3%	33.9%	59.0%	6.1%	229.88
2007	10.6%	485.6%	635,862	11.2%	34.9%	61.6%	6.1%	235.78

11.1.3 Case C: Moderate Future

1) The following are the conditions and assumptions for estimating the future financial situation of Case C.

- a) Operating revenue: Original base case
- b) Project investment cost (outside plant installation cost): 30% Increase
- c) Depreciation: 2nd Year: 60%, 3rd Year: 40%
- d) Operating expenses: Additional increase of staff by 2%
- e) The number of employee: 6.6% efficiency increase per year of
(line/employee)
- f) Staff remuneration per employee: 3% increase per year
- g) Long-term Loan:
75% of the Project initial investment cost from 1992 to 2006
 - i) Foreign Loan: 5 year grace period and 10 year repayment period,
10% as interest rate.
 - ii) Local Loan: 3 year grace period and 7 year repayment period,
12% as interest rate.

2) Table 11.1.3-1 shows the summary of the estimated financial statements under the above conditions.

Table 11.1.3-1 Summary of Case C

(Unit: Million Baht)

Year	Income Statement			Cash Flow			Balance Sheet		
	Total Revenue	Total Expenses	Net Income before Remitt.	Receipt	Disburse-ments	Cash Balance	Assets	Liabilities	Equities
1987	9,553.4	7,339.6	2,213.8	11,855.9	12,369.5	544.9	34,535.9	30,408.9	4,127.0
1988	11,290.8	8,907.0	2,383.8	18,852.3	18,215.4	1,181.8	40,157.5	34,260.9	5,896.6
1989	12,137.6	9,238.9	2,898.6	16,828.7	17,932.3	78.2	46,971.6	38,922.3	8,049.4
1990	13,848.0	10,745.8	3,102.2	24,677.6	25,433.3	-677.6	59,645.6	49,368.5	10,277.0
1991	16,364.4	12,407.9	3,956.5	29,675.9	31,632.3	-2,633.9	71,038.8	57,983.6	13,055.2
1992	18,938.5	15,056.5	3,882.0	29,739.4	32,455.7	-5,350.3	83,412.9	67,742.1	15,670.8
1993	22,494.4	18,391.4	4,103.0	37,238.8	38,798.2	-6,909.6	99,216.1	80,887.6	18,328.5
1994	26,043.8	21,994.9	4,049.0	40,781.1	42,941.6	-9,070.1	111,828.3	90,989.3	20,839.0
1995	29,616.7	25,518.6	4,098.1	44,988.5	46,138.7	-10,820.3	125,280.8	102,030.6	23,250.2
1996	33,189.5	28,882.4	4,307.1	45,575.6	44,446.5	-9,691.2	137,132.0	111,552.0	25,580.0
1997	36,762.3	31,918.2	4,844.1	40,810.1	36,266.9	-5,148.0	139,372.2	111,144.2	28,228.0
1998	39,576.2	34,000.9	5,575.3	51,014.3	49,404.8	-3,538.5	148,033.4	116,989.9	31,043.5
1999	42,326.4	35,985.2	6,341.2	53,804.3	53,551.6	-3,285.8	154,556.4	120,106.3	34,450.0
2000	44,940.8	38,038.0	6,902.8	56,421.9	53,504.9	-368.8	161,726.0	123,404.7	38,321.3
2001	47,715.6	40,033.0	7,682.6	57,329.2	53,393.0	3,567.4	167,363.1	124,292.5	43,070.6
2002	50,698.3	41,435.6	9,262.7	55,047.7	48,988.4	9,626.7	169,116.1	119,354.6	49,761.5
2003	54,246.0	43,631.2	10,614.8	66,784.1	65,656.5	10,754.3	180,272.5	123,810.8	56,461.7
2004	57,398.3	45,933.2	11,465.1	69,912.1	67,185.8	13,480.6	192,071.8	128,268.8	63,802.9
2005	60,710.4	48,717.9	11,992.5	73,224.0	68,729.4	17,975.2	204,187.6	132,635.7	71,551.9
2006	64,199.2	51,488.7	12,710.6	74,671.1	66,801.6	25,844.6	214,208.1	134,144.8	80,063.4
2007	68,025.5	53,169.8	14,855.7	68,292.1	67,643.8	26,493.0	215,326.3	124,129.0	91,197.3

Table 11.1.3-1 indicates that:

- a) Net income is positive throughout the period,
- b) Cash balance becomes negative in FY 1990 and continues to be negative until FY 2000. Cash balance once again becomes positive in FY 2001 and increases every year until FY 2007.

The following figures show estimated revenues and expenses, net income, liabilities and equities, cash flow, and cash balance of Case C.

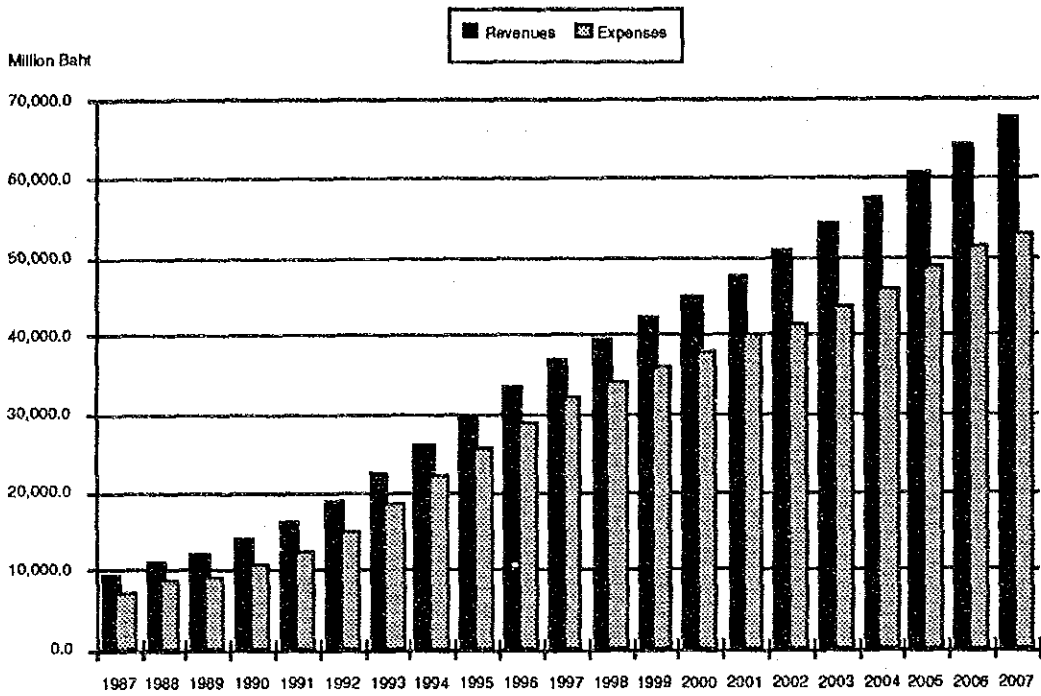


Figure 11.1.3-1 Estimated Revenues and Expenses of Case C

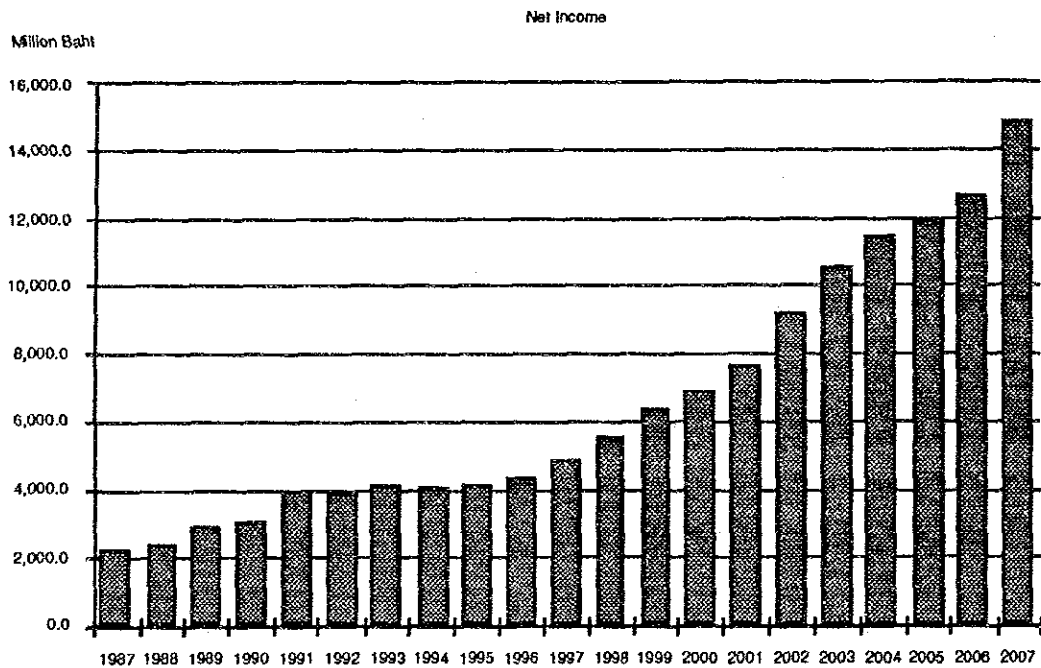


Figure 11.1.3-2 Estimated Net Income before Remittance to the Treasury of Case C

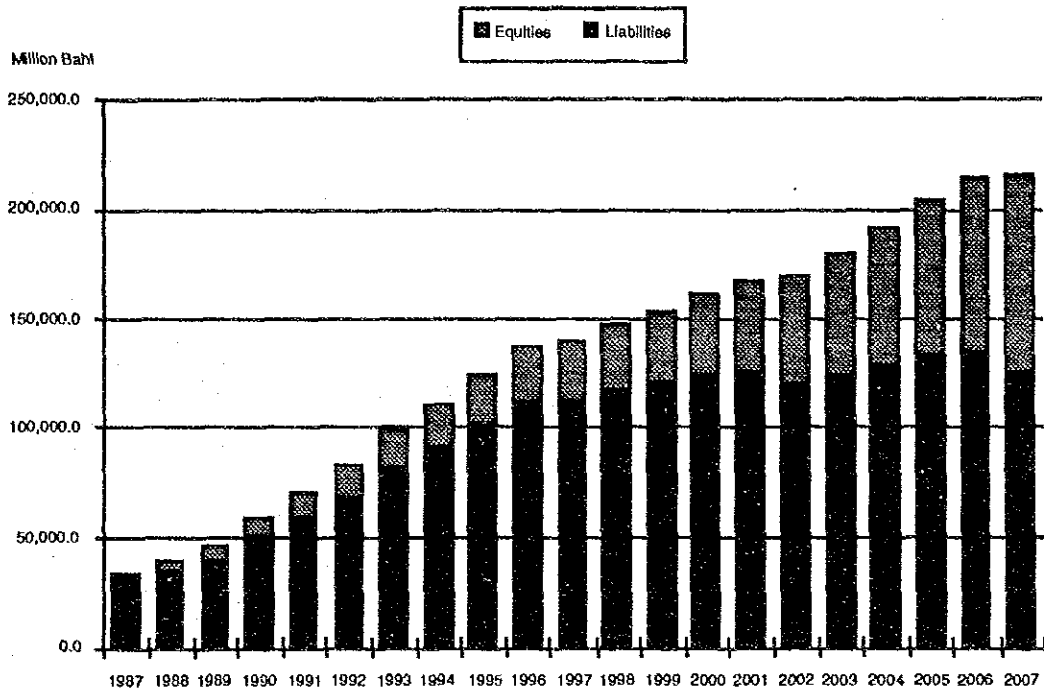


Figure 11.1.3-3 Estimated Liabilities and Equities of Case C

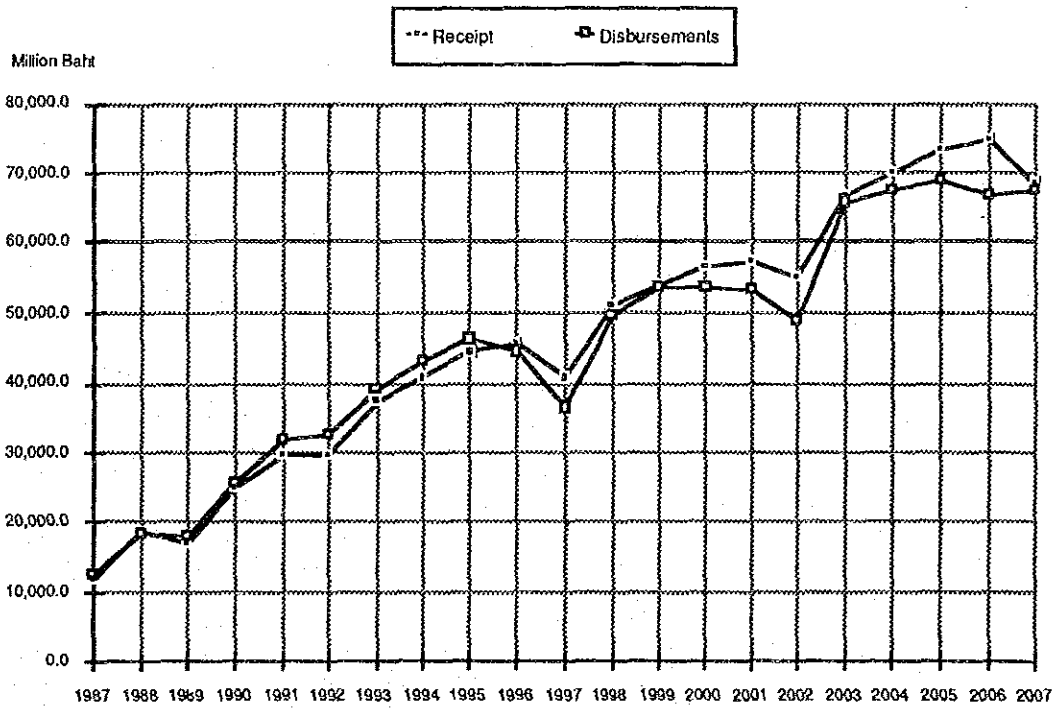


Figure 11.1.3-4 Estimated Cash Flow of Case C

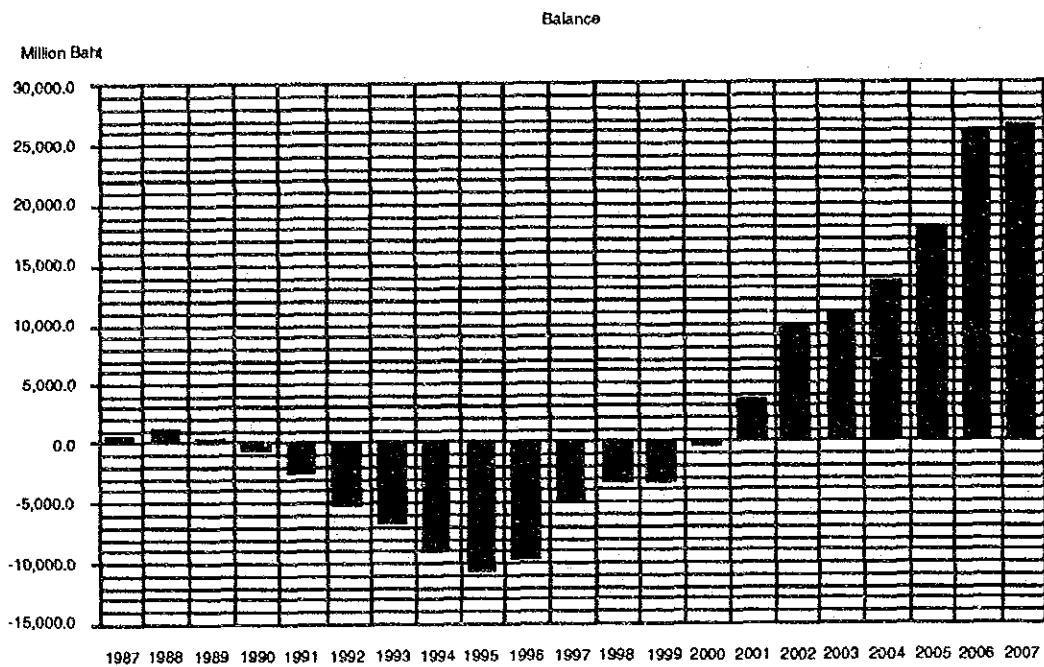


Figure 11.1.3-5 Estimated Cash Balance of Case C

Table 11.1.3-2 Management Indexes of Case C

Year	Total Capital Profit Ratio	Liquidity Ratio	Revenue per Head (Baht)	Ratio of Interest Expenses to OP. Revenue	Ratio of Depreciation Expenses to OP. Revenue	Ratio of Accumulated Depreciation to Total Fixed Assets	Staff Remuneration per OP. Revenue	Line/Head
1987	6.6%	114.4%	133,820	22.5%	18.2%	17.4%	15.5%	50.81
1988	6.4%	117.6%	154,589	19.9%	15.0%	18.7%	14.3%	56.02
1989	6.7%	77.9%	158,136	17.8%	18.7%	19.7%	14.9%	59.72
1990	5.8%	56.7%	168,732	17.5%	21.0%	19.6%	14.2%	63.66
1991	6.1%	34.9%	183,897	17.1%	22.8%	20.0%	13.7%	67.86
1992	5.0%	6.7%	196,059	19.0%	24.9%	21.2%	13.2%	72.34
1993	4.5%	-1.1%	209,826	21.0%	26.2%	22.3%	12.8%	77.11
1994	3.8%	-11.5%	219,627	22.9%	27.6%	24.0%	12.5%	82.20
1995	3.5%	-19.4%	231,131	23.8%	29.2%	26.0%	12.1%	87.63
1996	3.3%	-2.5%	243,941	24.2%	30.6%	28.9%	11.7%	93.41
1997	3.5%	31.4%	257,979	23.1%	31.6%	33.8%	11.3%	99.57
1998	3.9%	37.1%	270,488	22.8%	32.4%	36.9%	10.9%	106.15
1999	4.2%	40.1%	288,041	22.1%	32.7%	39.9%	10.5%	113.15
2000	4.4%	55.1%	306,768	21.1%	33.4%	43.0%	10.2%	120.62
2001	4.7%	74.9%	326,745	19.8%	34.4%	46.4%	9.8%	128.58
2002	5.5%	102.7%	348,052	17.5%	35.2%	50.8%	9.5%	137.07
2003	6.1%	107.0%	372,077	17.0%	35.3%	52.4%	9.2%	146.11
2004	6.2%	118.3%	397,030	16.5%	35.6%	54.1%	8.8%	155.76
2005	6.1%	133.4%	423,613	16.2%	36.7%	55.9%	8.5%	166.04
2006	6.1%	160.2%	451,938	15.5%	38.0%	58.6%	8.2%	177.00
2007	6.9%	156.9%	482,120	13.0%	39.1%	61.3%	7.9%	188.68

The reasonable case seems to be Case C. The only major problem is shortage in cash flow. Therefore, it needs some additional arrangement in order to resolve this cash shortage problem. The following section shows the revised version of Case C.

11.1.4 Revised Case C

1) The borrowings are arranged in this section to resolve cash shortage problem during Phase-1 of Case C. The following are the conditions and assumptions for the revised version of Case C.

- a) Operating revenue: Original
- b) Project investment cost (outside plant installation cost): 30% Increase
- c) Depreciation: 2nd Year: 60%, 3rd Year: 40%
- d) Operating expenses: Additional Increase Rate is 2%
- e) The number of employee: 6.6% efficiency increase per year of
(line/employee)
- f) Staff remuneration per employee: 3% increase per year
- g) Long-term Loan:
75% of the Project initial investment cost from 1992 to 2006
 - i) Foreign Loan: 5 year grace period and 10 year repayment period,
10% as interest rate.
 - ii) Local Loan: 3 year grace period and 7 year repayment period,
12% as interest rate.
- h) Short-term Loan: One year as the debt repayment term,
15% as the interest rate, borrowing amount per year is
as follows:
 - FY 1990: 1,000 million Baht
 - FY 1991: 3,000 million Baht
 - FY 1992: 6,000 million Baht
 - FY 1993: 8,100 million Baht
 - FY 1994: 11,000 million Baht
 - FY 1995: 14,000 million Baht
 - FY 1996: 14,000 million Baht
 - FY 1997: 10,000 million Baht
 - FY 1998: 9,000 million Baht
 - FY 1999: 9,000 million Baht
 - FY 2000: 6,500 million Baht

• FY 2001:

3,000 million Baht

2) Table 11.1.4-1 shows the summary of the estimated financial statements of the revised version of Case C.

Table 11.1.4-1 Summary of the Revised Case C

(Unit: Million Baht)

Year	Income Statement			Cash Flow			Balance Sheet		
	Total Revenue	Total Expenses	Net Income before Remitt.	Receipt	Disburse-ments	Cash Balance	Assets	Liabilities	Equities
1987	9,553.4	7,339.6	2,213.8	11,855.9	12,369.5	544.9	34,535.9	30,408.9	4,127.0
1988	11,290.8	8,907.0	2,383.8	18,852.3	18,215.4	1,181.8	40,157.5	34,260.9	5,896.6
1989	12,137.6	9,238.9	2,898.6	16,828.7	17,932.3	78.2	46,971.6	38,922.3	8,049.4
1990	13,848.0	10,809.7	3,038.3	25,677.6	25,508.3	247.4	60,575.4	50,341.1	10,234.2
1991	16,456.9	12,671.4	3,785.5	32,768.4	32,904.9	111.0	73,808.0	60,910.3	12,897.7
1992	19,213.0	15,665.3	3,547.6	36,013.9	36,057.4	67.4	88,888.0	73,598.8	15,289.2
1993	22,890.5	19,343.3	3,547.2	45,734.9	45,712.4	89.9	106,323.8	88,749.4	17,574.4
1994	26,562.1	23,284.2	3,277.9	52,299.4	52,235.9	153.4	121,226.9	101,658.8	19,568.0
1995	30,101.1	27,190.9	2,910.2	58,872.9	58,402.1	624.2	136,985.7	115,802.8	21,182.9
1996	33,841.0	30,769.0	3,072.0	60,227.1	60,003.5	847.8	148,022.5	125,337.7	22,684.8
1997	37,556.1	33,564.1	3,992.0	51,604.0	51,582.7	869.1	145,810.6	121,049.0	24,761.6
1998	40,177.9	35,311.6	4,866.3	60,616.0	60,520.8	964.3	153,001.6	125,899.8	27,101.8
1999	42,776.6	37,223.0	5,553.6	63,254.6	63,609.0	609.9	158,951.8	128,971.3	29,980.4
2000	45,330.4	39,113.0	6,217.4	63,311.5	63,358.0	563.4	163,177.5	129,785.3	33,392.2
2001	47,808.8	40,696.5	7,112.4	60,422.4	60,379.3	606.5	164,914.2	127,154.9	37,759.3
2002	50,402.2	41,646.0	8,756.2	54,751.6	52,042.1	3,316.0	163,281.9	119,171.3	44,110.7
2003	53,615.0	43,619.0	9,996.0	66,153.0	65,473.2	3,995.9	173,941.6	123,545.5	50,396.0
2004	56,722.5	45,917.8	10,804.7	69,236.3	66,920.6	6,311.6	185,280.4	127,985.8	57,294.6
2005	59,993.5	48,698.9	11,294.6	72,507.1	68,446.4	10,372.3	196,912.3	132,336.6	64,575.7
2006	63,439.0	51,465.8	11,973.2	73,910.8	66,502.5	17,780.6	206,421.6	133,828.7	72,592.9
2007	67,219.1	53,142.8	14,076.3	67,485.7	67,327.7	17,938.5	206,999.3	123,795.0	83,204.3

Table 11.1.4-1 indicates that:

- a) Cash balance is maintained to be positive every year,
- b) Net income decreases from FY 1991 to FY 1995, but turns to increase from FY 1996.

Following figures show estimated revenues and expenses, net income, liabilities and equities, cash flow, and cash balance of the revised version of Case C.

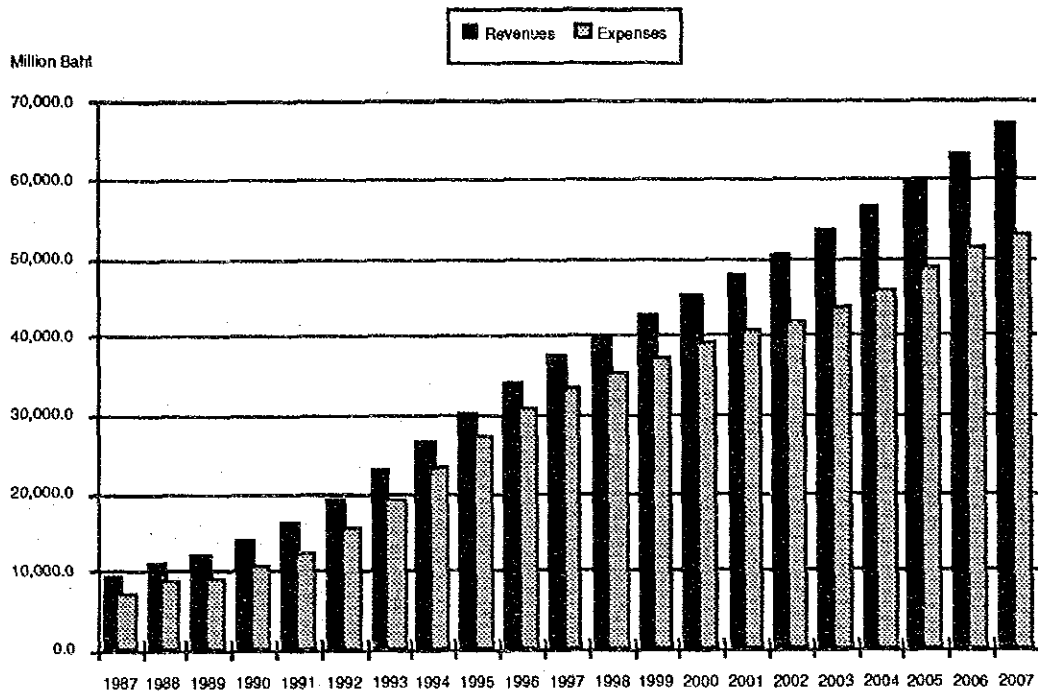


Figure 11.1.4-1 Estimated Revenues and Expenses of the Revised Case C

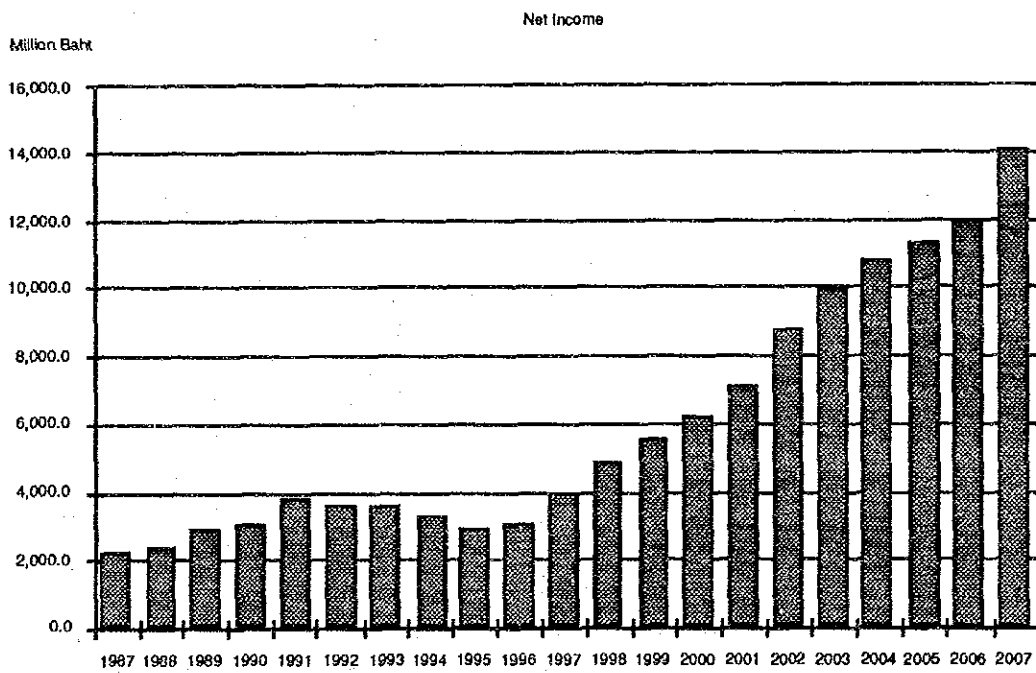


Figure 11.1.4-2 Estimated Net Income before Remittance to the Treasury of the Revised Case C

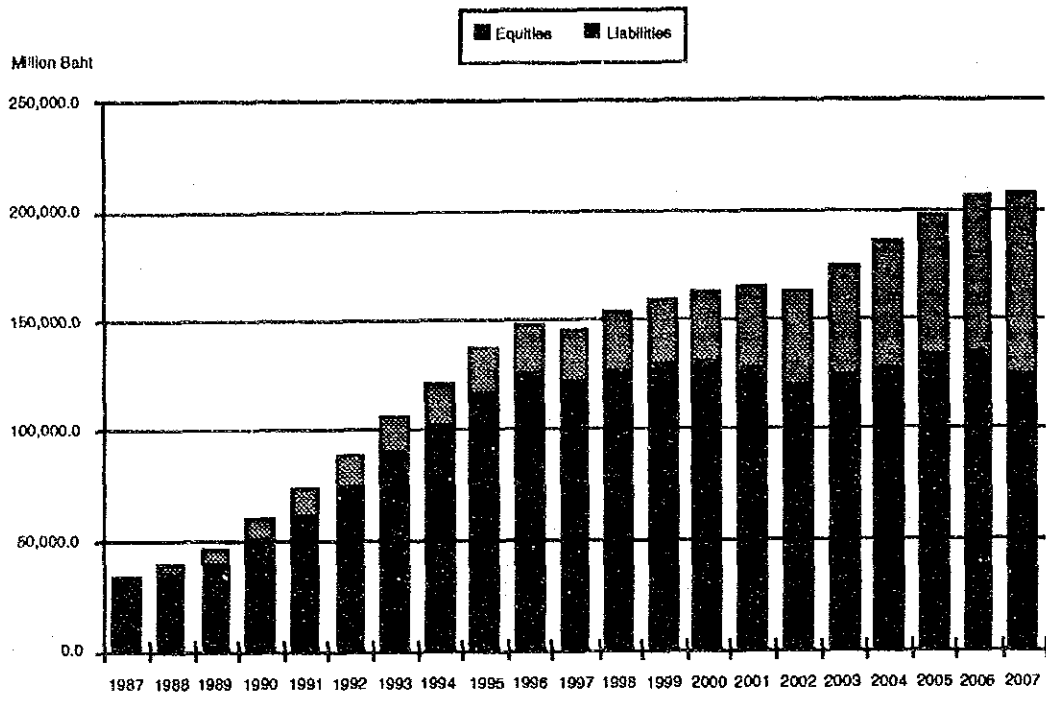


Figure 11.1.4-3 Estimated Liabilities and Equities of the Revised Case C

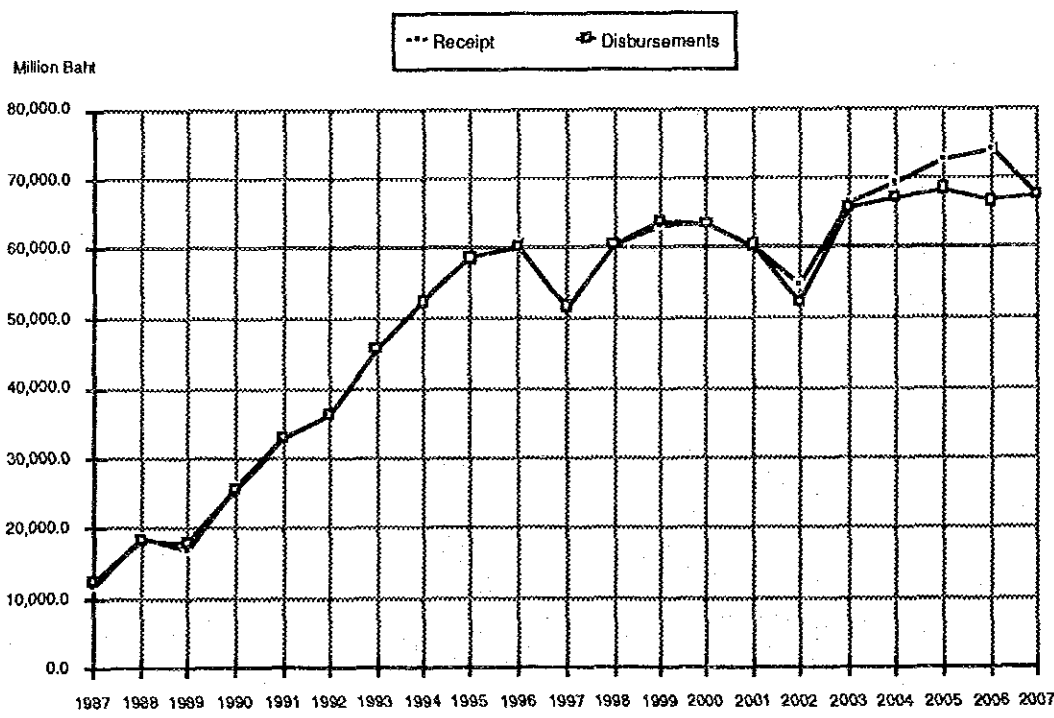


Figure 11.1.4-4 Estimated Cash Flow of the Revised Case C

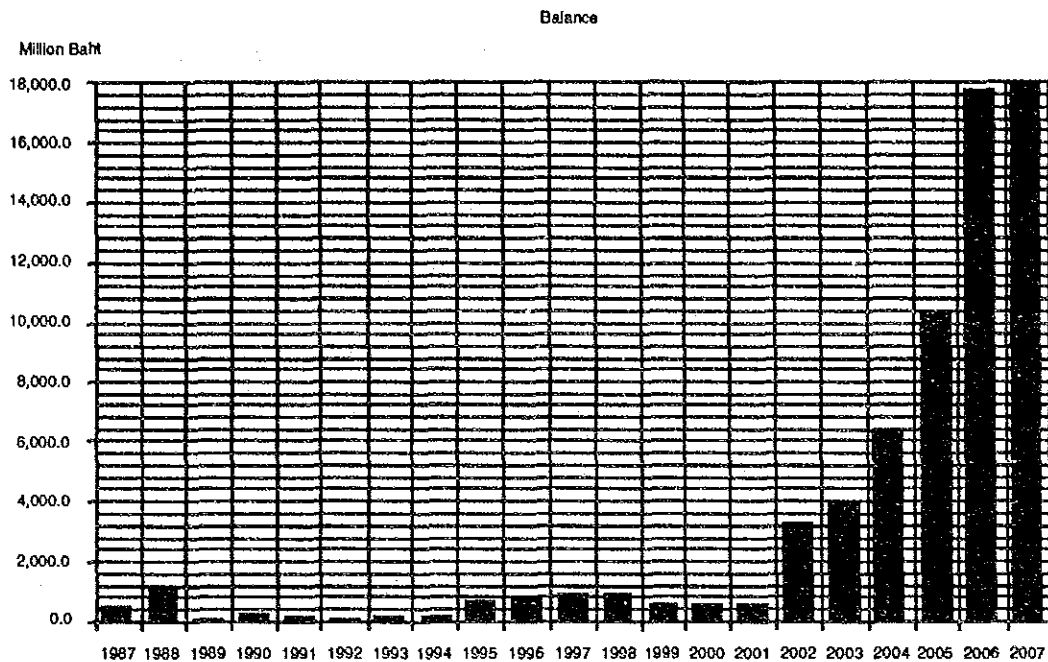


Figure 11.1.4-5 Estimated Cash Balance of the Revised Case C

Table 11.1.4-2 Management Indexes of the Revised Case C

Year	Total Capital Profit Ratio	Liquidity Ratio	Revenue per Head (Baht)	Ratio of Interest Expenses to OP. Revenue	Ratio of Depreciation Expenses to OP. Revenue	Ratio of Accumulated Depreciation to Total Fixed Assets	Staff Remuneration per OP. Revenue	Line/Head
1987	6.6%	114.4%	133,820	22.5%	18.2%	17.4%	15.5%	50.81
1988	6.4%	117.6%	154,589	19.9%	15.0%	18.7%	14.3%	56.02
1989	6.7%	77.9%	158,136	17.8%	18.7%	19.7%	14.9%	59.72
1990	5.7%	61.4%	168,732	18.1%	21.0%	19.6%	14.2%	63.66
1991	5.6%	51.5%	183,897	19.0%	22.8%	20.0%	13.7%	67.86
1992	4.4%	40.9%	196,059	22.6%	24.9%	21.1%	13.2%	72.34
1993	3.6%	40.7%	209,826	25.8%	26.2%	22.3%	12.8%	77.11
1994	2.9%	34.6%	219,627	28.4%	27.6%	24.0%	12.5%	82.20
1995	2.3%	35.8%	231,131	30.2%	29.2%	26.0%	12.1%	87.63
1996	2.2%	36.5%	243,941	30.5%	30.6%	28.9%	11.7%	93.41
1997	2.7%	42.8%	257,979	28.0%	31.6%	33.7%	11.3%	99.57
1998	3.3%	41.4%	270,488	26.4%	32.5%	36.9%	10.9%	106.15
1999	3.6%	41.3%	288,041	25.3%	32.8%	39.9%	10.5%	113.15
2000	3.9%	45.4%	306,768	23.8%	33.5%	42.9%	10.2%	120.62
2001	4.3%	53.2%	326,745	21.3%	34.5%	46.4%	9.8%	128.58
2002	5.3%	73.8%	348,052	17.9%	35.3%	50.8%	9.5%	137.07
2003	5.9%	77.3%	372,077	17.0%	35.4%	52.4%	9.2%	146.11
2004	6.0%	87.8%	397,030	16.5%	35.7%	54.1%	8.8%	155.76
2005	5.9%	102.9%	423,613	16.2%	36.7%	55.9%	8.5%	166.04
2006	5.9%	129.8%	451,938	15.5%	38.1%	58.6%	8.2%	177.00
2007	6.8%	126.1%	482,120	13.0%	39.2%	61.3%	7.9%	188.68

11.1.5 Case D: Postponed Replacement Schedule

1) The major problem in Case C is cash shortage in the period of Phase-1. In this section, we adjust the total project investment cost.

The total project investment cost consists of following two costs:

- a) Expansion project installation cost,
- b) Rehabilitations and replacements costs of existing facilities.

One alternative case is to postpone the replacements of analog and digital exchanges and transmission facilities of Phase-1 to the period of Phase-2. In this case, replacement of these facilities starts from Phase-2.

Table 11.1.5-1 Original Rehabilitations and Replacements Costs for Existing Facilities

(Unit: Million Baht)

	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Switching	1,457.3	2,199.7	3,657.0	4,005.8	6,046.4	10,052.2	3,062.0	4,621.9	7,683.9
Outside Plant	1,470.4	483.4	1,953.8	769.1	252.9	1,022.0	883.0	290.3	1,173.3
Transmission	145.7	331.1	476.8	218.3	496.2	714.5	190.1	432.1	622.3
Sub Total	3,073.4	3,014.2	6,087.6	4,993.2	6,795.5	11,788.7	4,135.2	5,344.3	9,479.5

Table 11.1.5-2 Postponed Rehabilitations and Replacements Costs for Existing Facilities

(Unit: Million Baht)

	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Switching	0.0	0.0	0.0	1,457.3	2,199.7	3,657.0	4,005.8	6,046.4	10,052.2
Outside Plant	1,470.4	483.4	1,953.8	769.1	252.9	1,022.0	883.0	290.3	1,173.3
Transmission	0	0	0	145.7	331.1	476.8	218.3	496.2	714.5
Sub Total	1,470.4	483.4	1,953.8	2,372.1	2,783.7	5,155.8	5,107.1	6,832.9	11,940.0

Table 11.1.5-3 Total Project Costs of Case D

(Unit: Million Baht)

Total Project Costs	Phase-1			Phase-2			Phase-3		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
1. Original	41,154.6	28,502.3	69,656.9	26,967.8	28,856.4	55,824.2	34,113.6	26,201.3	60,314.8
2. Case C: 30% UP	49,121.7	31,738.4	80,860.0	30,355.0	31,951.2	62,306.1	39,348.5	28,675.0	68,023.5
3. Case D: Postponed	47,359.5	28,994.7	76,354.2	27,476.0	27,600.3	55,076.3	40,416.1	30,289.4	70,705.4
Difference (2 - 3)			4,505.8			7,229.8			-2,681.9

The following are the conditions and assumptions for Case D.

- a) Operating revenue: Original
- b) • Project investment cost (outside plant installation cost): 30% Increase
• Replacement costs of switching and transmission facilities:
Postponed 5 years later
- c) Depreciation: 2nd Year: 60%, 3rd Year: 40%
- d) Operating expenses: Additional Increase Rate is 2%
- e) The number of employee: 6.6% efficiency increase per year of
(line/employee)
- f) Staff remuneration per employee: 3% increase per year
- g) Long-term Loan:
75% of the Project initial investment cost from 1992 to 2006
 - i) Foreign Loan: 5 year grace period and 10 year repayment period,
10% as interest rate.
 - ii) Local Loan: 3 year grace period and 7 year repayment period,
12% as interest rate.
- h) Short-term Loan: One year as the debt repayment term,
15% as the interest rate, borrowing amount per year is
as follows:
 - FY 1990: 1,000 million Baht
 - FY 1991: 3,000 million Baht
 - FY 1992: 6,000 million Baht
 - FY 1993: 8,000 million Baht
 - FY 1994: 10,000 million Baht
 - FY 1995: 12,000 million Baht

- FY 1996: 12,000 million Baht
- FY 1997: 6,500 million Baht
- FY 1998: 4,500 million Baht
- FY 1999: 3,000 million Baht

2) Table 11.1.5-4 shows the summary of the estimated financial statements of Case D.

Table 11.1.5-4 Summary of Case D

(Unit: Million Baht)

Year	Income Statement			Cash Flow			Balance Sheet		
	Total Revenue	Total Expenses	Net Income before Remitt.	Receipt	Disburse-ments	Cash Balance	Assets	Liabilities	Equities
1987	9,553.4	7,339.6	2,213.8	11,855.9	12,369.5	544.9	34,535.9	30,408.9	4,127.0
1988	11,290.8	8,907.0	2,383.8	18,852.3	18,215.4	1,181.8	40,157.5	34,260.9	5,896.6
1989	12,137.6	9,238.9	2,898.6	16,828.7	17,932.3	78.2	46,971.6	38,922.3	8,049.4
1990	13,848.0	10,809.7	3,038.3	25,677.6	25,508.3	247.4	60,575.4	50,341.1	10,234.2
1991	16,456.9	12,671.4	3,785.5	32,768.4	32,904.9	111.0	73,808.0	60,910.3	12,897.7
1992	19,213.0	15,653.2	3,559.8	35,743.5	35,683.0	171.5	88,631.0	73,333.7	15,297.4
1993	22,900.9	19,270.2	3,630.7	44,834.2	44,558.5	447.2	105,242.3	87,603.8	17,638.5
1994	26,597.9	23,043.6	3,554.3	50,524.1	50,853.5	117.8	118,702.2	98,884.8	19,817.3
1995	30,097.6	26,691.1	3,406.5	56,058.3	56,038.2	137.9	133,014.7	111,249.7	21,764.9
1996	33,792.4	30,065.7	3,726.7	57,502.6	56,695.6	944.9	143,888.9	120,183.3	23,705.6
1997	37,565.9	32,637.8	4,928.1	47,679.9	48,440.3	184.5	140,536.1	114,126.2	26,409.9
1998	40,109.5	34,040.8	6,068.6	54,746.2	54,449.4	481.4	146,458.4	116,693.0	29,765.3
1999	42,728.3	35,614.2	7,114.1	55,904.9	56,249.7	136.6	151,005.1	117,119.3	33,885.7
2000	45,283.0	37,171.1	8,111.9	55,462.8	54,297.0	1,302.4	155,126.5	116,376.7	38,749.8
2001	47,882.7	38,771.7	9,111.0	56,411.8	51,238.3	6,476.0	161,100.3	116,510.0	44,590.4
2002	50,989.2	40,139.7	10,849.5	55,499.5	48,218.8	13,756.7	164,636.3	112,369.0	52,267.3
2003	54,659.0	42,378.4	12,280.6	67,679.8	64,740.2	16,696.2	178,043.0	118,086.7	59,956.3
2004	57,992.5	44,781.2	13,211.3	70,989.1	66,320.7	21,364.7	192,261.9	123,916.6	68,345.4
2005	61,498.8	47,685.0	13,813.8	74,495.1	67,959.2	27,900.6	206,924.5	129,727.1	77,197.4
2006	65,191.8	50,569.4	14,622.4	76,065.9	66,195.9	37,770.6	219,533.0	132,642.4	86,890.7
2007	69,218.1	52,319.1	16,899.0	69,484.7	67,227.1	40,028.2	222,874.1	123,510.7	99,363.4

Table 11.1.5-5 indicates that:

- a) Cash balance is maintained to be positive every year,
- b) Liabilities increase until FY 1996 and then turns decreasing until FY 2003.

The replacement plan of the existing facilities aims at two objectives, namely, to make ISDN introduction smoothly (replacement of analog facilities), and to avoid investment concentration (digital facilities). If replacement plan of analog facilities is postponed, ISDN introduction plan will be influenced greatly especially in the metropolitan area, because

ISDN service will have to be commenced with a limited number of the present SPC exchanges having ISDN function. For the other influence of postponement of digital facility replacement, the reader should refer to the contents of section 8.2.4 of the report.

Following figures show estimated revenues and expenses, net income, liabilities and equities, cash flow, and cash balance of Case D.

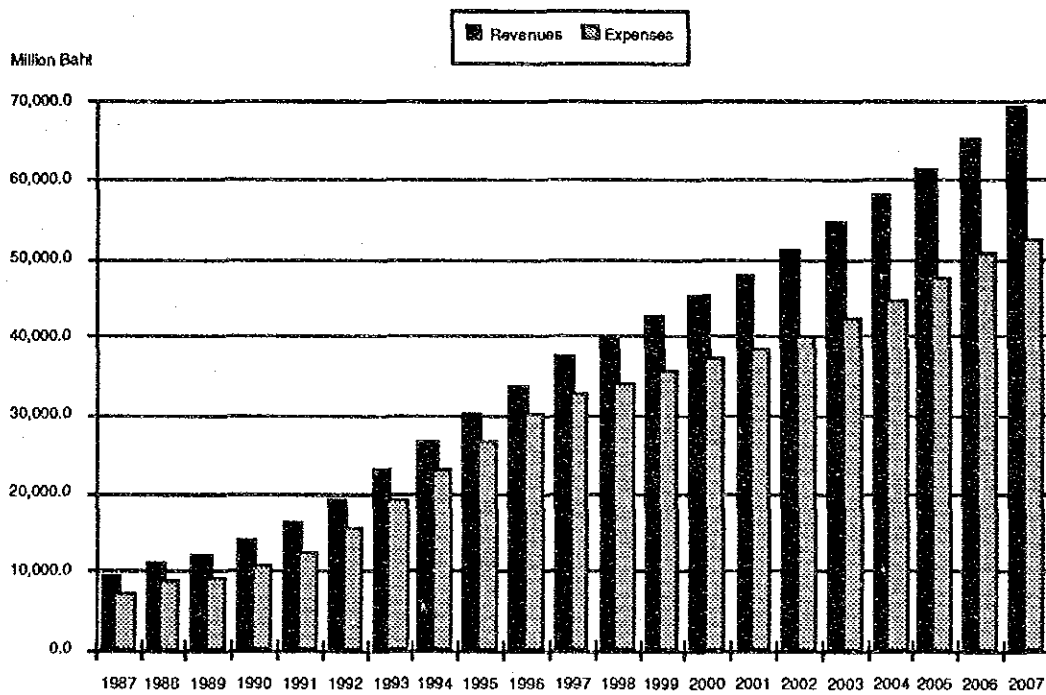


Figure 11.1.5-1 Estimated Revenues and Expenses of Case D

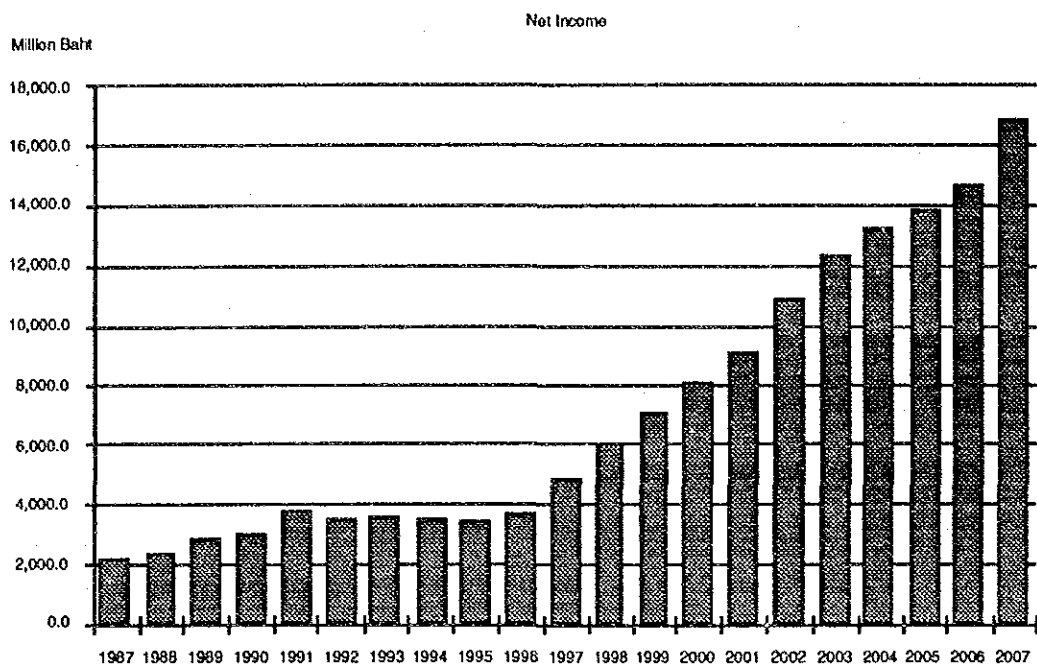


Figure 11.1.5-2 Estimated Net Income before Remittance to the Treasury of Case D

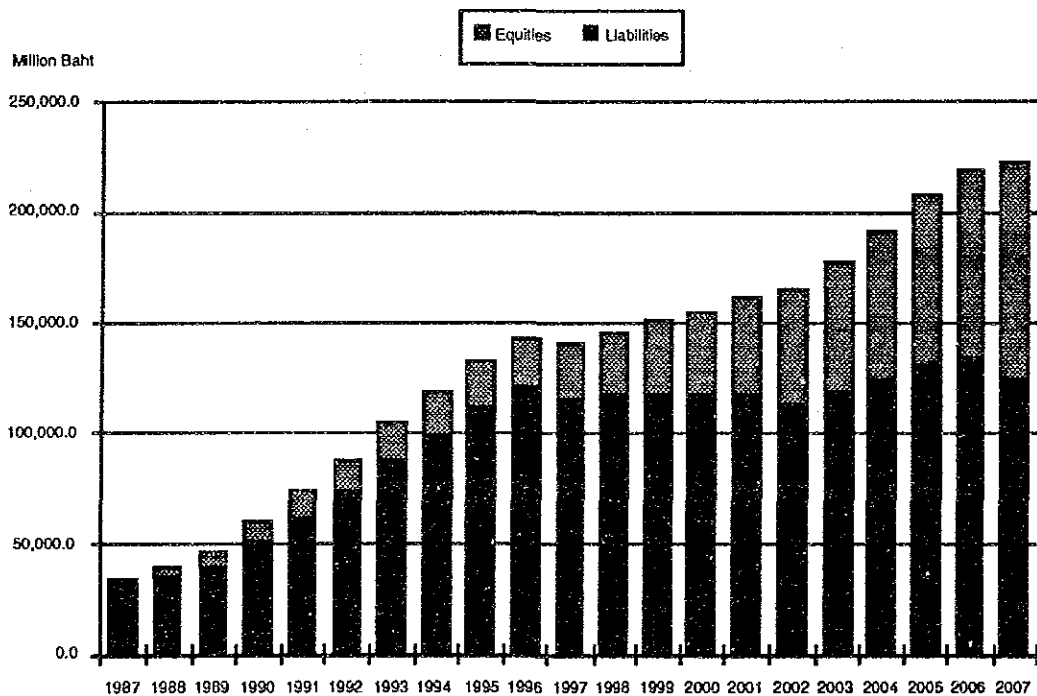


Figure 11.1.5-3 Estimated Liabilities and Equities of Case D

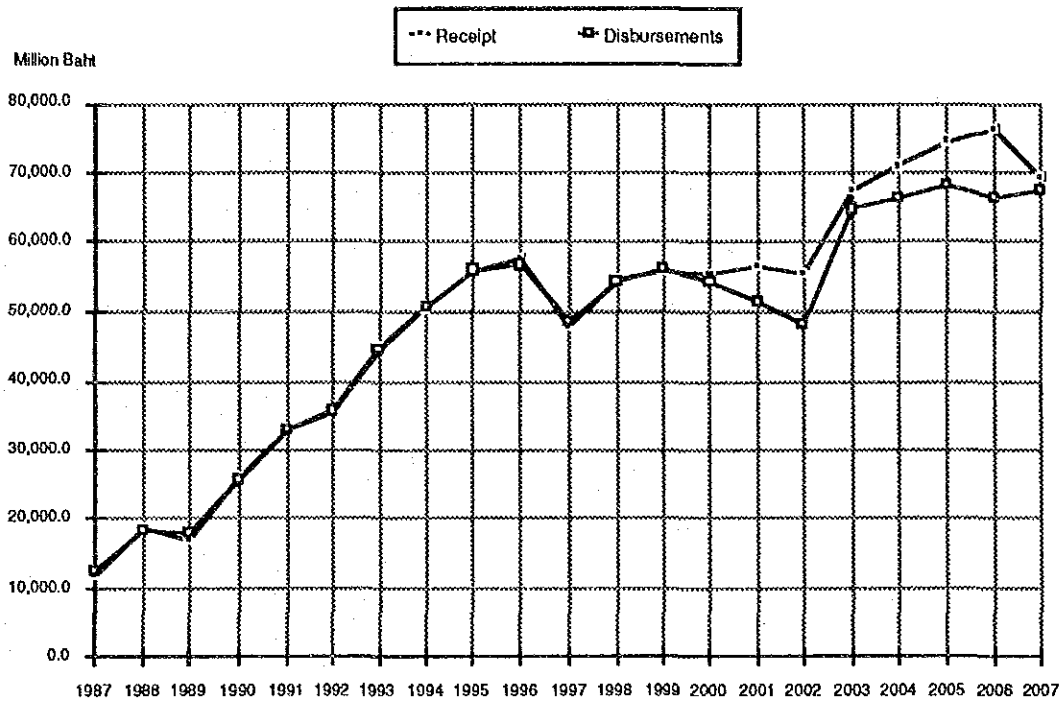


Figure 11.1.5-4 Estimated Cash Flow of Case D

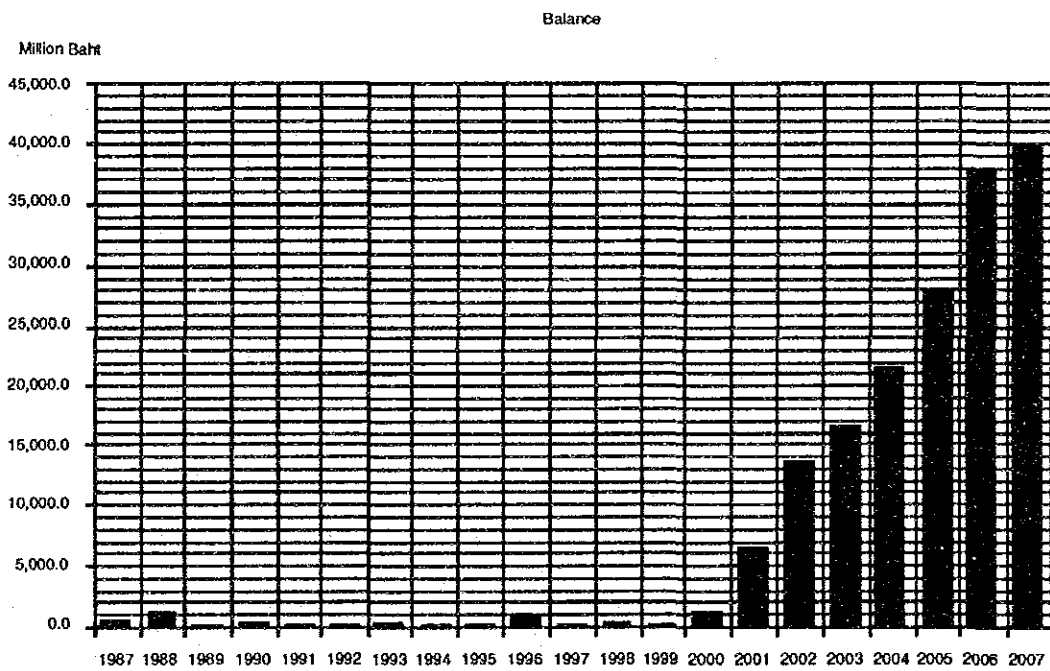


Figure 11.1.5-5 Estimated Cash Balance of Case D

Table 11.1.5-5 Management Indexes of Case D

Year	Total Capital Profit Ratio	Liquidity Ratio	Revenue per Head (Baht)	Ratio of Interest Expenses to OP. Revenue	Ratio of Depreciation Expenses to OP. Revenue	Ratio of Accumulated Depreciation to Total Fixed Assets	Staff Remuneration per OP. Revenue	Line/Head
1987	6.6%	114.4%	133,820	22.5%	18.2%	17.4%	15.5%	50.81
1988	6.4%	117.6%	154,589	19.9%	15.0%	18.7%	14.3%	56.02
1989	6.7%	77.9%	158,136	17.8%	18.7%	19.7%	14.9%	59.72
1990	5.7%	61.4%	168,732	18.1%	21.0%	19.6%	14.2%	63.66
1991	5.6%	51.5%	183,897	19.0%	22.8%	20.0%	13.7%	67.86
1992	4.4%	41.6%	196,059	22.5%	24.9%	21.2%	13.2%	72.34
1993	3.7%	42.9%	209,826	25.4%	26.1%	22.5%	12.8%	77.11
1994	3.2%	35.9%	219,627	27.5%	27.5%	24.4%	12.5%	82.20
1995	2.7%	36.6%	231,131	28.6%	28.8%	26.5%	12.1%	87.63
1996	2.7%	39.6%	243,941	28.7%	30.0%	29.4%	11.7%	93.41
1997	3.5%	46.2%	257,979	25.8%	30.9%	34.3%	11.3%	99.57
1998	4.2%	47.0%	270,488	23.6%	31.6%	37.7%	10.9%	106.15
1999	4.8%	50.1%	288,041	21.9%	31.8%	40.9%	10.5%	113.15
2000	5.3%	63.4%	306,768	20.0%	32.4%	44.1%	10.2%	120.62
2001	5.8%	88.9%	326,745	18.1%	33.1%	47.7%	9.8%	128.58
2002	6.7%	122.2%	348,052	16.0%	33.7%	52.0%	9.5%	137.07
2003	7.2%	134.6%	372,077	15.8%	33.8%	53.3%	9.2%	146.11
2004	7.1%	153.8%	397,030	15.6%	34.1%	54.8%	8.8%	155.76
2005	6.9%	175.7%	423,613	15.6%	35.2%	56.4%	8.5%	166.04
2006	6.9%	207.6%	451,938	15.1%	36.6%	58.9%	8.2%	177.00
2007	7.6%	206.3%	482,120	12.8%	37.7%	61.6%	7.9%	188.68

11.1.6 Case E: Tariff Increase

1) In order to cover the cash shortages in Phase-1, the tariff change is applied in this section in addition to borrowings. As one possible example, monthly charge is doubled from FY 1993 for consideration.

The following are the conditions and assumptions for Case E.

- a) Operating revenue: Original with doubled monthly charges from FY 1993 as follows:
 - i) for a rotary dial telephone line user: 100 Baht per month
 - ii) for a push button telephone line user: 200 Baht per month
- b) Project investment cost (outside plant installation cost): 30% Increase
- c) Depreciation: 2nd Year: 60%, 3rd Year: 40%
- d) Operating expenses: Additional Increase Rate is 2%
- e) The number of employee: 6.6% efficiency increase per year of (line/employee)

- f) Staff remuneration per employee: 3% increase per year
- g) Long-term Loan:
 - 75% of the Project initial investment cost from 1992 to 2006
 - i) Foreign Loan: 5 year grace period and 10 year repayment period, 10% as interest rate.
 - ii) Local Loan: 3 year grace period and 7 year repayment period, 12% as interest rate.
- h) Short-term Loan: One year as the debt repayment term, 15% as the interest rate, borrowing amount per year is as follows:
 - FY 1990: 1,000 million Baht
 - FY 1991: 3,000 million Baht
 - FY 1992: 6,000 million Baht
 - FY 1993: 6,500 million Baht
 - FY 1994: 7,500 million Baht
 - FY 1995: 8,000 million Baht
 - FY 1996: 5,000 million Baht

2) Table 11.1.6-1 shows the summary of the estimated financial statements of Case E.

Table 11.1.6-1 Summary of Case E

(Unit: Million Baht)

Year	Income Statement			Cash Flow			Balance Sheet		
	Total Revenue	Total Expenses	Net Income before Remitt.	Receipt	Disburse-ments	Cash Balance	Assets	Liabilities	Equities
1987	9,553.4	7,339.6	2,213.8	11,855.9	12,369.5	544.9	34,535.9	30,408.9	4,127.0
1988	11,290.8	8,907.0	2,383.8	18,852.3	18,215.4	1,181.8	40,157.5	34,260.9	5,896.6
1989	12,137.6	9,238.9	2,898.6	16,828.7	17,932.3	78.2	46,971.6	38,922.3	8,049.4
1990	13,848.0	10,809.7	3,038.3	25,677.6	25,508.3	247.4	60,575.4	50,341.1	10,234.2
1991	16,456.9	12,671.4	3,785.5	32,768.4	32,904.9	111.0	73,808.0	60,910.3	12,897.7
1992	19,213.0	15,665.3	3,547.6	36,013.9	36,057.4	67.4	88,888.0	73,598.8	15,289.2
1993	24,802.6	19,411.6	5,391.0	45,683.7	45,586.6	164.5	106,755.7	87,945.3	18,810.3
1994	28,828.7	23,157.4	5,671.3	51,000.1	51,042.6	121.9	121,599.7	99,191.4	22,408.3
1995	32,704.2	26,808.5	5,895.6	55,410.0	55,321.1	210.8	137,007.6	110,983.2	26,024.4
1996	36,752.9	30,056.4	6,696.4	54,073.0	54,218.9	65.0	147,686.9	117,731.1	29,955.8
1997	40,778.1	32,617.7	8,160.4	44,760.0	42,754.9	2,070.1	147,458.4	112,631.6	34,826.8
1998	43,885.9	34,405.3	9,480.6	55,269.3	50,881.4	6,457.9	158,934.4	118,674.3	40,260.1
1999	47,142.3	36,436.4	10,705.8	58,576.8	55,224.6	9,810.2	168,580.8	121,988.4	46,592.4
2000	50,295.0	38,537.9	11,757.1	61,732.8	55,374.8	16,168.2	179,214.9	125,497.2	53,717.7
2001	53,642.3	40,584.4	13,057.8	63,212.5	55,472.7	23,907.9	188,679.1	126,608.9	62,070.2
2002	57,233.7	42,041.8	15,191.9	61,539.7	51,291.3	34,156.3	194,644.8	121,909.2	72,735.6
2003	61,445.1	44,297.2	17,147.9	73,936.6	68,196.9	39,896.0	210,440.0	126,624.9	83,815.0
2004	65,319.7	46,664.2	18,655.5	77,783.9	69,984.9	47,695.0	227,341.7	131,365.5	95,976.3
2005	69,400.2	49,518.0	19,882.2	81,864.2	71,810.3	57,748.9	245,046.7	136,032.8	109,013.9
2006	73,706.1	52,362.3	21,343.8	84,128.3	70,182.1	71,695.1	261,173.7	137,861.3	123,312.5
2007	78,401.2	54,121.7	24,279.5	78,618.2	71,342.9	78,970.4	268,948.6	128,185.2	140,763.4

Table 11.1.6-1 indicates that:

- a) Cash balance is maintained to be positive every year,
- b) The amount of short term loan of Case E is the least of these three additional cases.

Following figures show estimated revenues and expenses, net income, liabilities and equities, cash flow, and cash balance of Case E.

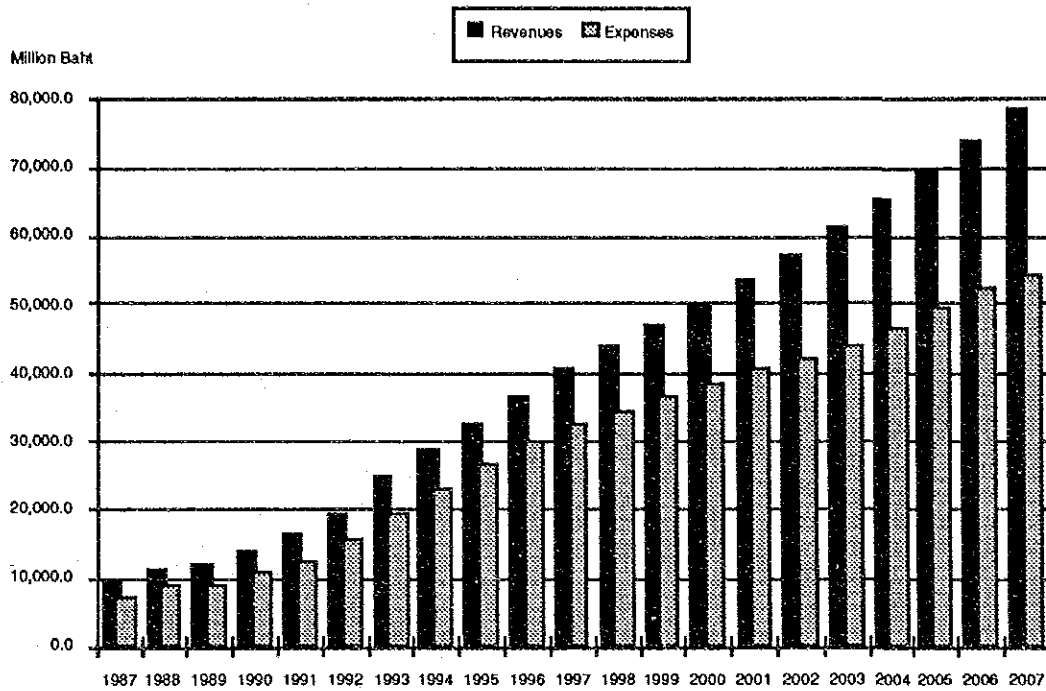


Figure 11.1.6-1 Estimated Revenues and Expenses of Case E

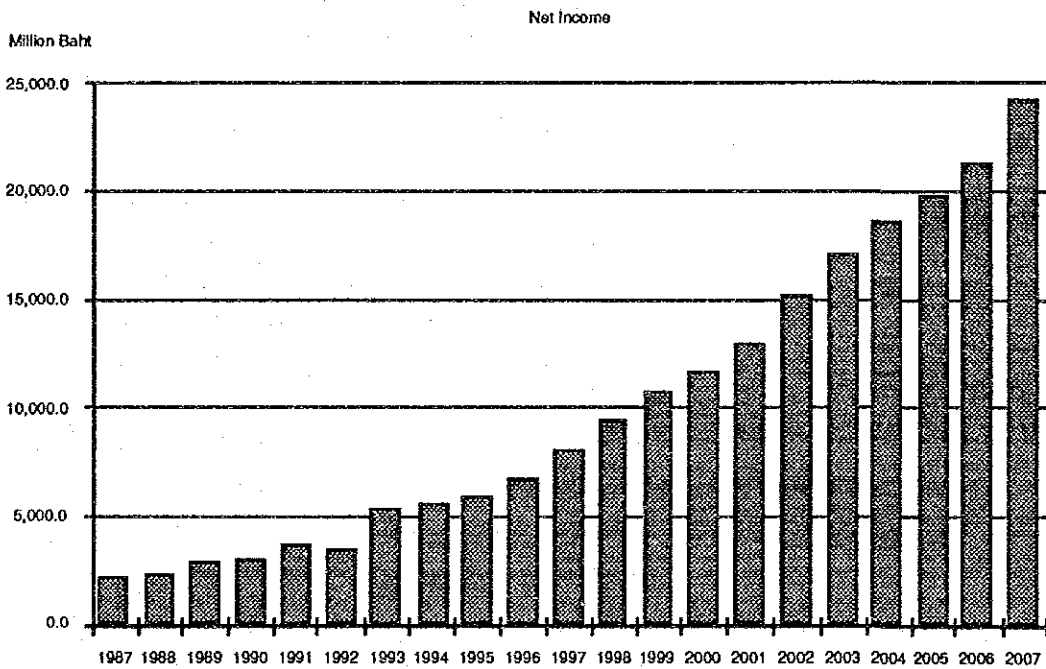


Figure 11.1.6-2 Estimated Net Income before Remittance to the Treasury of Case E

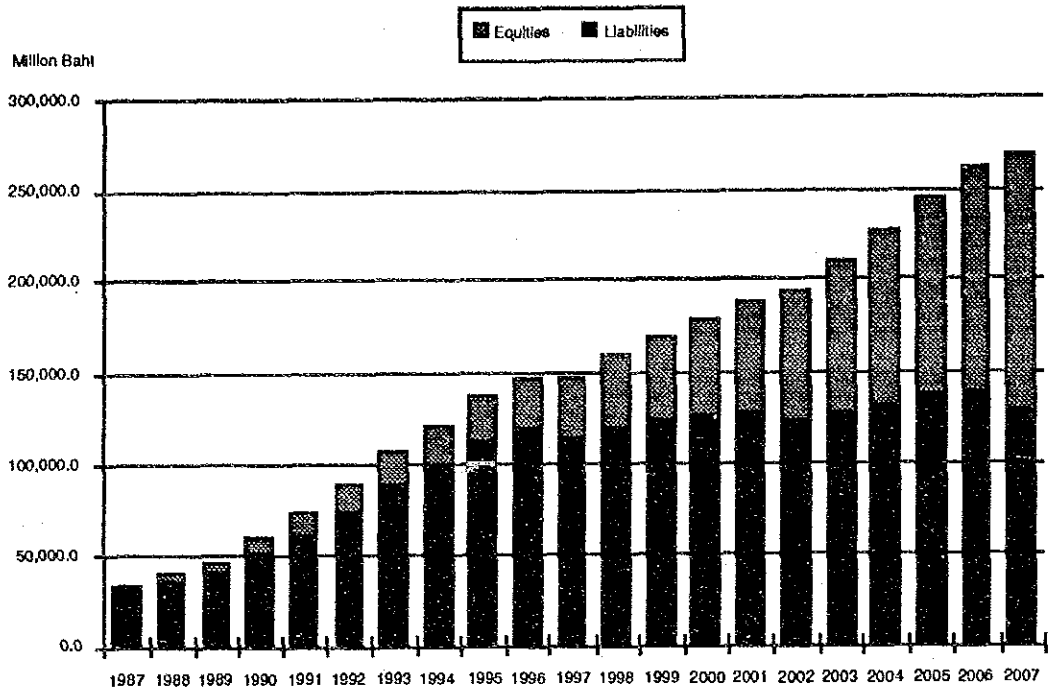


Figure 11.1.6-3 Estimated Liabilities and Equities of Case E

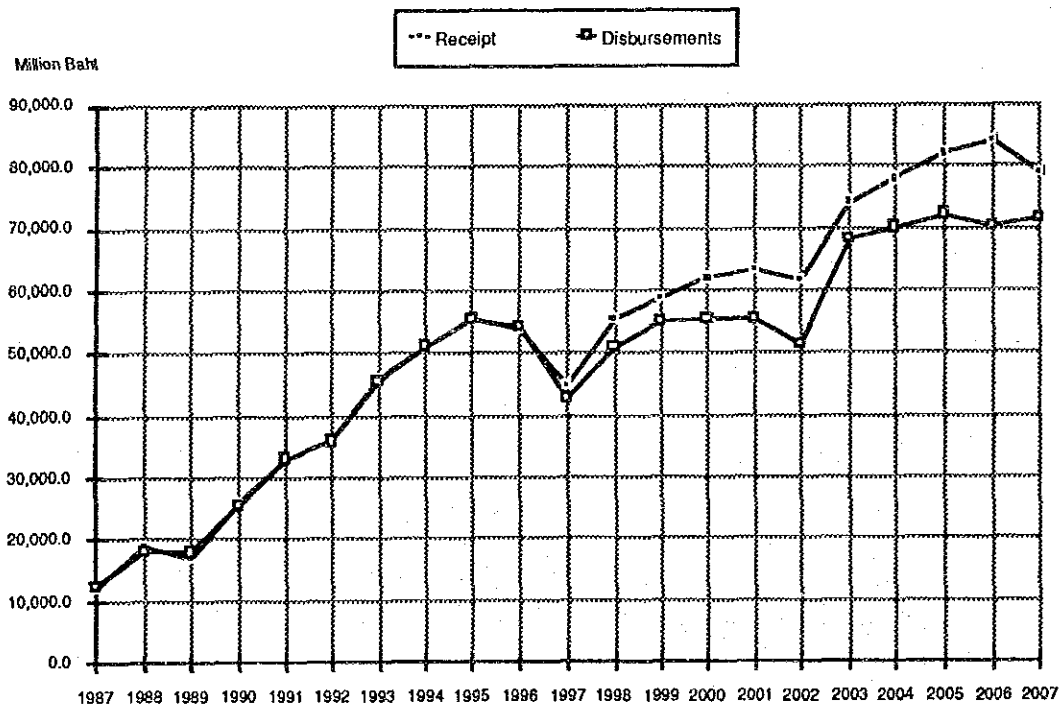


Figure 11.1.6-4 Estimated Cash Flow of Case E

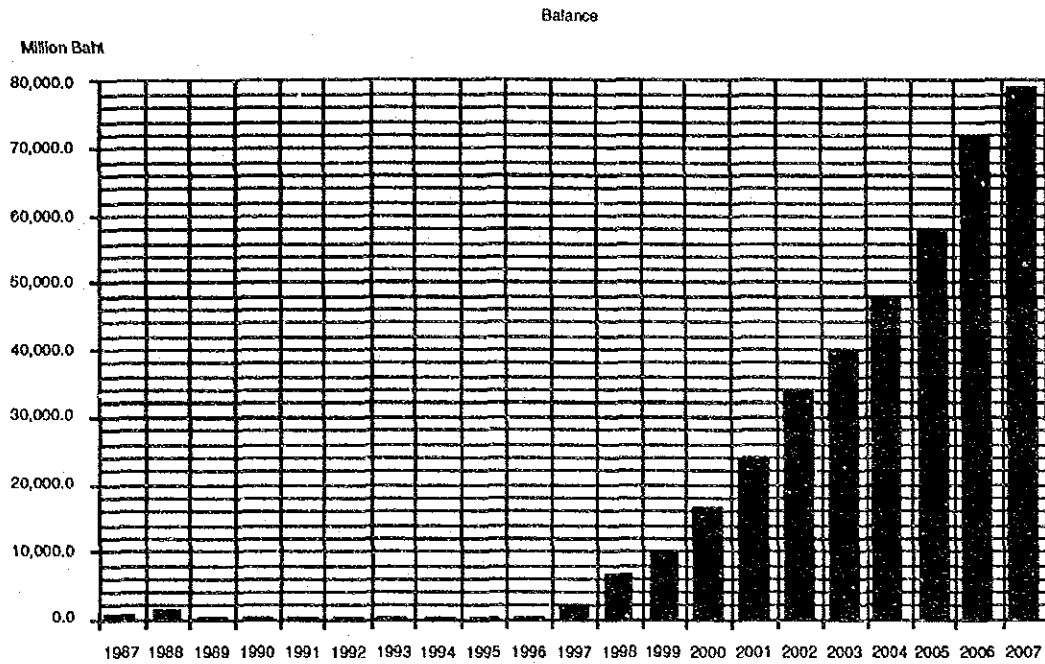


Figure 11.1.6-5 Estimated Cash Balance of Case E

Table 11.1.6-2 Management Indexes of Case E

Year	Total Capital Profit Ratio	Liquidity Ratio	Revenue per Head (Baht)	Ratio of Interest Expenses to OP. Revenue	Ratio of Depreciation Expenses to OP. Revenue	Ratio of Accumulated Depreciation to Total Fixed Assets	Staff Remuneration per OP. Revenue	Line/Head
1987	6.6%	114.4%	133,820	22.5%	18.2%	17.4%	15.5%	50.81
1988	6.4%	117.6%	154,589	19.9%	15.0%	18.7%	14.3%	56.02
1989	6.7%	77.9%	158,136	17.8%	18.7%	19.7%	14.9%	59.72
1990	5.7%	61.4%	168,732	18.1%	21.0%	19.6%	14.2%	63.66
1991	5.6%	51.5%	183,897	19.0%	22.8%	20.0%	13.7%	67.86
1992	4.4%	40.9%	196,059	22.6%	24.9%	21.1%	13.2%	72.34
1993	5.5%	45.4%	227,710	23.2%	24.1%	22.3%	11.8%	77.11
1994	5.0%	40.8%	238,723	24.8%	25.4%	24.0%	11.5%	82.20
1995	4.6%	44.6%	251,511	25.5%	26.8%	26.0%	11.1%	87.63
1996	4.7%	49.2%	265,686	24.9%	28.1%	28.9%	10.7%	93.41
1997	5.5%	74.3%	281,176	22.1%	29.0%	33.7%	10.4%	99.57
1998	6.2%	85.6%	295,206	20.9%	29.7%	36.9%	10.0%	106.15
1999	6.5%	101.8%	314,382	20.2%	30.0%	39.9%	9.6%	113.15
2000	6.8%	127.8%	334,840	19.4%	30.6%	42.9%	9.3%	120.62
2001	7.1%	159.4%	356,661	18.2%	31.5%	46.4%	9.0%	128.58
2002	7.9%	197.8%	379,935	16.0%	32.3%	50.8%	8.7%	137.07
2003	8.5%	215.8%	406,063	15.5%	32.4%	52.4%	8.4%	146.11
2004	8.5%	240.5%	433,255	15.1%	32.6%	54.1%	8.1%	155.76
2005	8.4%	266.2%	462,225	14.8%	33.6%	56.0%	7.8%	166.04
2006	8.4%	302.1%	493,094	14.2%	34.9%	58.6%	7.5%	177.00
2007	9.2%	311.8%	525,989	11.9%	35.9%	61.3%	7.2%	188.68

11.1.7 Debt Service of Each Case

Figure 11.1.7-1 shows the debt service of the revised Case C, Case D, and Case E. Figure 11.1.7-2 shows the debt service coverage ratio of these three cases.

Note: Debt Service = Amortization + Financial Charges

Debt Service Coverage Ratio = [Net Profit before Financial Charges - Remittance to the Treasury - Bonus + Depreciation] / Debt Service

Table 11.1.7 Debt Service Coverage Ratio of Each Case

(Unit: Million Baht)

Year	Revised Case C			Case D			Case E		
	Total Internal Fund	Total Debt Service	Debt Service Coverage Ratio (%)	Total Internal Fund	Total Debt Service	Debt Service Coverage Ratio (%)	Total Internal Fund	Total Debt Service	Debt Service Coverage Ratio (%)
1989	4,715.4	3,603.9	130.84	5,703.0	3,603.9	158.25	5,703.0	3,603.9	158.25
1990	4,929.0	4,474.6	110.15	6,777.2	4,474.6	151.46	6,777.2	4,474.6	151.46
1991	5,703.0	8,849.0	64.45	8,604.6	8,849.0	97.24	8,604.6	8,849.0	97.24
1992	6,777.2	10,097.0	67.12	10,690.0	10,083.7	106.01	10,696.4	10,097.0	105.94
1993	8,604.6	15,484.3	55.57	13,280.1	15,410.6	86.17	14,253.3	15,370.3	92.73
1994	10,696.4	20,421.7	52.38	15,905.4	20,096.8	79.14	17,019.6	18,458.4	92.21
1995	13,313.7	25,368.5	52.48	18,399.0	23,921.4	76.91	19,692.6	21,191.7	92.93
1996	16,015.5	28,838.8	55.53	21,032.6	26,227.4	80.19	22,426.6	21,770.1	103.02
1997	18,664.3	30,664.1	60.87	23,085.5	27,831.5	82.95	24,592.8	20,310.3	121.09
1998	21,426.5	27,638.8	77.52	24,628.7	22,924.2	107.44	26,588.3	16,285.0	163.27
1999	23,569.5	29,469.0	79.98	25,967.7	23,384.5	111.05	28,452.9	19,186.5	148.30
2000	25,314.3	29,028.8	87.20	27,259.2	21,124.7	129.04	30,297.2	18,924.4	160.10
2001	26,804.9	26,265.7	102.05	28,616.9	17,916.1	159.73	32,229.1	19,088.9	168.84
2002	28,254.6	21,583.0	130.91	30,171.3	17,197.2	175.44	34,061.9	18,369.3	185.43
2003	29,531.7	18,416.0	160.36	32,280.4	17,233.8	187.31	36,442.1	18,416.0	197.88
2004	30,625.0	18,357.7	166.82	34,317.3	17,182.4	199.72	38,722.1	18,357.7	210.93
2005	32,384.4	18,540.5	174.67	36,695.0	17,414.1	210.72	41,351.1	18,540.5	223.03
2006	34,265.9	19,146.3	178.97	39,161.6	18,088.2	216.50	44,091.4	19,146.3	230.29
2007	36,474.2	18,660.6	195.46	41,283.7	17,740.8	232.71	46,534.7	18,660.6	249.37

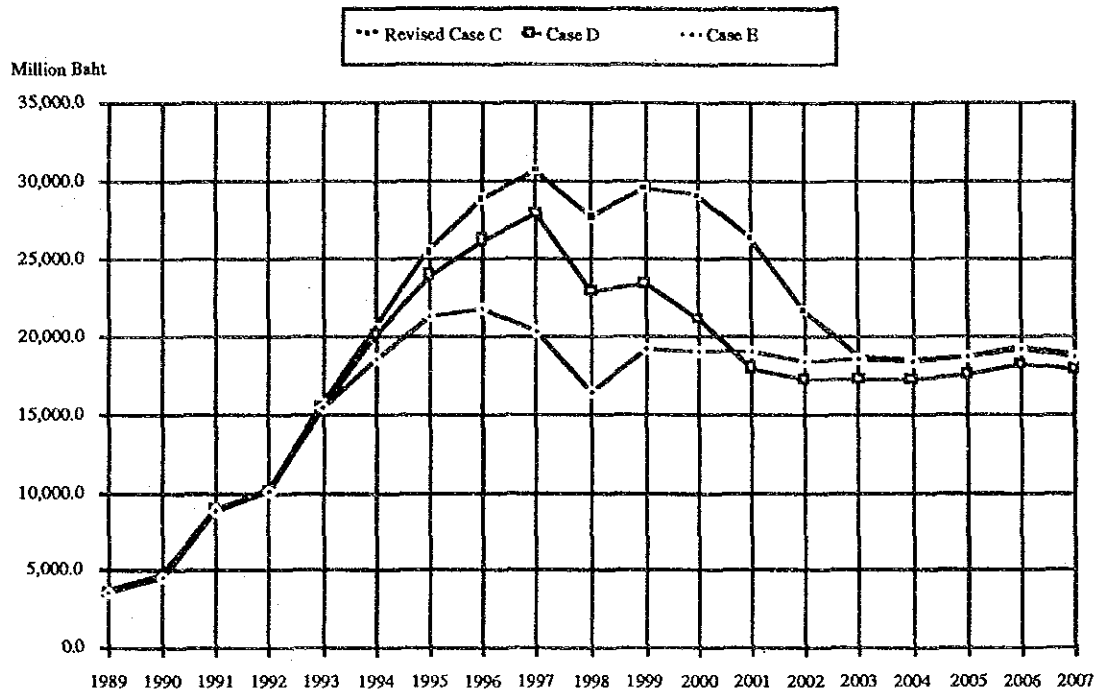


Figure 11.1.7-1 Debt Service of Each Case

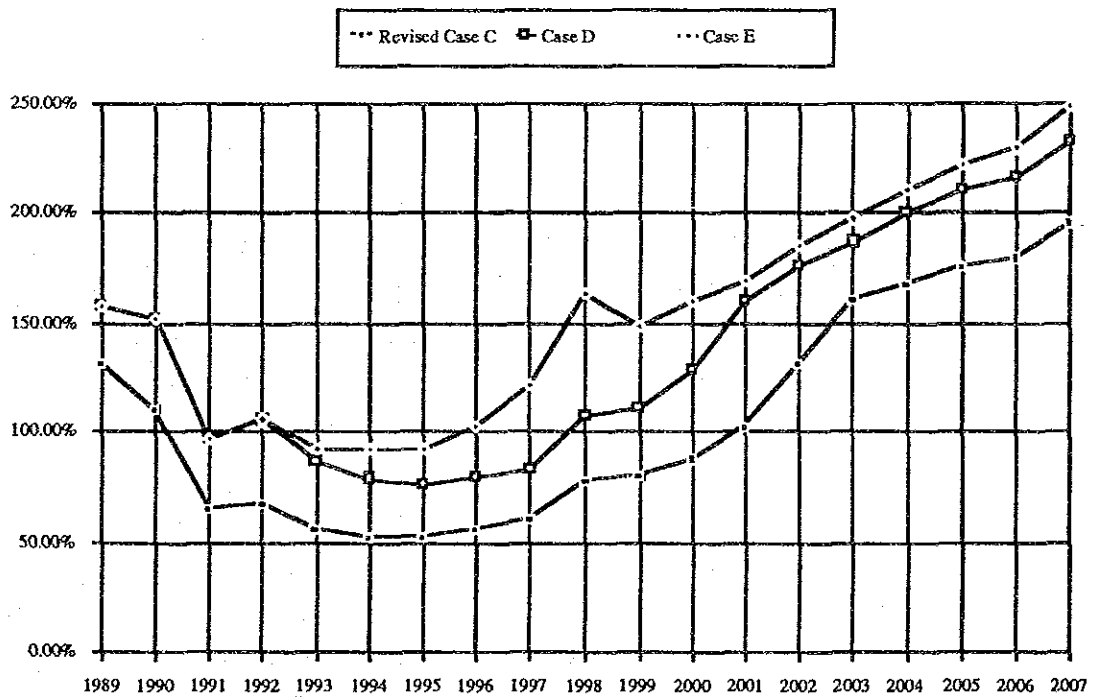


Figure 11.1.7-2 Debt Service Coverage Ratio of Each Case

11.2 Measures to Improve Financial Position

11.2.1 Financial Policy

Major financial conditions imposed on TOT are the following two:

1) more than 25% of construction expenses of any investment project must be financed by internal reserves,

2) more than 1.5 debt service coverage ratio must be maintained,

where debt service coverage ratio is defined by dividing total amount of internal funds by total debt service.

TOT must satisfy the first condition to be able to obtain government guaranteed foreign loans. This condition is also imposed by the World Bank for one of the funding conditions to TOT. The second condition is not imposed on TOT as strictly as the first condition. TOT, however, makes its best efforts to meet with the condition since the treasury puts a heavy weight on this condition in evaluating financial situations of public enterprises.

In some situations, especially in Phase-1, it is expected not to be able to meet with the above conditions. Hence, TOT should examine the following issues to improve its financial position.

11.2.2 Fund Management

As forecasted and discussed in 11.1, TOT must take every available measure to increase its revenues, decrease its operation and maintenance expenses as well as construction costs, smoothly and continuously obtain low interest external long-term loans, and successfully issue bonds since the proposed plan on expansion, replacement, and rehabilitation in this study demands a quite hefty sum of long-term financial commitments for implementation. Efficient and cautious short-term cash management should be also emphasized not to cause financial crises by cash shortage.

TOT must manage not only large amount, but also many kinds of financial funds for many years, once the Project starts. TOT must manage all kinds of loans, equities, working capital, cash inflows and outflows. Financial mismanagement will jeopardize implementation of the Project and cause a tremendous loss to both TOT and society. Hence, it is recommended to obtain a help of professional fund managers who are knowledgeable on both domestic and international money markets. They should be responsible of managing to keep financial charges and currency exchange loss to the minimum possible level.

11.2.3 Remittance to the Treasury

In order to increase its internal reserves so that TOT can generate larger amount of own capital for implementing projects, remittance to the treasury is a heavy burden. TOT should work more aggressively on being totally or partially excused from paying remittance to the treasury until at least TOT eliminates the existence of waiting applicants.

Telecommunications is unique in its effectiveness in a society in comparison with other public utilities because of externality. The social benefit of telecommunications development will increase with an accelerated speed as the number of subscribers increases. The more people have telephones, the larger becomes one person's benefit from use of telephone because his or her accessibility to other people increases. Hence, it is essential to complete a nation-wide telecommunications network and increase people's accessibility to the telecommunications services to exploit the maximum benefit of the telecommunications services.

It is, therefore, highly recommended for TOT to make much more aggressive promotion efforts to make policy makers recognize:

- 1) what roles the telecommunications sector can play and how significant the telecommunications sector development is for the nation-wide socio-economic development,
- 2) that the current and future tight financial situation of TOT is the major cause of preventing the telecommunications sector from developing.

11.2.4 Depreciation

One good and widely practiced method to increase the available amount of internal reserves is to take the maximum advantage of depreciation for profit-loss calculation, although net income on book decreases. There are three issues to be examined on depreciation. The first is on accounting method of calculating depreciation. The second is on service lives of equipment and facilities. The third is on work in progress and plant under construction.

1) Accounting Method of Depreciation

TOT is currently using the straight line method to calculate depreciation. The straight line method should be replaced by the fixed rate method. This method is better in improving the internal reserve position of TOT in the following two aspects:

- a) a larger portion of invested capital can be recovered earlier so that larger internal reserves become available in earlier stage of construction,
- b) a larger portion of invested capital can be recovered faster before facilities become technologically and economically obsolete.

2) Service Life

TOT is currently planning to revise service lives of telecommunications facilities in the near future. Shortening service lives increases available amount of internal reserves because facilities depreciate faster. Service lives of facilities should be revised according to technical progress.

Table 11.2.4-1 shows a list of service lives of facilities TOT and NTT are currently using.

Table 11.2.4-1 Service Life of Equipment

(Unit: Years)

Items	TOT	NTT
Digital Exchange	10	6
Crossbar Exchange	25	16
Radio Transmission	15	9
Aerial Cable	20	13
Under Ground Cable	30	13
Conduit Cable	30	13
Optical Aerial Cable	20	10
Optical Underground Cable	20	10
Optical Conduit Cable	30	10
Computer	10	6
Data Processing Equipment	10	5

3) Work in Progress and Plant under Construction

Prompt transfer of capital from the work in progress and plant under construction status to the fixed asset status is very important to increase depreciation. As shown in Table 11.2.4-2, the amount of the work in progress and plant under construction status is quite large

in relation to the amount of the fixed assets status although it has been improving for the last few years. To promote the capital transfer, it is essential for Department of Project Management in Bureau of Engineering and Project and Department of Finance in Bureau of General Affairs to work much more closely and cooperate each other.

Table 11.2.4-2 Plant under Construction and Work in Progress

	(Unit: Million Baht)				
Year	1984	1985	1986	1987	1988
Fixed Assets (Book Value)	9,731	11,963	15,660	23,139	27,374
Less Accumulated Depreciation	3,488	4,053	4,782	6,206	7,676
Net Fixed Assets	6,243	7,910	10,878	16,933	19,698
Plant under Construction and Work in Progress	9,617	12,491	15,296	12,609	13,604

Fifty percent of the capital in the work in progress and plant under construction status is transferred to the fixed asset status one year later and the remaining sum is transferred two years later. It is recommended to transfer sixty to seventy percent of the capital in one year.

11.2.5 Tariff

Tariff is one of major revenue management tools. Tariff structures of TOT have never been closely examined from either economic theoretic viewpoints or managerial viewpoints. To establish a sound and effective financial management system, it is recommended for TOT to conduct a tariff review project at the earliest possible time. In the project, the following items should be closely studied:

- 1) efficient tariff structure,
- 2) fair tariff structure,
- 3) relationship between cost allocations and tariff structure,
- 4) cross subsidization,
- 5) rate base,
- 6) regulatory framework for tariff structure revisions,
- 7) possibility of price cap regulation.

11.2.6 Marketing and Customer Relations

1) Marketing and customer relations are one of the least developed management areas in TOT because:

- a) demands for the telecommunications services have been always far larger than supplies; therefore, marketing has never been a serious issue,
- b) TOT as a public enterprise has not been managed like a customer oriented private enterprise.

2) Even though TOT has not achieved demand-supply balance yet, the market of the mobile telephone is already under competition and it is expected that new carriers will enter into the future new telecommunications market such as ISDN. Therefore, it is strongly required for TOT to take marketing and customer relations more seriously. To improve the marketing and customer relations functions, the immediate efforts should be primarily concentrated on improvement of the following systems:

- a) improvement of customer management system,
- b) improvement of traffic management system,
- c) improvement of billing and collection management system.

3) Major problems of these systems are that:

- a) the data base on the customers and traffic is not well organized and difficult to use,
- b) purposes, objectives, jobs, tasks, duties, procedures, rules, standards, and systems flow charts are not clearly defined and documented.

4) Hence, as the results, the following deficiencies are eminent now:

- a) customer complaints and requests are not effectively processed and reflected on management,
- b) more specific and detailed demand data are not collected; hence, demand forecasts are not reliable,
- c) there are many missed opportunities, wastes of resources, indifferent attitudes of cost savings.

5) After TOT eliminates the existence of waiting applicants and achieves demand-supply balance for the telephone services, marketing efforts must be greatly enhanced in order to create more demands for the telecommunications services and offer customer friendly services. Marketing becomes very important in opening up people's minds to make them being fully aware that modern and sophisticated telecommunications services are not just to

)
transmit voice messages, but to transmit, store, and process all kinds of information and to support people in making intelligent decisions. TOT should lead the industry to promote "Informationization" of the society and become the primary promoter of the telecommunications services.

11.2.7 Increase General Work Efficiency

TOT should consider the following measures to increase general work efficiency.

- 1) promotion of office automation,
- 2) clarifications, documentation, and manualization of job definition, purposes, objectives, duties, rules, procedures, standards, and organization-wide education of middle and lower management people,
- 3) promotion of QC circles,
- 4) effective utilization of management information system.

11.3 Another Alternative Measures to Ease the Cash-flow Problems

Section 11.1 examined various scenarios on financings of the Project. There can be many more varieties examined in Section 11.1. No matter how the Project is financed by different external funds, the best financial source is internal reserves.

In case that TOT has problems of raising enough internal and external capital to carry out the Project, alternative measures must be considered. One such measure, for example, is to delay the target years of supply objectives such as achieving the demand-supply balance, rehabilitations and replacements of facilities, and introduction of ISDN. TOT should be, however, aware of consequences of resorting to these policies, i.e., slow down of telecommunications development and, hence, slow down of the socio-economic development.

CHAPTER 12

HUMAN RESOURCE MANAGEMENT

CHAPTER 12. HUMAN RESOURCE MANAGEMENT

As the number of customers, the telecommunications network, and the volume and varieties of the service offerings expand, the human resources and organization management of TOT will play greater roles for realizing successful business operations. Even if it has the most advanced facilities, no organization can function without adequate human resources and a management system which directs, controls, and integrates people's cooperative works.

TOT is expected to undertake complex and massive facility expansion projects and to provide various sophisticated telecommunications services to its customers after 1992. TOT, therefore, faces formidable preparatory tasks of establishing an organization structure to manage human resources, material resources, and financial resources for the future construction and operations. If TOT cannot complete the preparatory tasks, TOT will face many difficulties in carrying out the complex and massive expansion projects and business operations in the future. Figure 12.1 shows the present and the future management issues from the above mentioned viewpoints.

12.1 Human Resources

TOT is expected to undertake complex and massive facility expansion projects until 2007 so that it can offer better accessibility to the network and more diversified and sophisticated services to the customers. The current policy and management system for human resources are not, however, adequate for accommodating the large scale expansion projects. In some regional offices, manpower shortage has become quite explicit and severe and overtime work has become common daily practice.

When facilities are expanded, the manpower must be also expanded at the same time. Massive facilities will be just wasted without proper expansion and allocation of human resources. Expenses on human resources are the major expense items in business operations; therefore, they must be efficiently and carefully managed.

12.1.1 The Required Number of Staff and Human Resources Management Policy

1) The required number of staff to carry out the large scale facility expansion projects and to provide satisfactory services to the customers within an affordable manpower cost constraint can be examined by the method described in Figure 12.1.1-1. The conditions and figures should be reviewed not only every year but also five to ten year intervals.

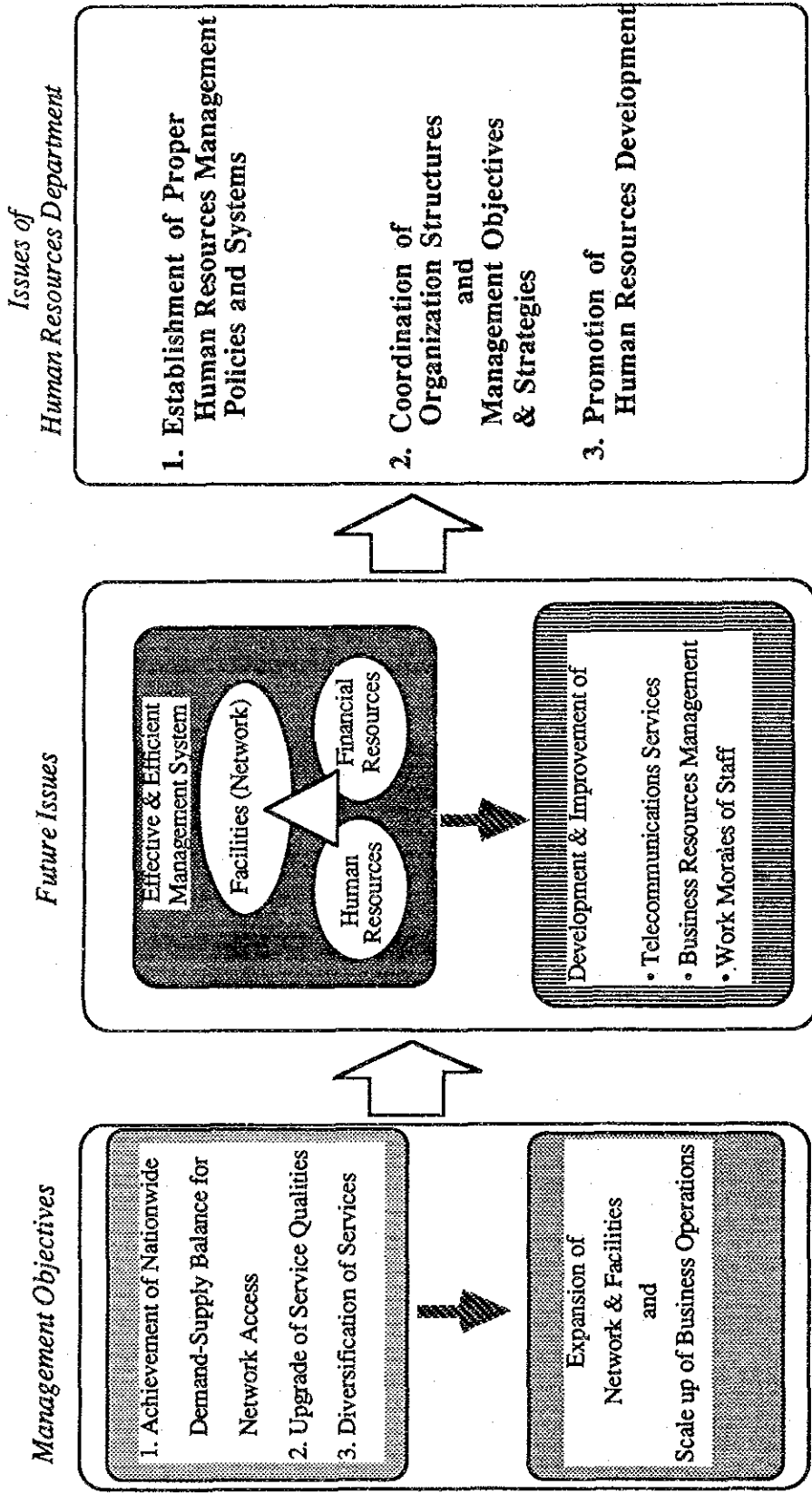


Figure 12.1 Present and Future Management Issues

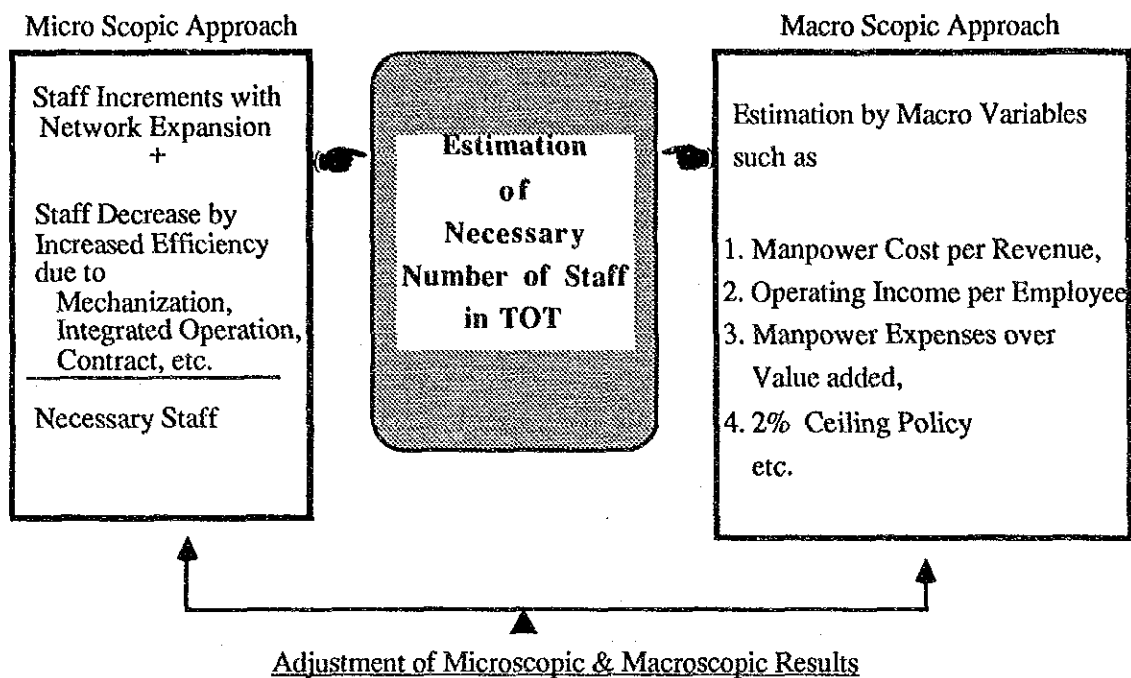


Figure 12.1.1-1 Microscopic & Macroscopic Approaches to Estimate the Necessary Number of Staff

2) In order to estimate the required number of staff by any microscopic approach, job classification and description must be clarified at first. Then rules must be standardized for estimation of the required number of staff in each department of TOT. The followings are examples of computational rules.

a) Commercial Department

- The number of required staff is estimated according to efficiency defined by using quantitative indexes such as the number of subscribers, the number of subscription requests.
- Efficiency must be defined and calculated for group categories such as regional groups and customer groups.

b) Telephone Directory and Dial Service Assistance Department

- The number of required staff is computed by the following formula

$$\text{Operating load} = \frac{(60 \text{ minutes})}{(\text{Average length of period the operator service was requested for one call})}$$

The number of required staff = (Average number of calls in one hour) /
(Operating load)

c) Switching Department

For a digital exchange (LS)

- The total number of required staff for a given line capacity is computed by summing up the number of required staff in all job categories. Table 12.1.1-1 shows a numerical example for three cases of line capacity.

Table 12.1.1-1 Standard Manpower Allocation Table for LS

(Unit: Man)

LS (Line Capacity)	10,000	20,000	30,000
Maintenance Job	1.8	2.7	3.4
Repair	0.2	0.4	0.5
Regular Test	0.2	0.2	0.2
Regular Job	1.4	2.1	2.7
Attached Job	0.5	0.8	1.0
Total	2.3	3.5	4.4

d) Outside Plant Department (Maintenance)

- The required number of staff is computed according to efficiency defined by using quantitative indexes such as the number of telephone poles, the number of subscribers, and the length of cables.

- Efficiency is calculated for each group category such as region and customer groups.

e) Administration Department

- The required number of staff is approximated as 10% of the total number of staff in the above four departments.

3) The lines per employee figure of TOT is fairly low for an operating entity which provides mainly telephone service and makes a wide use of digital exchanges. Table 12.1.1-2 and Figure 12.1.1-2 show the number of telephone lines and the lines per employee figures of twenty-one countries.

Table 12.1.1-2 The Number of Main Telephone Lines and Staff in 21 Countries

Country	Main Lines	Staff	Line/Staff
Brunei	22,300	652	34.2
Peru *85	412,819	14,358	28.8
Philippines *85	477,963	13,563	35.2
Chile	557,987	10,945	51.0
Singapore	830,497	12,421	66.9
Thailand *88	1,005,872	17,956	56.0
Malaysia	1,042,827	28,059	37.2
Hongkong	1,844,403	14,610	126.2
India	3,165,214	305,883	10.3
Greece	3,291,971	29,595	111.2
Mexico *85	3,553,671	42,570	83.5
China (People's Republic of)	6,596,000	982,800	6.7
Australia	6,668,006	93,495	71.3
Brazil	7,249,741	104,023	69.7
Korea (Republic of)	7,659,000	48,470	158.0
Spain	9,801,009	63,021	155.5
Canada	12,250,680	99,400	123.2
United Kingdom	22,137,000	223,084	99.2
France	23,911,097	165,198	144.7
Germany (Federal Republic of)	26,339,284	214,349	122.9
Japan *88	50,337,000	276,600	182.0

Source: ITU, Yearbook of Common Carrier Telecommunication Statistics
(15th edition) 1977-1986, 1988

Note: Data with no mark is as of 1986 year.

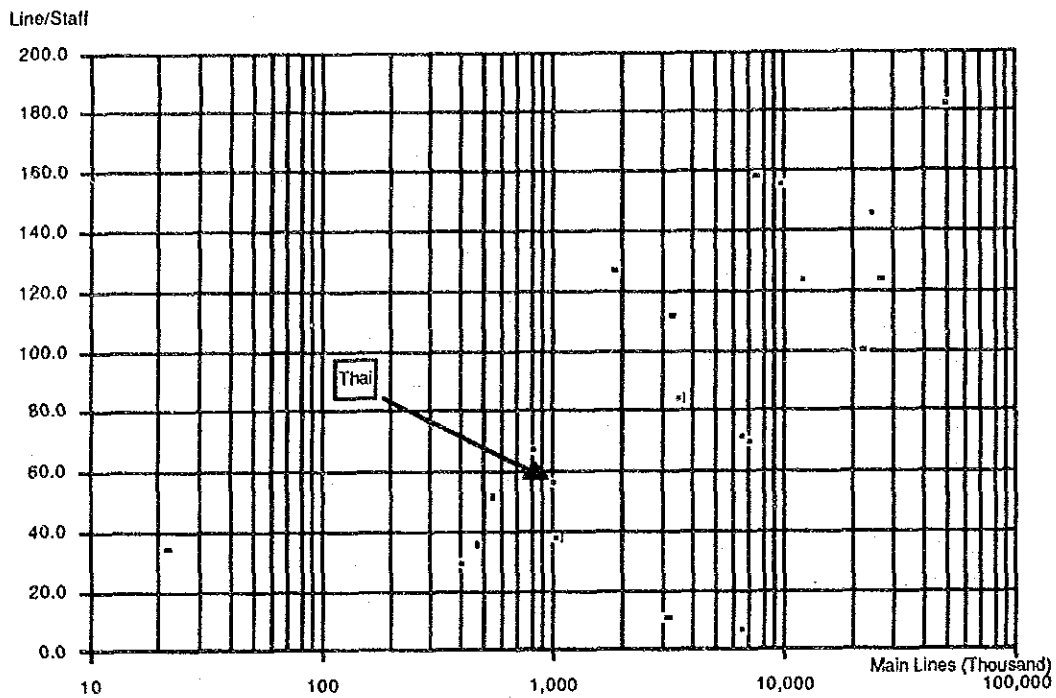


Figure 12.1.1-2 Main Telephone Lines and Lines per Staff by Country

It is necessary for TOT to make efforts to improve efficiency of the staff. Figure 12.1.1-3 displays some examples of labor productivity improvement policies.

Improvement of Staff Working Efficiency

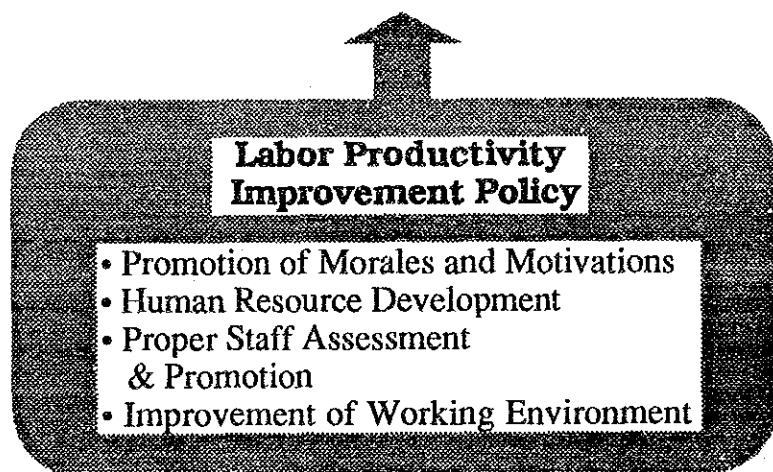


Figure 12.1.1-3 Labor Productivity Improvement Policy

4) The present situation of staff allocation must be reviewed for making necessary improvements to increase labor productivity. Especially since the number of administrative staff is rather high, it should be reduced to a more proper level for its roles and functions.

5) The number and allocation of staff are closely related to service qualities. Quality control of services must be uniformly administered throughout the country by universally set standards which are coordinated with facility expansion. The table below shows examples of service indicators.

Commercial Dept.	Completion Rate of Service Orders within a Certain Period
Dial Assist. Dept.	Response Rate
Maintenance Dept.	Fault Frequency Rate, Fault Recovery Time

6) It is essential to create a department which administers human resources management. This department should possess total authority and responsibility in formulating and implementing all plans (short, medium, and long) and policies regarding human resources necessary for facility expansion, operation, and maintenance. Another duty the department must perform is to create and maintain a detailed data base on human resources.

12.1.2 The Number of TOT Staff in the Fiscal Year of 2007

1) Estimation by Macroscopic Approaches

a) If TOT adheres to the government imposed 2% ceiling policy of annual new employment rate, the total number of TOT employees at the end of FY 2007 will be calculated as follows:

$$17,956 \text{ persons} \times (1.02)^{19} = 26,200 \text{ persons}$$

where 17,956 is the number of employees at the end of FY 1988.

b) If TOT can keep the present ratio of manpower cost over total revenue until FY 2007, the total number of employees at the end of FY 2007 will become as follows:

$$(61,454.2 \text{ million Baht} \times 0.13) / [87.8 \text{ thousand Baht} \times (1.06)^{19}] = 30,100 \text{ persons}$$

where 61,454.2 million Baht is the estimated total revenue in FY 2007 of Case A in Chapter 11,

0.13 is the manpower cost ratio in FY 1988,

87.8 thousand Baht is the manpower cost per employee at the end of FY 1988,

1.06 is the estimated increase rate of the manpower cost per employee.

2) Estimation by Microscopic Approaches

Due to lack of appropriate data for detailed estimation by microscopic approaches, the required number of staff at the end of FY 2007 is estimated by using the number of subscribers and the historical growth rate of the number of connected lines per employee.

$$6,170,000 \text{ lines connected} / [56.0 \times (1.066)^{19}] = 32,700$$

where 6,170,000 is the estimated line connected at the end of FY 2007,

56.0 is the number of connected lines per employee in FY 1988,

1.066 is the average past growth rate of the number of connected lines per employee.

3) The Number of Staff in the Fiscal Year of 2007

a) The number of TOT staff in FY 2007 employed for the Project is obtained by adjusting the figures estimated by macroscopic and microscopic approaches. In case of applying the 2% ceiling policy for annual new employment rate, the number of TOT staff in FY 2007 will be 26,200. Then, the number of the connected lines per employee will become 235, when the total number of the subscribers is 6,170,000 as forecasted. Since this 235 connected lines per employee figure is higher than the present figures of developed countries, manpower efficiency level of TOT is expected to in a range of developed country levels in FY 2007. For TOT to be able to realize this figure, manpower productivity must be greatly increased. It is essential for TOT to undertake manpower productivity improvement projects at every level in the organization. To successfully implement the projects, necessary data should be collected and processed and carefully laid out plans must be formulated beforehand.

Figure 12.1.2 shows estimation results of the required number of staff obtained by the microscopic and macroscopic approaches.

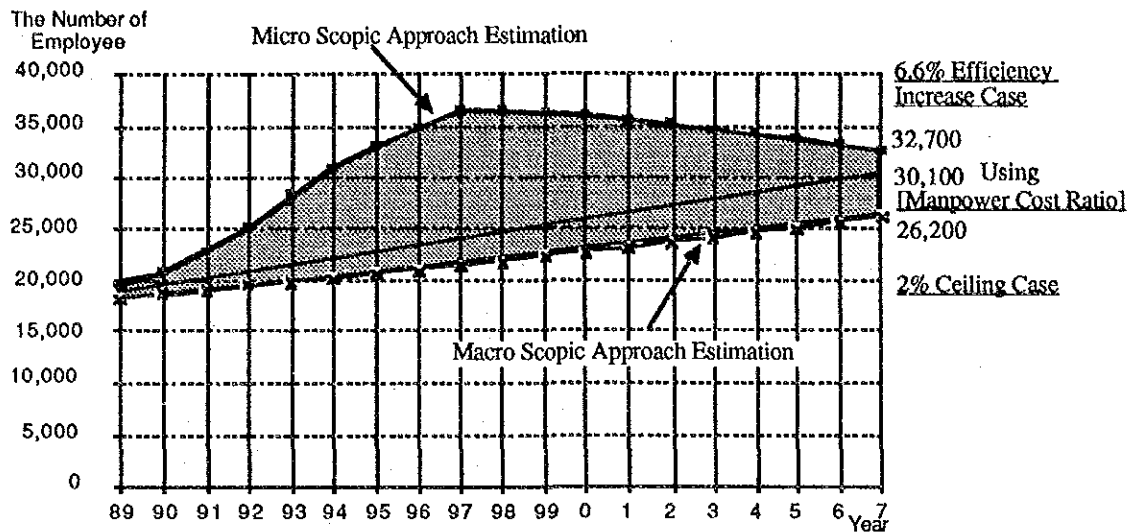


Figure 12.1.2 The Estimated Number of TOT Staff in the Future

Table 12.1.2 shows a manpower plan developed by the macroscopic approach.

Table 12.1.2 The Manpower Plan

Year	1988	1992	Phase-1	1997	Phase-2	2002	Phase-3	2007
Period		1989-92		1993-97		1998-2002		2003-07
Total Number of Staff	17,960		19,400		21,400		23,600	26,200
Net Increment		1,440		2,000		2,200		2,600
Retired		-290		-700		-1,400		-2,200
Recruit		1,730		2,700		3,600		4,800
Annual Recruit		430		540		720		960

b) Since a large amount of manpower is expected to be involved for the Project, utilizing outside human resources such as contractor, subcontractors, and part-time workers must be also taken into account.

12.2 Organization

In general, organization is the means by which management coordinates the efforts of employees to attain the business objectives. Organization involves structure. An organizational structure is a framework enabling management to delegate and control the responsibilities of individuals and departments.

TOT is expected to undertake complex and massive expansion, rehabilitation, and replacement projects of its facilities and to operate and maintain them for providing diversified and sophisticated services. Hence, the organization must be structured to attain those objectives.

12.2.1 Shifting More Authority and Responsibilities to the Telecommunications Area Authorities

1) As its facilities and business operations become more complex and massive, centralized management by the headquarters will face numerous difficulties in controlling regional and end offices. On the other hand, almost no discretionary decision making authority is given to regional and end offices. To increase its operational efficiency, TOT should review roles and functions of the headquarters and regional and end offices and decentralize its directing and controlling functions more to regional and end offices.

TOT should give more decision making autonomy to regional and end offices so that telecommunications area specific problems and issues can be dealt with in much faster and more careful manners by taking advantage of utilizing more detailed area information and more intimate and specific customer relations. Heads of regional offices should play more active roles in directing and controlling resources for dealing with problems occurred within their own telecommunications areas.

The headquarters should be more specialized in over-all strategic decision makings, planning and coordinations of inter-telecommunications area problems. The resources that the headquarters occupies should be kept as small and little as possible because an oversized and overpowered headquarters usually creates undesirable operational consequences such as slow decision makings, unclear authority span of controls and responsibilities, low morales, confused rules and procedures, ill-defined and described jobs and duties, and many more numerous hazards.

2) The present and immediate task that TOT is expected to achieve is to increase its network accessibility to the largest extent in accommodating customer demands as rapid as possible. To do so, TOT should reorganize itself into an functional organization so that it can coherently administer planning, construction, and operation and maintenance. The present, product departmentalized organizational structure, is more appropriate after TOT reaches the third business development stage, i.e., the stage of offering "Intelligent Business and Life Style Supporting Service".

Figure 12.2.1 shows the concept of decentralization.

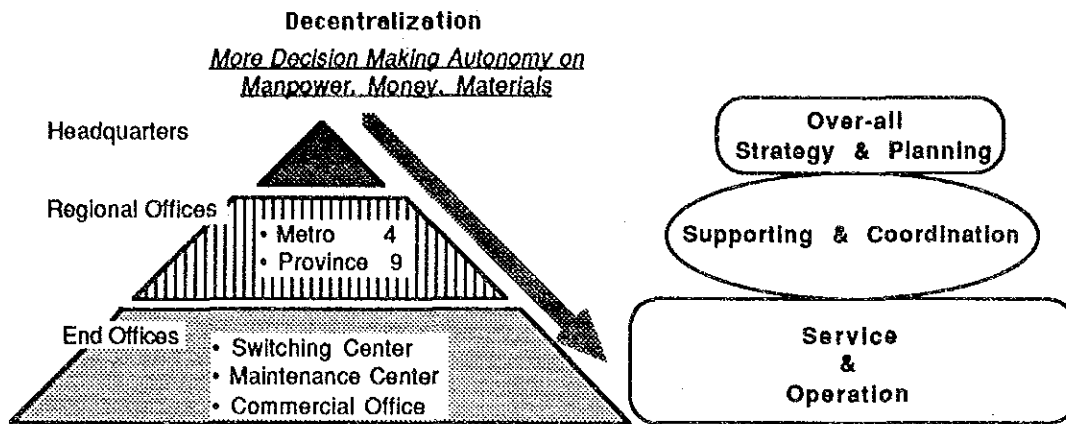


Figure 12.2.1 The Outline of a Decentralization Plan

12.2.2 Introduction of Profit and Cost Center System

After successfully eliminating a long list of waiting applicants, a profit and cost center system should be gradually introduced into the organization in Phase-3 according to the speed of decentralization and reformation of budgeting and financing system started in Phase-1 and 2 to increase operational efficiency, improve customer relations, and create positive working environment. Figure 12.2.2 shows an outline of the profit and cost center system.

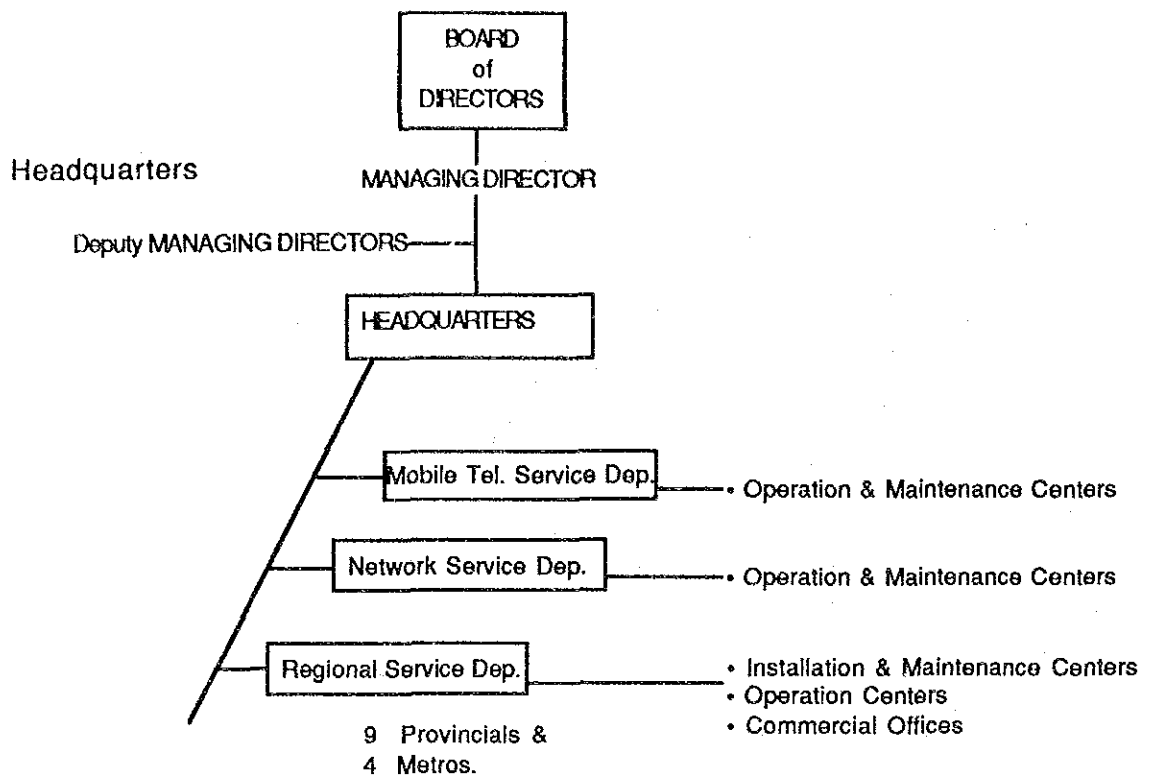


Figure 12.2.2 Organizational Outline of Profit and Cost Center System

12.3 Human Development

Organizations flourish through the efforts of individuals, because people are the most important resource a manager has. It is expected that the operation and management of TOT will become larger and more complicated in the future; therefore, it must develop skills and abilities of its people up to the sufficient level to be able to operate its own complex, massive, and sophisticated facilities. It is highly possible for many people to voice their requests for large-scale training programs at the earliest possible time because many new technologies will be introduced in the Project.

12.3.1 Development of Professional Staff

1) Of all human resource categories, shortage of professional engineers will be highly expected and become a critical issue in the near future without proper measures as construction of complex, massive, and sophisticated facilities progresses. Since TOT currently operates under multiple vendor systems for exchange and transmission facilities which are designed under different engineering specifications, engineering training is complicated and time

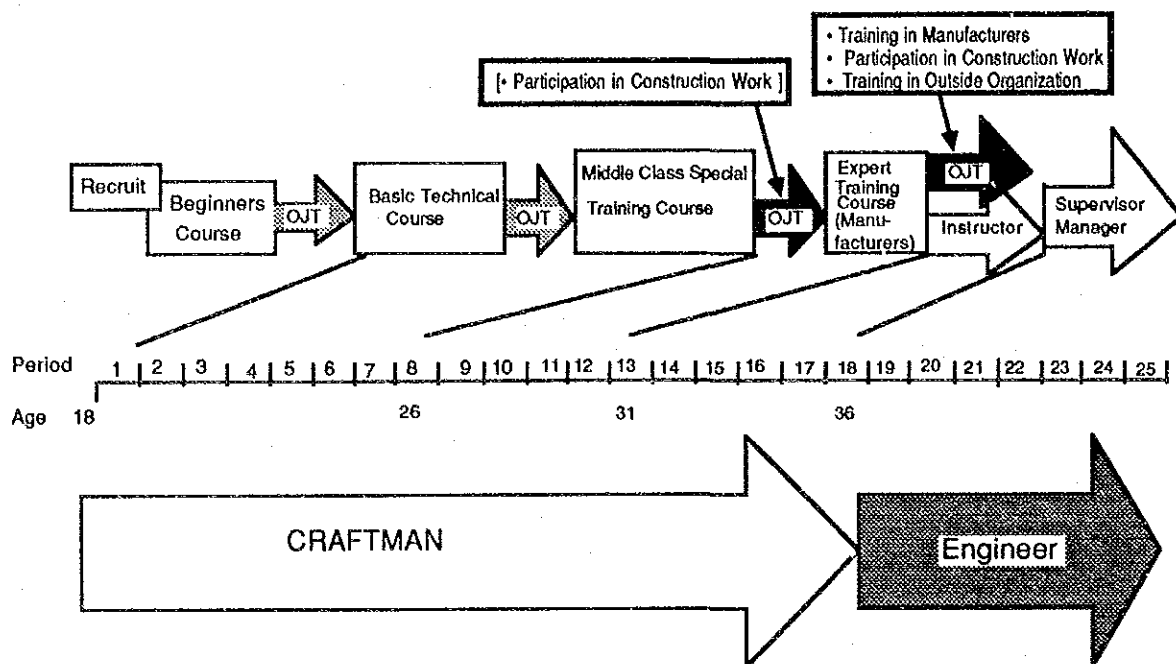
consuming. Hence, it is urgent and essential to take proper measures for acquiring professional engineers who can establish own technical standards and specifications, develop own technologies, and design own facilities.

2) To do so, at first, it is necessary to figure out how many people with what qualifications are needed in which field. It is recommended for TOT to make career development plans in which specific qualifications to be obtained and training methods are clearly defined and described. A training method recommended is to educate and train these people by making them go through different training programs such as class room training, on the job training, suppliers training, training at construction sites, training in different departments.

Table 12.3.1 shows a list of required experts and Figure 12.3.1 shows a training example for digital switching engineers.

Table 12.3.1 Required Experts

Technical Field	Administrative Field
Digital Switching Transmission Electric Power Outside Plant Software, etc.	Accounting & Finance Marketing, etc.



Knowledge & Skill Level

1	2	3	4
Service order work	Emergencies patching	Recovery of unusual fault	Recovery of system down
Daily operation	Usual repair	Abnormal repair	Abnormal repair
Basic testing	Software work	Planning	Technical guidance
Simple repair	Regular testing		

Figure 12.3.1 Training Steps of Digital Switching Technician and Engineer

12.3.2 Needs of Additional Training Centers

TOT has currently one training center in Bangkok; however, it is needed to establish at least three more training centers in the provincial areas in the future since TOT must expand its employees with its facility expansion. It must figure out not only how many training centers being needed, but also what roles being expected. In the expanded training center system, the present training center in Bangkok should be the central training center which mainly provides upper-class and executive management training. Creation of regional training centers in which beginners and lower management training will be conducted will greatly improve training effectiveness and lead to more efficient utilization of training facilities and staff.

Figure 12.3.2 and Table 13.3.2 show the future training center system development plan.

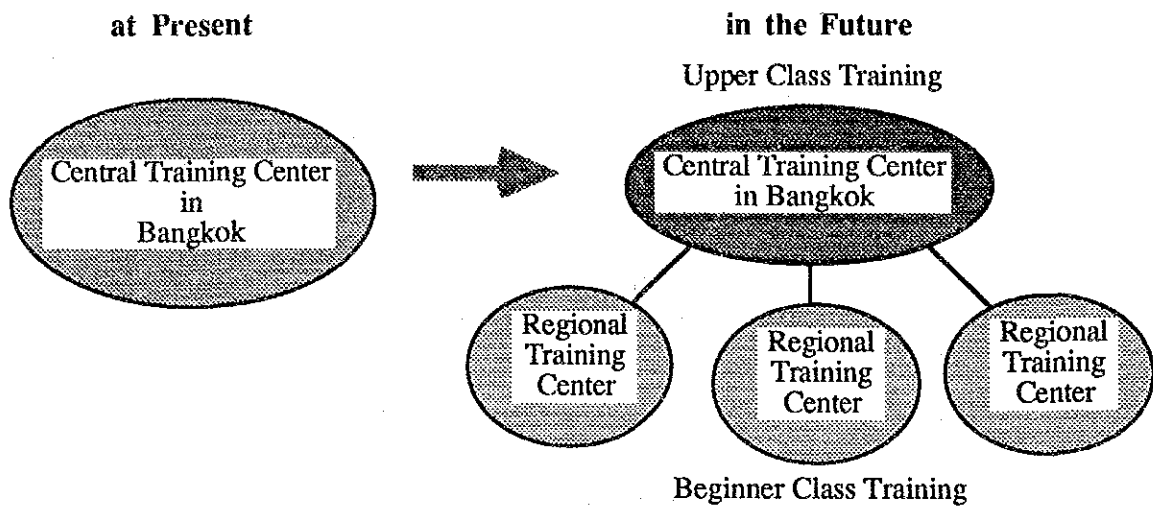


Figure 12.3.2 Training Center Development Plan in Future

Table 12.3.2 Training Center Development Concept

	at the End of Sep.1988	in the Future	Note
The Number of Employee in TOT	17,952	26,200	
Training Cycle per Employee	One Training in 4 or 5 years	One Training in 3 years *	* 3 years: aiming at increasing training opportunities
Training Capacity			
Central (Bangkok)	4,500 trainee/year	6,000 trainee/year	Additional 1500 is on schedule.
Regional	---	3,000 trainee/year	Training of regional specific requirements
Total	4,500	9,000	$26,200 / 3 \approx 9,000$

12.3.3 Human Resources Development Programs

1) On-The-Job Training Programs

In order to level up the abilities of the staff, TOT should promote further utilization of on-the-job training programs. TOT has just started organization-wide QC programs and should enhance the programs more. The following are examples of on-the-job training:

- a) Activities on QC circles,
- b) Activities on promoting internal public relations,
- c) Activities on promoting internal proposals for improvement

2) Experience Enrichment Program

TOT does not have any policy on transferring its employees from one department to another department or from headquarters to regional offices except for upper management people or unless an employee makes an explicit request of transfer. TOT should consider rotating its prominent staff in various departments and offices for enrichment of over-all management experiences. For future executives, it is important and useful to know and experience many fields of the operations and organization from a viewpoint of developing a systematic understanding of the whole operations and organization. Hence, it is highly recommended for TOT to introduce systematic experience enrichment training through position transfer and rotation programs. Furthermore, it is also recommended to eventually expand experience enrichment programs not just for future executives, but for every employee of TOT to make more experienced and knowledgeable staff in TOT as a whole.

Figure 12.3.3 shows an example of experience enrichment program.

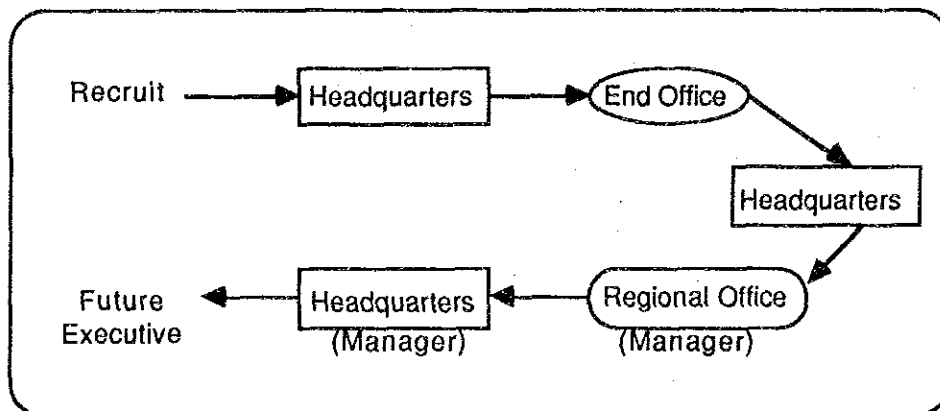


Figure 12.3.3 One Example of Experience Enrichment Program

12.4 Promotion and Compensation System

Promotion and compensation systems affect employee motivations and incentives. Hence, they must be formulated and practiced to take out the fullest extent of employees contributions to organizations.

12.4.1 Promotion System

- 1) It will be critical for further development of TOT if it can increase work incentives of non-college graduate employees and obtain more contributions from them since their share in the total staff in TOT is about 90%. In the present system, it takes at least ten years for a high school graduate employee to reach the level at which a newly recruited college graduate employee is ranked. Even though this kind of promotion treatment may be a common practice in the Thai society, TOT should give more internal opportunities for its non-college graduate employees to improve their status by establishing college equivalent educational programs within TOT or by providing financial assistance to those who take night or correspondence college courses.
- 2) It is recommended for TOT to promote more able non-college graduate staff to higher management positions for creating higher work incentives among non-college graduate staff.
- 3) The basic principle of staff appraisal is to evaluate employees on their abilities and achievements as fairly as possible. It is recommended for TOT to keep making further efforts to make its evaluation criterion, procedures, training and selection evaluators more clear, thorough, and objective.
- 4) Figure 12.4.1 shows the present staff promotion system in TOT. TOT currently classifies its clerical workers and craftsmen into three ranks; however, it should add one more rank to give more incentive to those people.

[Grade]	[the Shortest Case]	[Recruit Grade]
Exective Administrator 3 Engineer		
Exective Administrator 2 Engineer	5 years	
Exective Administrator 1 Engineer	5 years	
Administrator Engineer 3	5 years	
Administrator Engineer 2	2 years (Doctor) 4 years (below Doctor)	
Administrator Engineer 1	2 years (Master) 4 years (Bachelor 4 years) 5 years (below Bachelor)	← University
Clerical Official CRAFTSMAN 3	3 years (Diploma) 4 years (below Diploma)	← High Technical School
Clerical Official CRAFTSMAN 2	3 years (Certificate) 4 years (below Certificate)	← Technical School
Clerical Official CRAFTSMAN 1	2 years (Grade 12)	← High School

Figure 12.4.1 Summary of Personnel Institution in TOT

12.4.2 Compensation System

1) Compensation system must be designed not only from a viewpoint of providing employees with enough monetary compensation for their keeping a decent standard of living but also from a viewpoint of attracting quality staff. Although the over-all compensation structure of TOT is quite reasonable in comparison with other government agencies, it should keep working on upgrading its welfare programs, fringe benefits, and salaries for junior level employees.

2) Within a given budget framework, it is recommended for TOT to establish new expense categories on various compensations to promote further labor productivity increase. Some of the examples are listed in Figure 12.4.2.

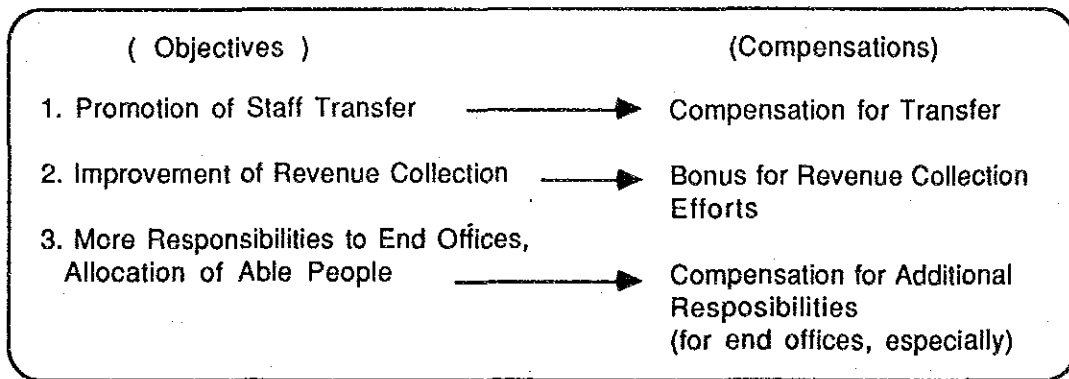


Figure 12.4.2 Example of Allowance and Objectives

3) TOT should establish a total personnel expense management system in the near future and provide higher compensations for higher productivity goals.

12.5 Recommendations

Figure 12.5 shows an implementation schedule of some of the recommended projects. It goes without saying that preliminary studies and tasks must be finished before the actual implementation.

Items \ Term	Prior to the Project 1990 ~ 1992	Phase-1 1993 ~ 1997	Phase-2 1998 ~ 2002	Phase-3 2003 ~ 2007
Staff Management	• Establishment & Improvement of Staff Management Systems	→		
	• Improvement of Work Performance	→		
	• Service Level Targets	→		
Organization	• Decentralization to Regional Offices	→	• Introduction of Profit & Cost Center	
Human Resource Development	• Development of Professionals	→		

Figure 12.5 Recommended Projects