

5. BENEFITS AND COST ANALYSIS

5.1 Cost and Benefits Comparison Methodology

Equipment cost at each project unit level arises during 15 years from 1986 to 2000. Maintenance and operation cost arises during 1986 through 2020. On the benefits side, subscription charge benefits first appear in the year after equipment investment and continue until 2000. Standing charge and call charge benefits continue until 2020. In all cases, the period wherein cost and benefits arise is long so that the value of 1,000 Rupees in 1986 may be reduced to mere 10 Rupees worth in 2000. Therefore, both cost and benefit items are discounted at a specific rate and thus converted to the present worth as of 1986, and then totalized for comparison.

By use of different discount rates, the rate can be found where at the totalized present worth of cost items as of 1986 becomes equal to that of benefit items. Such rate is IERR, i.e., internal economic rate of return. The higher the IERR, the better the investment feasibility.

5.2 Service Life and Salvage Value

For service life of telecommunications facilities, such as switching equipment and local cable equipment, 20 years are adopted as this figure is commonly used for service life. Salvage value is set at zero because 20 years from now, technological renovations of many kinds will take place so that economic value of the then existing equipment will be reduced to zero.

However, in this Master Plan, some of equipment investments are scheduled for the year 2000. For such equipment, maintenance and operation cost will be appropriated until 2020 in order to make sure of benefits accrual. (Refer to Figure 8-3.)

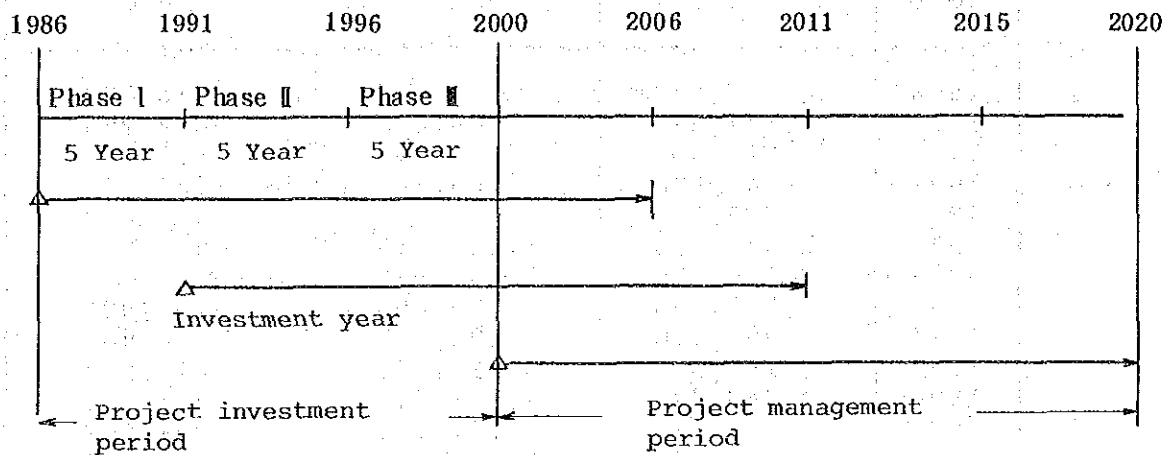


Figure 8-3 Project Investment Period and Project Management Period

5.3 IERR of Whole Project

First, evaluation is made for IERR accruing from the present Master Plan as a whole. In this case, the whole Master Plan is assumed to constitute one project. Evaluation cash flow is in Table 8-12. Calculation by this cash flow shows that when the discount rate of 17.33% is used, the total of cost items converted to the present worth becomes equal to that of benefit items. Therefore, IERR of this Master Plan is 17.33%. Usually, when IERR is more than 10% of opportunity cost of capital, investment is considered to be feasible.

From the national viewpoint, IERR of 17.33% is at a very high level.

Table 8-12 Cash Flow

(1000 Rupees)

Year	Cost	Benefit	B-C
1986	816,577	0	-816,577
1987	1,177,340	508,056	-669,285
1988	1,221,400	619,199	-602,198
1989	1,346,690	760,144	-586,545
1990	1,320,270	948,596	-371,678
1991	2,445,790	1,525,230	-920,557
1992	2,505,290	2,002,940	-502,359
1993	2,745,090	2,579,000	-166,086
1994	2,966,110	3,091,080	124,969
1995	3,185,530	3,597,070	411,539
1996	4,947,470	4,876,290	-71,186
1997	5,323,190	5,711,240	388,047
1998	5,722,620	6,637,180	914,564
1999	6,095,540	7,461,600	1,366,060
2000	6,490,370	8,370,040	1,879,670
2001	3,413,700	7,523,940	4,110,240
2002	3,413,700	7,523,940	4,110,240
2003	3,413,700	7,523,940	4,110,240
2004	3,413,700	7,523,940	4,110,240
2005	3,413,700	7,523,940	4,110,240
2006	3,413,700	7,523,940	4,110,240
2007	3,368,000	7,523,940	4,155,940
2008	3,310,820	7,523,940	4,213,130
2009	3,258,920	7,523,940	4,265,020
2010	3,204,340	7,523,940	4,319,600
2011	2,819,490	6,244,890	3,425,390
2012	2,724,660	6,244,890	3,520,230
2013	2,640,720	6,244,890	3,604,170
2014	2,556,780	6,244,890	3,688,110
2015	2,472,840	6,244,890	3,772,050
2016	1,795,220	3,989,300	2,194,080
2017	1,646,180	3,989,300	2,343,120
2018	1,497,140	3,989,300	2,492,160
2019	1,348,090	3,989,300	2,641,210
2020	1,199,050	3,989,300	2,790,250

5.4 Sensitivity Analysis - Scale of Plan Eligibility

The present Master Plan is basically the demand and supply plan. It presupposes demand growth under the existing tariff system and 100% demand fulfillment in the year 2000.

Sensitivity analysis is required in two aspects. One involves the case wherein demand decreases due to tariff raise or demand growth is to a small degree with tariff system remaining as it is or demand increases on account of tariff reduction, i.e., the case wherein benefits suffer curtailment. The other comprises the case wherein cost increases.

Table 8-13 and Figure 8-4 present sensitivity analysis results. Even in the event of 20% decrease of benefits and 20% cost increase, IERR stands at 11.75% and 13.76%, respectively. In both cases, IERR is above 10%.

Table 8-13 Sensitivity Analysis of IERR (%) (1)

Item	20%	10%	0	-10%	-20%
Decrease of benefits	11.75	14.58	17.33	20.05	22.75
Increase of cost	13.76	15.40	17.33	19.68	22.60

Note: Consumer's surplus for call charge is 15%.

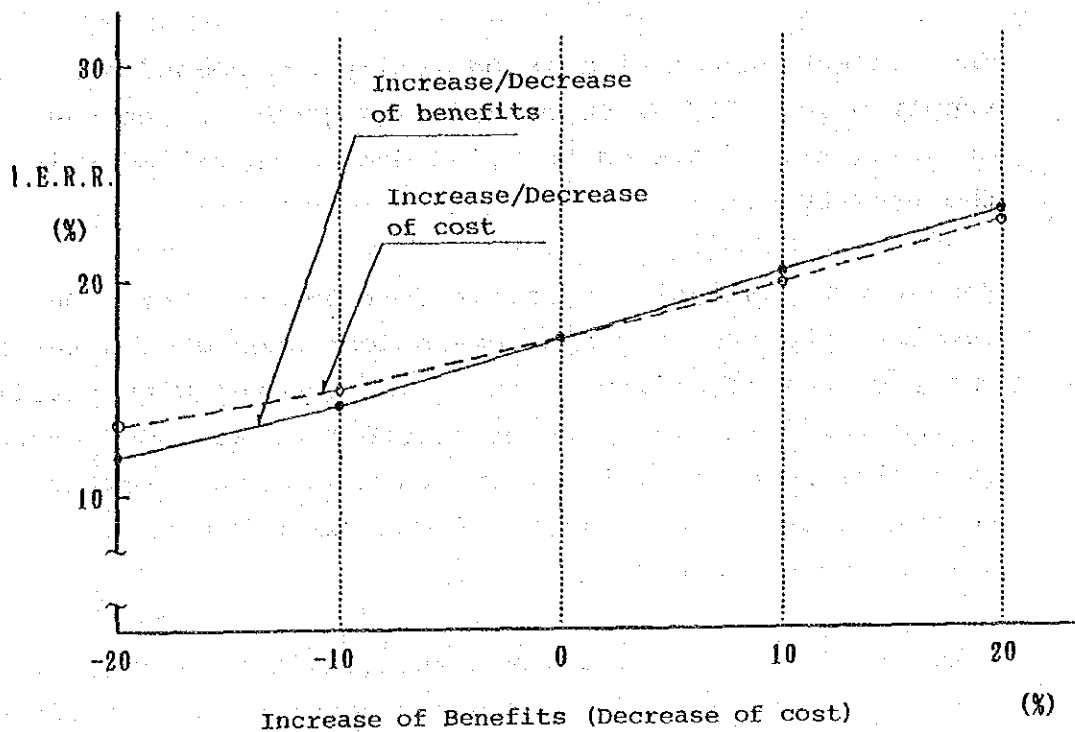


Figure 8-4 Sensitivity Analysis of IERR (1)

Sensitivity analysis is made for the case wherein consumer's surplus for call charge varies also. Results are in Table 8-14 and Figure 8-5.

Table 8-14 Sensitivity Analysis of IERR (%) (2)

Item	5%	10%	15%	20%	25%	30%
Whole country	14.73	16.05	17.33	18.58	19.79	20.97
Colombo Central area	19.10	20.89	22.67	24.43	26.18	27.92

Note: Figures for Colombo Central area are for reference.

In all cases, opportunity cost of capital is at a level exceeding 10%. The most significant finding of all is that under no circumstance should benefits decrease by more than 20%. And this is the precondition to feasibility of investment.

The foregoing sensitivity analysis results attest to stable, high IERR which can be expected from the present Master Plan.

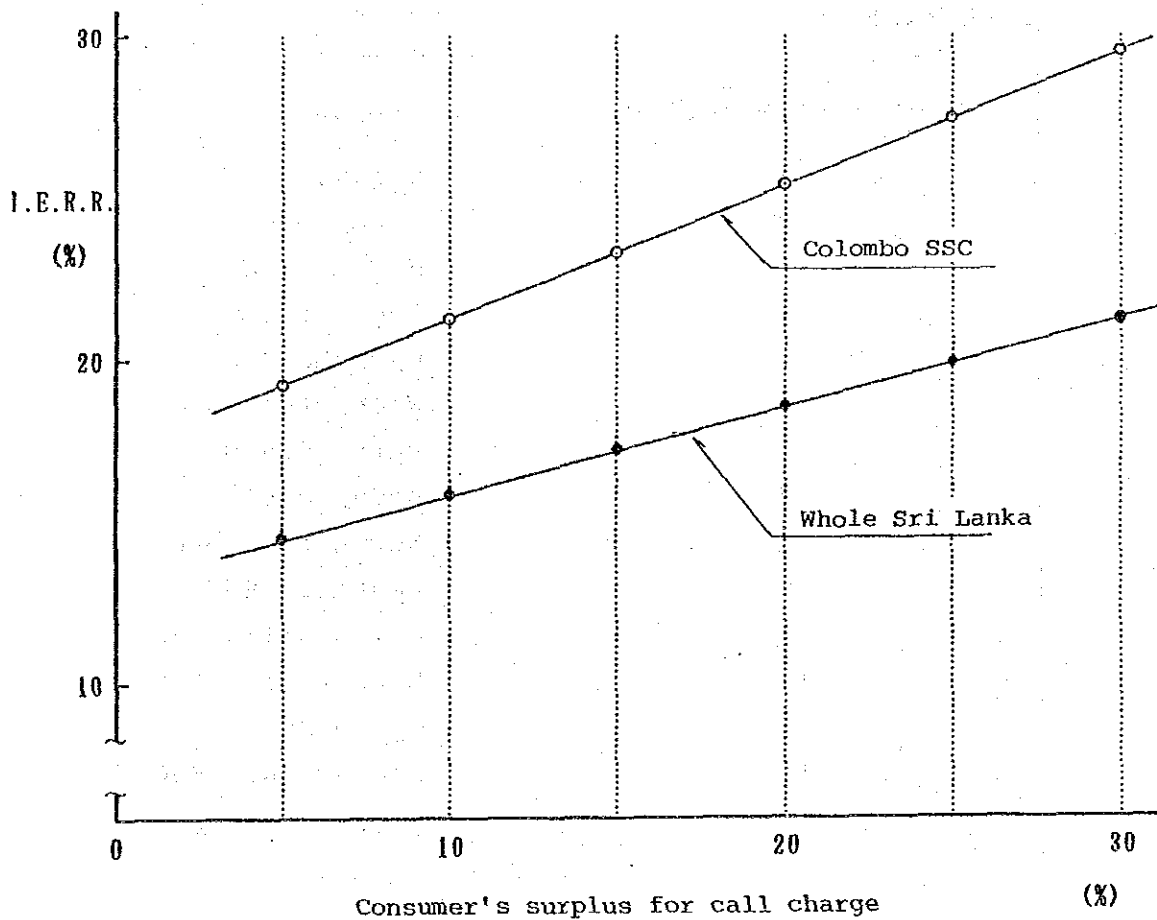


Figure 8-5 Sensitivity Analysis of IERR (2)

5.5 Order of Priority for Investment

IERR breakdown by project units in the present Master Plan is in Table 8.15. Individual IERRs vary broadly from 3% to 23%. The aforementioned 17.33% for the whole project is the result of low IRR having complemented high IRR. Generally, in main cities, such as Colombo, Kandy and Jaffna, IERR is high. Hence high priority for investment. At 14 exchanges out of a total of 30, investment feasibility (i.e., opportunity cost of capital) exceeds 10%. Thus, for those 14 exchanges, early project implementation is desirable. The 14 exchanges are:

Order of Priority	Exchange
1	Colombo SSC
2	Kandy SSC
3	Jaffna SSC
4	Kegalle SSC
5	Gampaha SSC
6	Hambantota SSC
7	Ratnapura SSC
8	Badulla SSC
9	Kurunegala SSC
10	Panadura SSC
11	Avissawella SSC
12	Bandarawala SSC
13	Galle SSC
14	Anudarapura SSC

Table 8-15 IERR Breakdown by Project Units (Exchange Basis)

1.	Anuradapura	12.65
2.	Ampara	5.31
3.	Avissawella	13.85
4.	Badulla	15.54
5.	Batticaloa	8.11
6.	Bandarawela	13.36
7.	Colombo	22.67
8.	Chillaw	8.76
9.	Galle	13.34
10.	Gampaha	16.95
11.	Hambantota	16.15
12.	Hatton	8.74
13.	Jaffna	20.89
14.	Kalmunai	8.46
15.	Kandy	21.05
16.	Kurunegala	14.93
17.	Kulutara	9.10
18.	Kegalle	19.30
19.	Mannar	3.71
20.	Matale	7.18
21.	Matara	8.64
22.	Nawalapitiya	6.80
23.	Negombo	9.68
24.	Nuwara Eliya	8.77
25.	Polonnaruwa	6.44
26.	Panadura	14.69
27.	Puttalam	3.88
28.	Ratnapura	15.16
29.	Trincomalee	3.01
30.	Vavuniya	6.87
Total		17.33

5.6 Optimum Investment Plan Formulation

Optimum investment plan can be obtained by coordination of the undermentioned two requirements.

- (1) For SSCs where IERR falls short of 10%, investment period is to be delayed. By this means, greater demand, hence larger benefits, can be expected.
- (2) For SSCs where IERR exceeds 10% but assigned investment period is late, investment period is to be advanced to the extent where IERR does not fall below 10%.

The requirement (1) exerts favorable influence on IERR of the whole Master Plan whereas the requirement (2) performs to the contrary. This time, within the Master Plan framework, investment period for five exchanges is delayed by one year and for another five exchanges advanced by one year. As the result, IERR of the whole Master Plan becomes 18.4%. Thus, by means of investment period adjustment by one year, optimum investment plan can be obtained inside the range where IERR of the whole Master Plan does not fall below 17.33%. No substantial variation takes place because Colombo SSC occupies major weight in the whole network architecture. This arrangement is adopted as optimum investment plan.

Five exchanges where investment period is delayed by one year are:

1. Chillaw
2. Hatton
3. Mannar
4. Matara
5. Nuwara Eliya

Five exchanges where investment period is advanced by one year are:

1. Hambantota
2. Kurunegala
3. Kegalle
4. Panadura
5. Ratnapura

5.7 Investment Cost of Optimum Investment Plan
(Financial Cost)

By optimum investment plan analysis, year by year investment amounts in the present Master Plan are modified as in Table 8-16. (Maintenance and operation management costs are excluded from this modification.)

Table 8-16 Investment Amount Modification

(Unit: 1,000 Rupees)

	Master Plan Investment Cost	Optimum Plan Investment Cost	Balance
1986	811,143	599,268	-211,875
1987	1,022,990	1,116,976	+93,986
1988	985,518	1,109,875	+124,357
1989	1,023,510	1,069,748	+46,238
1990	889,888	889,741	-147
1991	8,373,000	8,365,000	-8,000
1995			
1996	14,805,000	14,629,000	-176,000
2000			

6. FINANCIAL ANALYSIS.

6.1 Significance

Analysis made in the foregoing is economic analysis. The government's telecommunications investment policy should be based on optimum investment plan obtained by economic analysis, plus consideration to enable telecommunications to perform their role as public property at top efficiency.

Optimum investment plan estimates labor cost, for instance, at lower level than actually required and, for benefits, even takes account of time saving benefits resulting from rapid transmission of information. In other words, optimum investment plan consists of cost and benefits comparison using visionary figures, aimed at best possible utilization of resource from the national viewpoint.

Following is the study of financially considered investment safety in the case of optimum investment plan. Study is made in the form of comparison between actually required cost and actually available revenue.

6.2 IFRR Study

IFRR, i.e., internal financial rate of return, means the discount rate whereby to discount annual expenditure and revenue and make their respective totalized present worths equal. If this discount rate is higher than long term interest rate on capital, financial feasibility of investment at that time can be certified.

This time, IFRR calculation is made for optimum investment plan obtained by economic analysis only.

For IFRR calculation, the undermentioned two cases are considered.

- (1) Case where the government makes investment
- (2) Case where private enterprise makes investment

Long term interest rate on capital in Sri Lanka is estimated at 5-8%. This estimate is from the undermentioned indices.

Sri Lanka:	a) Short term government bond	2.2%
	b) Long term deposit interest balance	4.5 - 5.5%
	c) Estimated long term interest (a + b)	6.7 - 7.7%
	d) Development Finance Corporation's long term loan interest	2.2 - 7.7%
Japan:	Official rate (long term)	6.0%
U.S.A.:	Long term Treasury Note rate	4.85%

Note: Figures above are given in nominal interest minus price rise.

Equipment investment cost (in market price) breakdown by exchange and by year in the case of optimum investment plan is in Table 8-17.

Due to difference in investment period, phase by phase equipment investment amounts change as under.

Phase I	4,786 million Rupees
Phase II	8,365 million Rupees
Phase III	14,629 million Rupees

These figures provide investment cost basis for financial analysis.

Table 8-17 (1/2) Investment Cost (in Rs 1,000)

	1986	1987	1988	1989	1990	1991	1992	1993
1 Anuradapura	0	0	9,857	6,524	0	12,232	12,232	12,232
2 Ampara	0	0	54	24	0	5,496	5,496	5,496
3 Avissawella	3,120	2,080	144	22,476	14,710	4,782	4,782	4,782
4 Badulla	4,680	3,120	206	37,315	16,819	17,227	17,227	17,227
5 Batticaloa	0	0	139,565	29,181	0	13,870	13,870	13,870
6 Bandarawela	3,900	2,600	163	30,726	11,536	13,071	13,071	13,071
7 Colombo	369,202	515,796	503,828	321,212	272,336	1,120,930	1,059,930	1,059,930
8 Chilaw	0	11,700	92,561	20,164	44	0	2,961	2,961
9 Galle	13,158	0	449	106,803	72,005	37,220	36,113	36,113
10 Gampaha	52,825	44,545	253	111	0	15,839	15,839	15,839
11 Hambantota	0	132	58	0	5,893	5,893	5,893	5,893
12 Hattton	0	101,988	36,026	146	64	0	10,524	10,524
13 Jaffna	75,660	50,440	782	52,183	22,701	65,183	65,183	65,183
14 Kalunai	0	0	142	73,860	27,348	7,748	7,748	7,748
15 Kandy	1,560	25,925	192,593	140,362	59,571	111,363	80,979	80,979
16 Kurunegala	0	376	165	55,710	37,378	23,359	23,359	23,359
17 Kulutara	0	0	324	63,668	41,413	18,995	18,995	18,995
18 Kegalle	0	140	1,195	753	11,272	11,272	11,272	11,272
19 Mannar	0	8,580	5,720	64	8,608	27,560	15,253	12,341
20 Matale	780	520	210	92	72,038	24,853	14,898	14,898
21 Matara	0	151,970	55,099	302	133	507	30,252	30,252
22 Nawalipitiya	0	47,976	24,912	28	0	4,915	4,915	4,915
23 Negombo	0	0	654	99,091	63,319	59,093	59,093	59,093
24 Nuwara Eliya	0	5,460	3,640	217	95	12,517	44,786	36,857
25 Polonnaruwa	0	0	57	25	9,989	17,369	17,369	17,369
26 Panadura	67,823	34,328	115	0	13,501	13,501	13,501	13,501
27 Puttalam	1,560	1,040	62	27	79,063	22,687	307	307
28 Ratnapura	0	34,976	20,634	0	19,913	19,913	19,913	19,913
29 Trincomalee	0	0	13,019	8,646	29,992	28,236	15,024	15,024
30 Vavuniya	0	68,078	7,388	47	0	11,943	11,943	11,943
31 Total	811,143	1,022,990	985,518	1,023,510	889,888	1,804,790	1,641,880	1,641,880
Master Plan	599,268	1,166,976	1,109,875	1,069,748	889,741	1,727,577	1,641,880	1,641,880
Optimum Investment Plan								

Table 8-17 (2/2) Investment Cost (in Rs. 1,000)

	1994	1995	1996	1997	1998	1999	2000	2001
1 Anuradapura	12,232	12,232	25,343	25,343	25,343	25,343	25,343	
2 Ampara	5,496	5,496	12,354	12,354	12,354	12,354	12,354	
3 Avissawella	4,782	4,782	18,103	18,103	18,103	18,103	18,103	
4 Badulla	17,227	17,227	26,871	26,871	26,871	26,871	26,871	
5 Batticaloa	13,870	13,870	24,239	24,239	24,239	24,239	24,239	
6 Bandarawela	13,071	13,071	22,426	22,426	22,426	22,426	22,426	
7 Colombo	1,059,930	1,059,930	1,880,630	1,880,630	1,880,630	1,880,630	1,880,630	
8 Chillaw	2,961	2,961	2,961	11,726	11,726	11,726	11,726	11,726
9 Galle	36,113	36,113	76,992	76,992	76,992	76,992	76,992	
10 Gampaha	15,839	15,839	29,359	29,359	29,359	29,359	29,359	
11 Hambantota	5,893	19,632	19,632	19,632	19,632	19,632	0	
12 Hatton	10,524	10,524	10,524	19,130	19,130	19,130	19,130	19,130
13 Jaffna	65,183	65,183	126,970	126,970	126,970	126,970	126,970	
14 Kalmunai	7,748	7,748	20,696	20,696	20,696	20,696	20,696	
15 Kandy	80,979	80,979	206,534	206,534	206,534	206,534	206,534	
16 Kurunegala	23,359	43,443	43,443	43,443	43,443	43,443	0	
17 Kulutara	18,995	18,995	35,559	35,559	35,559	35,559	35,559	
18 Kegalle	11,272	16,133	16,133	16,133	16,133	16,133	0	
19 Mannar	12,341	12,341	12,341	6,137	6,137	6,137	6,137	6,137
20 Matale	14,898	14,898	24,129	24,129	24,129	24,129	24,129	
21 Matara	30,252	30,252	30,252	42,533	42,533	42,533	42,533	
22 Nawalipitiya	4,915	4,915	7,523	7,523	7,523	7,523	7,523	
23 Negombo	59,093	59,093	86,269	86,269	86,269	86,269	86,269	
24 Nuwara Eliya	36,857	36,857	36,857	50,023	50,023	50,023	50,023	
25 Polonnaruwa	17,369	17,369	8,154	8,154	8,154	8,154	8,154	
26 Panadura	13,501	28,885	28,885	28,885	28,885	28,885	0	
27 Puttalam	307	307	6,691	6,691	6,691	6,691	6,691	
28 Ratnapura	19,913	35,278	35,278	35,278	35,278	35,278	0	
29 Trincomalee	15,024	15,024	24,234	24,234	24,234	24,234	24,234	
30 Vavuniya	11,943	11,943	25,712	25,712	25,712	25,712	25,712	
31 Total	1,641,880	1,641,880	2,961,700	2,961,700	2,961,700	2,961,700	2,961,700	129,549
Master Plan			2,905,044	2,961,700	2,961,700	2,961,700	2,961,700	
Optimum Investment Plan								

6.3 IFRR of Investment by Government

When SLTD as self-supporting business entity carries out telecommunications business, two cases arise. One is the case where part of business profit is paid to the national treasury (Case I). The other is the case where business profit payment to the national treasury is not made (Case II). For these two cases, IFRR calculation is made subject to conditions mentioned below, with a view to probe into investment feasibility in monetary aspect.

- a) Investment cost be borrowed at interest of 3% per annum.
- b) Working capital be 30% of annual gross revenue.
- c) Depreciation be by fixed installment method.
- d) Investment be exempt from tax.

For Case I, the case where 10% of business profit is paid to the national treasury is taken up for study. In this case, calculation produces IFRR of 10.79%. For Case II, IFRR obtained by calculation is 12.19%. Thus, even in case where part of business profit is paid to the national treasury, IFRR is somewhere around 10%, i.e., higher than long term interest rate on capital of 5-8%. This fact demonstrates that optimum investment plan, even if operated by self-supporting business entity, breaks even by a broad margin.

Table 8-18 IFRR for Government Use

Case I (Paymnt to National Treasury: 10% of Profit)			Case II (Payment to National Treasury: 0)		
	Project Unit	IERR		Project Unit	IERR
1	Anuradapura	5.11	1	Anuradapura	6.35
2	Ampara	0.19	2	Ampara	1.39
3	Avissawella	8.43	3	Avissawella	9.89
4	Badulla	10.47	4	Badulla	11.93
5	Batticaloa	4.32	5	Batticaloa	5.49
6	Bandarawela	8.23	6	Bandarawela	9.47
7	Colombo	13.33	7	Colombo	14.91
8	Chillaw	5.39	8	Chillaw	6.52
9	Galle	8.27	9	Galle	9.48
10	Gampaha	11.5	10	Gampaha	13.2
11	Hambantota	8.86	11	Hambantota	10.27
12	Hatton	5.34	12	Hatton	6.37
13	Jaffna	14.61	13	Jaffna	16.45
14	Kalmunai	4.44	14	Kalmunai	5.58
15	Kandy	12.92	15	Kandy	14.75
16	Kurunegala	9.32	16	Kurunegala	10.69
17	Kulutara	4.07	17	Kulutara	5.04
18	Kegalle	12.92	18	Kegalle	14.75
19	Mannar	0.08	19	Mannar	1.17
20	Matale	2.94	20	Matale	3.92
21	Matara	4.87	21	Matara	5.88
22	Nawalapitiya	3.19	22	Nawalapitiya	4.3
23	Negombo	4.72	23	Negombo	5.74
24	Nuwara Eliya	3.88	24	Nuwara Eliya	5.02
25	Polonnaruwa	2.52	25	Polonnaruwa	3.69
26	Panadura	9.74	26	Panadura	11.26
27	Puttalam	.35	27	Puttalam	1.45
28	Ratnapura	8.78	28	Ratnapura	9.92
30	Vavuniya	3.48	30	Vavunia	4.36
	Total	10.79		Total	12.19

6.4 IFRR of Investment by Private Enterprise

In case where investment is made by private enterprise, maximum profit raising is the ultimate objective. Even in this case, investment by optimum investment plan based on economic analysis is required from the national viewpoint. For calculation of IERR whereby to know earning power of the enterprise concerned, the under-mentioned four conditions are established.

- a) Investment cost be wholly procured from fund on hand
- b) Working fund be 30% of annual gross revenue
- c) Depreciation be by fixed installment method
- d) Tax on investment be paid as business tax to the government

In case where 4% of gross revenue is paid as business tax, IFRR stands at 10.92% as in Table 8-19. When tax paid is 7% of gross revenue, IFRR decreases to 9.94%. This fact shows that even in the event the enterprise concerned borrows fund at interest rate of 6.5%, which is the average long term interest rate in real terms, i.e., after price rise subtraction, profit by about 3% can still be expected. Thus, for private enterprises also, telecommunications investment is certainly profit raising business.

Table 8-19 IFRR for Private Enterprise Use

A Business Tax: 4% of Gross Revenue			B Business Tax: 7% of Gross Revenue		
Project Unit		IERR	Project Unit		IERR
1	Anuradapura	4.78	1	Anuradapura	3.6
2	Ampara	.16	2	Ampara	Negative
3	Avissawella	8.76	3	Avissawella	7.88
4	Badulla	10.83	4	Badulla	9.97
5	Batticaloa	4.65	5	Batticaloa	3.99
6	Bandarawela	8.34	6	Bandarawela	7.47
7	Colombo	13.34	7	Colombo	12.16
8	Chillaw	5.82	8	Chillaw	5.27
9	Galle	8.44	9	Galle	7.63
10	Gampaha	12.2	10	Gampaha	11.43
11	Hambantota	8.65	11	Hambantota	7.45
12	Hatton	5.64	12	Hatton	5.06
13	Jaffna	15.27	13	Jaffna	14.35
14	Kalmunai	4.65	14	Kalmunai	3.92
15	Kandy	13.32	15	Kandy	12.24
16	Kurunegala	9.43	16	Kurunegala	8.46
17	Kulutara	3.89	17	Kulutara	2.99
18	Kegalle	13.48	18	Kegalle	12.51
19	Mannar	.33	19	Mannar	Negative
20	Matale	2.84	20	Matale	2.01
21	Matara	5.09	21	Matara	4.47
22	Nawalapitiya	3.54	22	Nawalapitiya	2.94
23	Negombo	4.59	23	Negombo	3.72
24	Nuwara Eliya	3.86	24	Nuwara Eliya	2.97
25	Polonnaruwa	2.79	25	Polonnaruwa	2.08
26	Panadura	10.34	26	Panadura	9.62
27	Puttalam	.63	27	Puttalam	Negative
28	Ratnapura	8.54	28	Ratnapura	7.47
29	Tiencomalle	Negative	29	Tiencomalle	Negative
30	Vavuniya	3.53	30	Vavuniya	2.87
Total		10.92	Total		9.94

7. ORGANIZATION & MANAGEMENT PLAN

7.1 Investment Amounts by Years

By the foregoing economic analysis, the required scale of investment has been determined. In view of such investment being well over the break-even point, its feasibility is manifest. This fact signifies that when investment is made by that scale, maintenance cost, as well as operation/management cost, can be covered by revenue that accrues. Phase by phase investment breakdown is in Table 8-20. (For exchange by exchange investment breakdown, refer to Table 8-17.)

Table 8-20 Investments by Phases

(in thousand Rupees)

	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year
Phase I	599,268	1,116,976	1,109,875	1,069,748	889,741	4,786,000
Phase II	1,727,577	1,651,880	1,641,880	1,641,880	1,711,327	8,365,000
Phase III	2,925,094	2,961,700	2,961,700	2,961,700	2,818,329	14,629,000

7.2 Implementation Methodology

For execution entities for investment in telecommunications sector, the undermentioned three are conceivable.

- a) National organization (SLTD)
- b) Self-supporting business entity
(public corporation)
- c) Private enterprise

7.3 Investment Execution by National Organization

The foregoing financial analysis is an analysis of long term investment plan covering newly planned telecommunications projects. At present, SLTD provides telecommunications services, operating existing facilities which include 73,425 telephones. SLTD holds on-going projects also. For all these, in-depth analysis concerning fund raising and revenue programs is necessary.

Essential for such analysis are profit and loss statement that presents operating revenues and operating expenses from/to existing facilities, balance sheet that presents fixed assets, current assets, capital and liabilities, and fund statement that presents internal fund raising, external borrowings, capital investment and debt repayment. At the present stage, balance sheet data are especially incomplete.

According to 1983 records, total operating revenues amount to 531,472,000 Rupees and total operating expenses to 348,346,000 Rupees. Gross profit after subtraction of interest payable totaling 80,163,000 Rupees amounts to 102,963,000 Rupees. However, SLTD is not an independent business entity so that all its revenues are delivered to national treasury. Revenue record for the first seven months of 1984 is in Table 8-21. Optimum investment plan prepared, this time, is on paying basis as already stated.

Table 8-21 1984 Revenue Collection of Billing Centers (Except Colombo)

Name of Billing Centers	January	February	March	April	May	June	July	Grand Total
1 Amparai	326,863.30	167,744.90	234,466.85	297,400.756	213,659.70	266,615.12	292,116.65	
2 Avisawella	374,808.52	43,167.30	5,305.90	103,052.56	5,849.50	43,844.81	48,338.80	
3 Bandarawela	190,551.67	284,275.53	210,470.68	124,122.88	129,452.16	100,978.68	69,863.90	
4 Batticaloa	1,026,938.00	706,640.69	909,787.33	578,317.28	758,436.56	886,091.75	767,814.69	
5 Chillaw	152,755.75	153,473.03	102,378.83	142,308.63	62,900.73	148,689.56	25,528.64	
6 Galle	12,044,399.41	9,314,799.77	15,588,891.14	7,336,105.06	13,914,609.99	11,077,156.05	1,319,043.03	
7 Gampaha	549,896.89	232,660.84	561,928.49	224,130.06	196,270.61	162,270.58	217,640.80	
8 Hatton	304,626.27	549,027.75	532,231.44	415,223.96	374,734.76	437,281.10	296,676.35	
9 Jaffna	2,422,202.28	1,742,329.62	2,532,458.23	2,036,399.71	1,840,781.34	2,260,881.87	2,131,163.12	
10 Kalmunai	495,691.75	196,954.19	278,207.60	340,736.29	3,207.89	1,495,371.71	397,686.14	
11 Mannar	127,042.75	587,490.17	64,803.30	55,184.80	40,655.50	100,465.70	98,778.95	
12 Matale	450,759.19	563,414.19	432,218.90	112,995.06	73,375.34	264,412.88	410,432.79	
13 Nawalapitiya	357,798.33	345,278.85	560,726.24	121,712.90	723,934.06	592,992.36	254,364.05	
14 Negombo	796,070.08	803,238.85	1,601,830.82	1,588,339.65	648,312.46	512,919.62	721,977.90	
15 Panadura	246,198.96	327,790.15	312,784.751	209,768.81	223,573.47	262,223.37	265,186.59	
16 Polonnaruwa	286,844.45	227,673.45	312,052.21	167,401.90	207,537.30	260,004.65	292,635.20	
17 Ratnapura	635,914.21	505,283.95	395,413.41	339,409.16	441,821.35	319,839.93	222,849.05	
18 Vavuniya	127,536.20	64,159.70	241,102.00	71,351.52	116,600.15	144,673.80	456,063.11	
19 Trincomalee	1,046,514.67	471,195.65	616,756.11	381,043.55	450,690.20	703,881.27	518,290.50	
20 Badulla	379,752.00	465,752.00	434,265.31	453,401.94	434,950.94	554,988.60	470,784.25	
21 habantota	181,645.30	129,462.83	111,171.19	124,449.36	120,586.65	337,393.48	208,317.73	
22 Kalutara	592,559.10	446,706.65	898,312.74	495,680.93	608,168.05	538,737.05	557,150.48	
23 Kandy	1,772,348.40	1,637,213.48	1,945,047.23	7,594,127.24	2,378,169.81	2,269,167.11	2,603,466.37	
24 Kegalle	71,280.16	165,008.86	141,978.83	103,589.28	8,100.57	34,378.04	76,194.18	
25 Kurunegala	450,214.56	659,694.15	699,328.83	389,040.15	587,356.12	446,075.02	324,756.74	
26 Mataara	474,919.16	1,032,269.73	955,425.42	523,319.86	6,357.49	617,670.63	687,506.77	
27 Nuwara Eliya	302,946.75	476,693.90	427,223.34	295,557.55	41,940.93	344,635.27	367,355.71	
28 Anuradapura	670,077.22	401,228.94	462,807.54	361,300.26	526,955.28	398,514.75	366,492.25	
Total	26,856,155.42	25,700,629.12	31,669,374.66	24,985,471.10	26,668,988.90	25,582,154.76	14,468,574.74	175,934,348.70

7.4 National Fund Distribution to Telecommunications Sector

Fund distribution from national treasury to telecommunications sector is at the rate of slightly less than 3%. The amount distributed in initial year of 1984-1988 public investment plan is 497 million Rupees or 2.4%. The corresponding amount in 1985-1989 plan is 604 million Rupees or 2.7%. Intra-telecommunications sector breakdown is in Table 8-22. A rolling plan, it is subject to annual review.

A summary follows:

	(in million Rupees)				
	1984	1985	1986	1987	1988
1984-88 plan:					
Total public investment	20,959	22,232	21,976	20,477	
Telecommunications sector share	497	700	848	346	
Ratio	2.4%	3.9%	3.9%	1.7%	
1985-89 plan:					
Total public investment		22,419	21,848	17,451	15,267
Telecommunications sector share		604	1,106	463	233
Ratio		2.7%	5.0%	2.6%	1.5%

Table 8-22 Telecommunication Sector Investment (Plan) (Million Rs)

	1985		1986		1987		1988		1989		1985-1989			
	T	FA	T	FA	T	FA	T	FA	T	FA	T	FC	LC	FA
Posts Telecommunication (On going)	604	306	1106	260	463	97	233	50	173	-	2579	1307	1272	713
(1) Rehabilitation Maintenance of Capital assets	13	-	30	-	35	-	40	-	40	-	158	117	41	-
(2) General Development of Telecommunication Services	8	-	18	-	18	-	18	-	18	-	80	51	29	-
(3) (CADS III) Colombo Area Development Scheme III	10	-	5	4	-	-	-	-	-	-	15	11	4	4
(4) (OTS) Overseas Telecommunication Service (Capital contr.)	12	-	15	-	15	-	15	-	20	-	77	77	-	-
(5) (OTS) Overseas Telecommunications Service (Equipment)	20	-	25	-	25	-	25	-	30	-	125	107	18	-
(6) (CADS IV) Colombo Area Development Scheme IV	90	60	226	120	50	45	-	-	-	-	366	215	151	225
(7) (OCADS II) Outer Colombo Development Scheme II	16	-	-	-	-	-	-	-	-	-	16	-	16	-
(8) South East Asia - Middle-East Western Europe Submarine Cable Project (SEA-ME-WE)	50	-	60	-	40	-	50	-	50	-	250	243	7	-
(9) Rural Exchange 1. Kandy 2. Hambantota	3	-	-	-	-	-	-	-	-	-	3	-	3	-
(10) Training Centre	6	6	58	48	80	52	70	50	-	-	214	144	70	156
(11) Telecom. Dev. Project	2	-	69	58	-	-	-	-	-	-	71	57	14	58
(12) Annual Programme Department of Posts	360	240	585	30	185	-	-	-	-	-	1130	270	860	270
Telecommunications (New project)	14	-	15	-	15	-	15	-	15	-	74	15	59	-
(1) Telecommunication Network improvement Greater Colombo area			145	97	549	379	413	297	306	216	1413	989	424	989
Total	604	306	1251	357	1012	476	646	347	479	216	3992	2296	1696	1702

7.5 Fund Restraint

If SLTD as a national organization is to execute Phase I investment, the scale of investment is about twice as large as its present investment scale. To procure necessary fund for financing such large scale investment out of distribution of national public investment to telecommunications sector will be next to impossible. As of 1984, national finance deficit is to the extent of 208 million Rupees. This deficit is considered to remain unabated in 1985-89 plan period. According to World Bank data, debt repayment will reach the peak in 1986 will loan principal repayment to follow suit in 1987. Thus, for national finance, considerable difficulty due to debt repayment will continue for some time to come. As long as national public investment distribution to telecommunications sector remains limited, the sure choice to procure the aforementioned big financial requirement for telecommunications investment is to have the investment executed by self-supporting business entity which is free from national finance restraint.

7.6 Investment Execution by Self-supporting Business Entity

If the contemplated investment is to be executed by public corporation, i.e., self-supporting business entity, the corporation concerned is to manage both the telecommunications services now in operation and the execution of optimum investment plan proposed, this time. In this case, the management of both items on paying basis can be expected, provided

- a) The management be carried out rationally and autonomously;
- and

- b) The corporation be trustworthy to the extent it can attract investment fund from external source.

To satisfy those two preconditions will require preparatory period of several years.

7.7 Investment Execution by Private Enterprise

Countries where telecommunications services are managed and provided by private enterprise are very few. Nevertheless, since recently, the conversion of public corporations into private enterprises is increasing. This is mainly to rationalize and modernize corporate management and, at the same time, to facilitate investment fund procurement. Hence ample possibility for management on paying basis of both the telecommunications services now in operation and the execution of optimum investment plan proposed, this time.

Therefore, telecommunications services management by private enterprise must also be feasible.

7.8 Preconditions

For transfer of telecommunications services management from national organization to self-supporting business entity or private enterprise, the undermentioned items are prerequisite.

- (1) To establish management/operation method toward self-supporting business entity or private enterprise concerned;
- (2) To make SLTD fund revaluation estimate;

- (3) To carry out consciousness renovation for personnel on SLTD payroll;
- (4) To establish long term government policy toward telecommunications services tariffs.

7.9 National Importance of Telecommunications Project

Telecommunications project effects are manifold, and all of them hold national importance. First to be pointed out is foreign currency acquisition effect. Among others are employment promotion effect, economic revitalization effect, medical service improvement effect, information transmission effect, social security effect, public welfare effect and income growth effect. All these effects can be assessed to some extent by output-input analysis.

However, even without assessment of those indirect or secondary effects, i.e., by means of service charge and consumer's surplus only, the proposed investment plan, this time, is proven to be sufficiently feasible.

Direct effect impact is much more serious than indirect or secondary effect impact. For example, the waiting subscriber list of Kandy Exchange carries the name of an applicant of 25 years ago who has not yet become visible subscriber. To relieve 100% such unsatisfied demand by the year 2000 is the objective, this time.

Waiting subscribers as of 2000 are estimated at a million while the population at that time reaches 19,300,000 according to an estimate in Chapter 3. This means that even if a million telephones are newly supplied, this time, telephone density as of 2000 is not

more than 5.6 telephones/100 inhabitants. This rate, compared with average 44.5% in developed countries, still remains considerably low. Hence the necessity for positive plan to promote telephone diffusion even among latent applicants not appearing in the waiting list, not to mention the listed waiting subscribers.

CHAPTER 9 PROJECT IMPLEMENTATION PLAN



Scene in front of
Bandaragama Exchange

CHAPTER 9 PROJECT IMPLEMENTATION PLAN

1. OVERVIEW

Based on network expansion plans which respectively cover different technology divisions, as studied and formulated in the preceding chapter, several sub-projects are organized and proposed hereunder.

The period of 15 years from 1986 to 2000 is divided into three five-year sectors, i.e., Phase I (1986-1990), Phase II (1991-1995) and Phase III (1996-2000). Especially for Phase I, recommendation is made for execution of short term work items according to order of priority in annual national telecommunication policy plans. For Phase II and Phase III, plans to meet demand growth in their respective five-year periods are proposed.

2. PHASE I (1986-1990)

2.1 Greater Colombo Telecommunication Network Improvement Project II

2.1.1 Background

Telecommunication network improvement plan in Greater Colombo Area consists of additional switching equipment installation and cable network expansion plan. The former is by CADS I-IV. The latter is by Greater Colombo Telecommunication Network Improvement Project, aimed at improvement and expansion of inter-office trunk lines of 24 exchanges in Greater Colombo Area and subscriber's cables of seven exchanges.

By the implementation of these projects, the accumulation of subscriber applicants on waiting list, which has become chronic in the central part of Greater Colombo Area, can be put under control and, at the same time, speech quality improvement can be realized.

Out of all 24 exchanges in Greater Colombo Area, 17 exchanges not covered by Greater Colombo Telecommunication Network Improvement Project I for subscriber's cable expansion still remain unable to provide desirable quality service. This is due to subscriber's cable network incompeletion in spite of trunk line and switching equipment expansion.

Service areas of those 17 exchanges embrace residential areas adjoining city quarters. Furthermore, light industry group has begun to appear in the areas. Thus, from the viewpoint of urban development and of economic administration also, the areas have come to assume ever-increasing importance.

Therefore, the improvement of subscriber's cable network of those 17 exchanges is an urgent requirement.

2.1.2 Project outline

This project is for expansion of subscriber's cables of the undermentioned 17 exchanges.

Exchange	Scheduled Expansion Cable Pairs	Existing Cable Pairs
1. ANGODA	700	300
2. HOKANDARA	800	100
3. HOMAGAMA	1,100	200
4. JA-ELA	1,300	400
5. KADAWATA	2,000	200
6. KADUWELA	1,200	100
7. KELANIYA	5,600	600
8. KOTTE	13,200	8,000
9. MAHARAGAMA	5,900	600
10. MALWANA	1,600	-
11. MORATUWA	4,800	1,000
12. PADUKKA	1,000	75
13. PILIYANDALA	1,100	200
14. RAGAMA	800	400
15. WATTALA	3,400	700
16. WELLAMPITIYA	3,400	400
17. KOLLUPITIYA	4,600	-
Total	52,500	13,275

Work method is pursuant to that for Greater Colombo Telecommunication Network Improvement Project I.

Objective area of Greater Colombo Telecommunication Network Improvement Project I and II are represented in Figure 9-1.

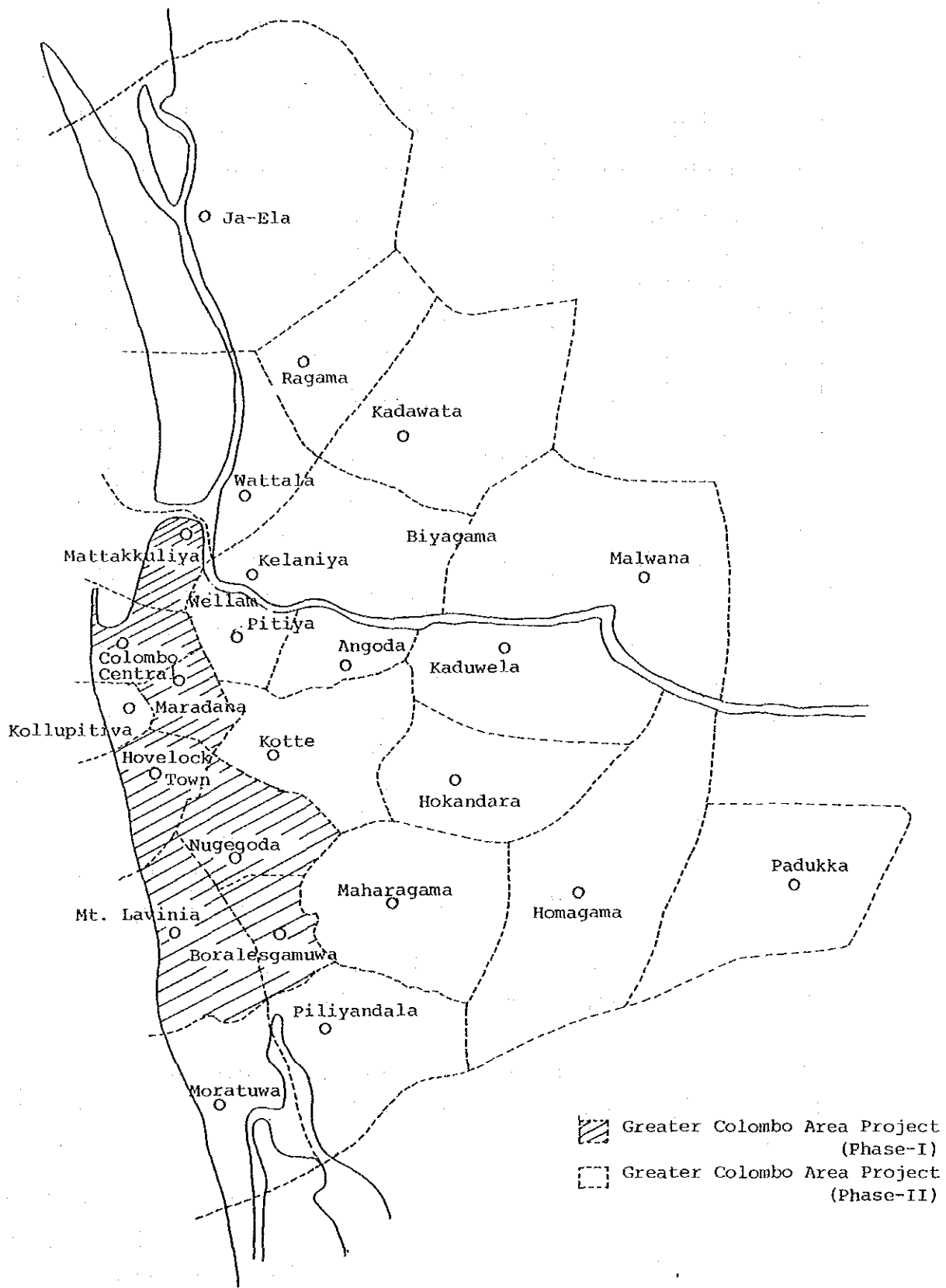


Figure 9-1 Greater Colombo Area

2.2 EOTD Project

(Enhancement of Organization of Telecommunication Department Project)

2.2.1 Outline

(Refer to CHAPTER 6, Section 5, Maintenance/Operation Plan, and Section 6, Auxiliary Facilities Standards.)

For satisfactory fulfillment of large scale telephone line expansion scheme proposed in this long term plan, the first essential is to enhance the organized power of SLTD as a whole, and this is not less important than to procure necessary funds. For this purpose, the existing SLTD organization must be readjusted where necessary so that the work flow can be rationalized, and, at the same time, skilled manpower employment must be promoted, together with staff employee training, from the viewpoint of capability upgrading.

Introduced below are several sub-projects aimed at SLTD organization enhancement. These sub-projects entail equipment and manpower spendings but, unlike telecommunication network improvement and expansion plan, do not result in direct service revenue. Therefore, when seeking fund from foreign government or international financial institution, it is recommended to enlist gratuitous assistance instead of ordinary financial assistance, such as loan.

Also recommended for implementation of those sub-projects is to employ qualified specialists/consultants from the outside of SLTD and, by taking full advantage of their expertise, execute each work item most appropriately and at high efficiency.

2.2.2 Sub-project classification

A. New Employment Sub-Project

General new employment plan is described in CHAPTER 6, paragraph 5, Maintenance/Operation Plan.

During five years from 1986 to 1990, about 570 new employments (annually, 114) are expected. Out of those 570, up to 450 will join the engineering staff. Breakdown by TSCs:

Anuradapura, Kandy, Galle:	About 170
Colombo:	About 400

Newly employed engineers will be assigned to maintenance/operation duty at telephone exchanges, radio repeater stations and other facilities or assume office at Maintenance Center to be established at each TSC or at SLTD Headquarters in Colombo. Those assigned to duty at telephone exchanges will be mobilized to reinforce subscriber's line cutover work staff. By this means, at least 50 work teams with a total of 150 members will be additionally organized to increase cutover work capacity for the whole country from existing 4,000 cases/year to 50,000 cases/year.

B. Work Mechanization Sub-Project

Maintenance/operation work mechanization is to elevate SLTD service efficiency. Main mechanization items follow:

- a. To distribute subscriber's line cutover work vehicles (about 80 for the whole country) and

necessary supplies to each Lineman Center. The purpose is to increase work capacity per team to be 5 days/day.

- b. To distribute outside plant maintenance itine-ration vehicles and special wagon with winch to each TSC. (About 3 vehicles/TSC and 1 wagon/TSC.)
- c. To distribute traffic measuring equipment to all switching centers.
- d. To distribute measuring equipment and tools of all kinds to Maintenance Centers.
- e. Distribute fork lift and crane to each RSC warehouse so as to facilitate warehousing and delivery.

C. Work Standardization Sub-Project

Work standardization is to standardize maintenance/operation work and planning methodology, as well as financial management work. Main work items to be standardized follow:

- a. Maintenance/operation work
 - Maintenance/operation manual making
 - Maintenance/operation standard establishment
 - Statistics and report format making and liaison network establishment

b. Planning work

- Planning work manual making
- Format, notations, etc., standardization

c. Financial/accounting work

- Telephone charge collection and counting-up manual making
- Financial/accounting system establishment
- Financial/accounting report format making

d. Others

- Inventory control manual making
- Records/data achieves standard establishment

D. Computerized Business Management Sub-Project

For statistical, analytical and mathematical processings at high speed, small electronic computer is to be installed where necessary. Work items considered to be rationalized by computer system are:

a. Attended telephone exchanges

(One computer at each telephone exchange subject to attended maintenance)

(i) Maintenance/operation work

- Subscriber records
(Names, directory numbers, addresses, pair numbers, trouble records, etc.)

- Distributing box records
(Usage records for each distributing box)
- Traffic measurement records
- Connection objectives analysis and findings records
(Grade of service by route, holding time, gross originating calls, successful call rate, busy hour concentration rate, etc.)
- Trouble records

(ii) Financial/accounting work

b. Maintenance centers

- Statistical processing of traffic measurement results and connection objectives analysis results reported from each telephone exchange
- Inventory control for maintenance spare parts and consumables

c. SLTD Headquarters

- Safe custody of plant records of all kinds and updating thereof where necessary to keep records up-to-date at all times
- Progress assessment for on-going project
- National maintenance/operation statistics making and necessary updating
- Financial/accounting work mechanization
- Project planning
(Calculation of circuits/equipment required, cost estimation, proforma specifications making)

E. Employee Training Sub-Project

Employee training methods are manifold. They include on-the-job training, classroom lessons at training center, overseas training which equipment suppliers administers, based on contract, and training courses sponsored by foreign organizations concerned. Taken up for study here are classroom lessons at training center.

Training centers are classified into two types. They are:

- a. Colombo Training Center (existing)
- b. Training Center for basic training, to be established at each TSC

Curricula at Colombo Training Center mainly consist of practical studies using equipment specially reserved for trainees, lessons on telecommunication theories by foreign lecturers, and case study exercises including electronic computer manipulation. These trainings are carried out periodically.

Basic Training Center at each TSC provides training on basic subjects, such as general knowledges about telecommunication and its technologies, as well as field worker education concerning standard practices.

Main cost components of this sub-project comprise cost of supplies to be distributed to each training center, plus manpower and materials cost to prepare instructional aids.

F. SLTD Buildings and Supplies Expansion Sub-Project

With the increase of SLTD staff employees and equipment expansion, additional offices and buildings must be established. This, in turn, necessitates replenishment of supplies.

There also arises necessity to procure buildings and supplies for warehouses where to store equipment and materials, as well as lineman centers, maintenance centers and training centers.

2.3 Subscriber's Cable Network Expansion Project for 5 Cities/Towns (OCADS-III, Category-I), Overall Network Expansion Project for 6 Cities/Towns (OCADS-III, Category-II)

2.3.1 Category-I: Subscriber's line network expansion project for 5 cities/towns

(1) Background

Five cities/towns to be covered by the project are as under.

Kalutara
Galle
Negombo
Avisawella
Matale

In these cities/towns, digital network construction by IDA project is in progress. This project is to install digital switching equipment in each city/town and RSU in each peripheral town/village, and

to connect RSUs and switching equipment by digital trunk network.

IDA project contains subscriber's cable network expansion plan for peripheral towns/villages; however, for subscriber's cable network of the above five cities/towns where digital switching key stations are to be established, the existing network is to be used intact, i.e., without expansion.

Nevertheless, in rural cities/towns/villages, telephone demand is growing rapidly whereas the existing subscriber's cable network is time-worn. Hence urgent need for network improvement and expansion in rural cities/towns/villages also, as in Greater Colombo Telecommunication Network Improvement Project II.

(2) Outline

Subscriber's cable network improvement and expansion are planned as under.

	<u>Scheduled Expansion Cable Pairs</u>
Kalutara	1,900
Galle	7,000
Negombo	5,100
Avissawella	1,200
Matale	1,900

2.3.2 Category-II: Overall Telecommunication Network Expansion

(1) Background

This project is for overall telecommunication network expansion for rural cities not covered by OCADS-II and IDA projects, where the number of waiting subscribers broadly exceeds the number of telephones installed and where the existing analog network may be forced to remain as it is in spite of fast progressing digitalization in the surrounding areas, thus posing impediment to technical advancement of telecommunication network in the future. Selected for coverage by this project are the undermentioned rural cities and environs.

Chillaw
Gampaha
Nawalapitiya
Hatton
Panadura
Matara

In the six rural cities named above and adjoining towns/villages, telecommunication service is by crossbar switches installed in 1970-71 or by step-by-step switches already past their useful life. At exchanges in those rural areas, the number of waiting subscribers by far exceeds the capacity of installed facilities. Especially in towns/villages, STD service is not available.

Networks in major cities of Sri Lanka, as well as main transmission systems, have already been digitalized by IDA project. Nevertheless, in other cities including the aforementioned eight, analog

systems remain as they are. Especially the six cities out of the eight excluding Mannar and Vavuniya assume key locations in the nationwide telecommunication network so that the delay in digitalization of exchanges in those cities exerts serious influence on the whole network performance.

(2) Outline

1) Switching equipment and RSU
(including power supply system)

Gampaha

Digital key station	2,400	line units	
RSU (4 units)	1,488	"	"
XB switches to be transferred from elsewhere	150	"	"

Hatton

Digital key station	1,300	"	"
RSU (6 units)	1,008	"	"

Matara

Digital key station	2,000	line units	
RSU (10 units)	2,352	"	"

Nawalapitiya

Digital key station	800	"	"
RSU (3 units)	576	"	"

Panadura

Digital key station	3,000	"	"
RSU (1 unit)	672	"	"

Chillaw

Digital key station	1,000	"	"
RSU (4 units)	672	"	"
XB switches to be transferred from elsewhere	1,000	"	"

2) Outside plant

Gampaha

Expansion by 3,700 cable pairs
(Existing: 1,835 cable pairs)

Hatton

Expansion by 2,300 cable pairs
(Existing: 979 cable pairs)

Matara

Expansion by 4,100 cable pairs
(Existing: 2,930 cable pairs)

Nawalapitiya

Expansion by 1,300 cable pairs
(Existing: 712 cable pairs)

Panadura

Expansion by 2,800 cable pairs
(Existing: 1,600 cable pairs)

Chillaw

Expansion by 1,500 cable pairs
(Existing: 525 cable pairs)

3) Transmission/radio facilities

Gampaha

System	No. of 2 Mbit/s System	
	Trunk	Junction
Radio & MUX	1	1
Cable PCM	-	4+3

Hutton

System	No. of 2 Mbit/s System	
	Trunk	Junction
Radio & MUX	9	-
Cable PCM	9+1	6+6

Matara

System	No. of 2 Mbit/s System	
	Trunk	Junction
Radio & MUX	18	4
Cable PCM	-	12+10

Nawalapitiya

System	No. of 2 Mbit/s System	
	Trunk	Junction
Radio & MUX	8	-
Cable PCM	8+1	3+3

Panadura

System	No. of 2 Mbit/s System	
	Trunk	Junction
Radio & MUX	5	-
Cable PCM	-	3+1

Chillaw

System	No. of 2 Mbit/s System	
	Trunk	Junction
Optical fiber	8	-
Radio & MUX	8	12
Cable PCM	-	8+7

2.4 Demand Fulfillment Project

In Sri Lanka, as of the end of 1983, waiting subscribers number 35,000 or about 30% of national subscriber demand totaling 110,000. This fulfilled demand ratio holds true in almost all areas of the country. Therefore, demand fulfillment project must be developed on nation-wide scale. However, in Phase I, demand fulfillment is to be executed on priority basis, i.e., beginning with areas where the unfulfilled demand situation requires immediate solution in view of their greater importance than other areas.

2.4.1 Working details

o Kandy area

In Kandy area, digitalization has been partly achieved by IDA project. Rihillagaskada is the sole

place where the step-by-step system remains unremedied. To cope with this situation, crossbar switches are to be transferred from Nawalapitiya to realize automatic switching in Rihillagaskada. More precisely,

- Switching equipment expansion
Grossbar switches, 360 line units
- Subscriber's cable expansion
200 cable pairs

o Other areas

Expansion work is to meet with demand in each year. Especially important is the expansion work for Colombo and Kandy municipalities where rapid demand growth is expected annually. Expansion work details by years follow:

o 1998

- Switching equipment expansion
6 exchanges 51,798 line units
- Subscriber's cable expansion
4 locations 48,300 cable pairs

o 1989

- Switching equipment expansion
12 exchanges 43,408 line units
- Subscriber's cable expansion
11 locations 36,800 cable pairs

o 1990

- Switching equipment expansion

8 exchanges 33,296 line units

- Subscriber's cable expansion

7 locations 28,300 cable pairs

2.5 Public Pay Telephone Expansion Project

Based on demand forecast for public pay telephone service, about 3,500 public pay telephones are to be additionally installed by 1990. (Out of 3,500 new public pay telephones, about 2,500 will be in Greater Colombo Area.)

Public pay telephones to be additionally installed comprise outdoor type and indoor type. The latter is to be installed at hotels; railway stations, merchant houses, hospitals and so forth.

Public telephone expansion is not to be executed independently. The execution is to keep abreast of other projects described in the foregoing.

2.6 TELEX Network Expansion Project

To improve and expand TELEX service, existing TELEX switches (NEDIX-510A) will be additionally installed.

- TELEX switches expansion 4,000 line units

- TELEX subscriber terminals expansion 4,400 units
(10% for spares)

3. PHASE II (1991-1995)

3.1 Overview

Phase II is for general telecommunication service expansion since necessary service foundation is laid down in Phase I. After 1990, telecommunication services will no longer be limited to conventional telephone, TELEX and telegram services. Demand for new services, such as data transmission, as well as facsimile and video services, will emerge, causing SLTD operations to become diversified.

From the viewpoint of availability of all kinds of services, full digital network construction is indispensable. In this sense, Phase II and Phase III projects assume utmost importance.

3.2 Facilities Expansion Plan

3.2.1 Switching equipment expansion

For the whole country, switching equipment will be expanded by 279,818 line units. Out of this total, 177,800 line units will be in Greater Colombo Area.

Digitalization objective for the whole of Sri Lanka as of the end of 1995 is 99%, excluding subscriber's cable network digitalization.

3.2.2 Subscriber's cable network expansion

During Phase II five years, 359,500 subscriber's lines will be additionally installed.

3.2.3 Transmission/radio network expansion

For the whole country 247 systems of 2 Mbit/s Trunk Line, 741+25 systems (669 will be in Greater Colombo Area) of PCM Junction system and 29 systems of Radio system will be expanded.

4. PHASE III (1996-2000)

4.1 Overview

Phase III is assumed to be the period wherein telecommunication services will achieve further development. Project implementation must be managed that the final objective of this long term plan will be fully attained in the year 2000. In concrete terms,

- (1) 100% telephone demand (5.6 telephones/100 inhabitants) fulfillment
- (2) 100% digitalization attainment (except for subscriber's line network)
- (3) Completion of network whereby to introduce new services in true sense
- (4) Elimination of service gap in quantity and quality between urban and rural areas

4.2 Facilities Expansion Plan

4.2.1 Switching equipment expansion

For the whole country, switching equipment will be expanded by 497,748 line units. Out of this total, 310,200 line unit will be in Greater Colombo Area.

Digitalization objective for the whole of Sri Lanka as of the end of 2000 is 100% excluding subscriber's cable network digitalization.

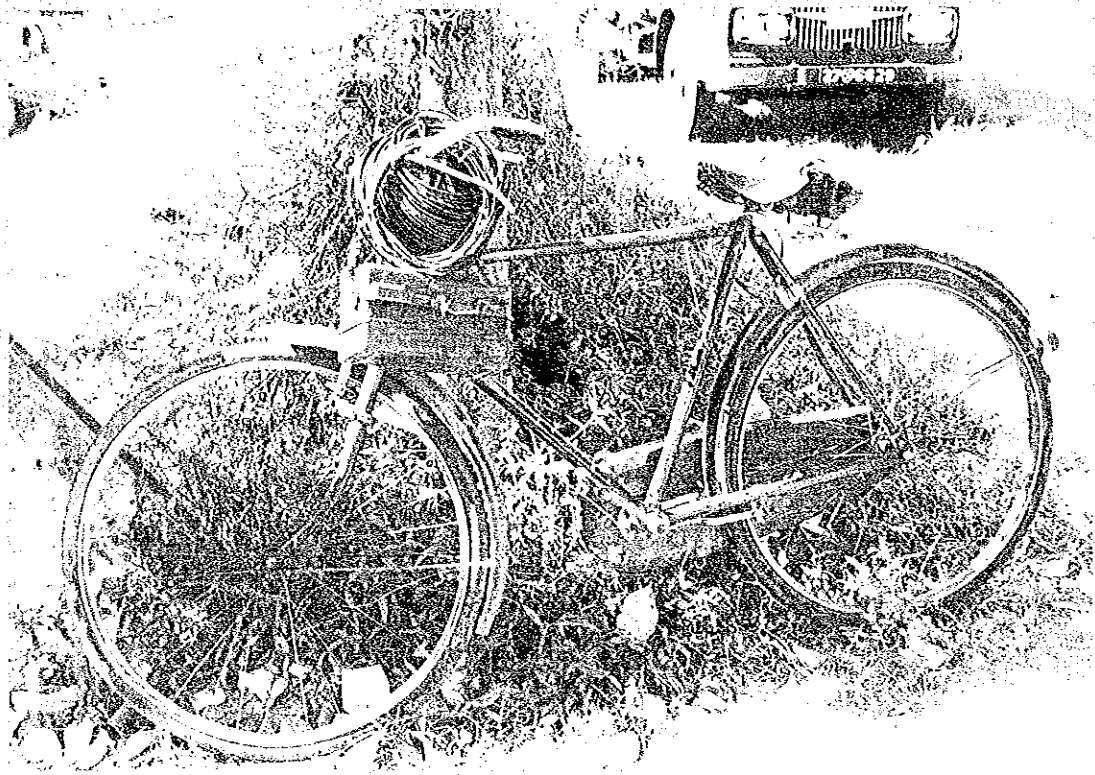
4.2.2 Subscriber's cable network expansion

During Phase III five years, 649,700 subscriber's lines will be additionally installed.

4.2.3 Transmission/radio network expansion

For the whole country 395 systems of 2 Mbit/s Trunk Line, 1,338+19 systems (1,203 will be in Greater Colombo Area) of PCM Junction system and 29 systems of Radio system will be expanded.

CHAPTER 10 RECOMMENDATIONS



Bicycle is useful for
dropwire installation work

CHAPTER 10 RECOMMENDATIONS

1. PHASE I IMPLEMENTATION

In this long term project up to the year 2000, Phase I (1986 - 1990) five years assume utmost importance as

- 1) Fundamental facilities expansion period to attain the year 2000 objectives;
- 2) Initial period for quantitative network expansion.

Therefore, work execution in this period requires supreme circumspection to do without basic fallacy. This chapter presents matters that demand special attention in Phase I implementation and recommends steps to be taken to deal with such matters as required.

1.1 Infallible Implementation Arrangement

Firmly established SLTD organization that functions at high efficiency is indispensable for successful Phase I implementation. (Refer to Chapter 6: Maintenance and Operation Plan.) Since the project, this time, is planned, beginning with 1986, steps for qualitative improvement of SLTD organization must be initiated at the present juncture.

1.2 Implementation Management System

As in Chapter 6, to improve operational efficiency of SLTD, productivity (number of telephones installed/ number of staff employees) must be elevated. This, in effect, is to keep unchanged the existing number of staff employees, i.e., about 10,000, until 1990.

Phase I implementation covers all telephone exchanges in Sri Lanka. Therefore, implementation planning must be keynoted by area equilibrium, and, for implementation in engineering divisions, such as switching equipment installation, as well as line network and radio/transmission network construction, satisfactory management must be practiced. For this purpose, recommendation is made for establishing Project Implementation Headquarters, composed of planning and construction departments, in SLTD Head Office. Also recommended for in-depth management of individual work executions is to make effective use of richly experienced foreign consultants.

1.3 Careful Arrangements with Related Organizations

Work execution exerts no small influence on social life of general citizenry. Among such work items are road excavation and big-sized equipment transport on public roads. For responsibility distribution with organizations concerned for road excavation backfilling and for compensation to noise suffering general citizenry, as well as compensation for damage to water service facilities and other public property, careful arrangements are required. The purpose is to enable work execution to proceed without hitches and with safety.

2. LOCAL PRODUCTION FOR LOCAL PROCUREMENT

2.1 Status Quo

Locally manufactured products which are necessary for work execution and which can be locally procured in Sri Lanka at present are listed below. However, for those products, there are limits to production capacity of manufacturers; furthermore, some of those products are of inferior quality for telecommunications use. Therefore, SLTD must prepare specifications for both materials and final products, and, at the same time, provide technical guidance to manufacturers.

Locally manufactured and procurable products:

- o Manhole and handhole covers (including cover frames)
- o Reinforcing steel bars
- o Pipes (PVC and steel pipes)
- o Cement
- o Concrete poles
- o Temporary work materials (molding boxes for manhole construction, etc.)

2.2 Local Production of Telephones and Accessories

For telecommunications-use materials and products, local production is to be considered, beginning with such items that do not require high technology or multiple production methodology. Recommendation is for telephones and accessories as initial product group for local production.

2.2.1 Required Quantity of Telephone Production

According to demand forecast and demand fulfillment plan contained in this report, annual telephone production quantity in each work phase is as follows:

	1986	1990	1996	2000
Main telephones (in thousand units)	119.3	261.7	553.2	1,080.6
Additional installations (in thousand units)	142.4	291.5	527.4	
Annual additional installations (in thousand units)	28.48	58.3	105.48	
Additional installation of extensions (in thousand units)	39.9	81.6	147.7	
Daily production (in unit)	200	410	740	

In the table above, daily production during Phase I (1986 - 1990) numbers 200 units. For the time being, this daily production mainly depends upon import of parts and components from foreign manufacturers and assembly thereof into complete telephones in Sri Lanka. In Phase II and Phase III, domestic production rate for parts and components is to be increased so that, in the year 2000, almost all kinds of parts and components can be domestically produced and assembled into complete telephones in Sri Lanka. Telephone Manufacturing Company, for its part, can enlist cooperation of foreign manufacturers, or, more precisely, technical guidance including financial assistance, by international tender.

3. ESTABLISHMENT OF LOCAL WORK COMPANY

With a view to improvement of SLTD productivity and operational efficiency, recommendation is made for establishing new privately managed company whose service line covers some of existing SLTD work items.

The purpose is to elevate quality level of, as well as service performance efficiency by, those work items. Work items to be separated from SLTD control and to be transferred to the proposed new company are:

- 1) Drop wire work to subscriber's premise
- 2) Drawing and reproduction service

3.1 Drop Wire Work to Subscriber's Premise

Existing SLTD capacity for drop wire work to subscriber's premises is at extremely low level. Annual work volume throughout the country is not more than 4,000 cases. As proposed in Chapter 6, manpower required for drop wire work to subscriber's premises in this long term plan is to be increased to at least 50 work teams comprising 150 men, and they are mechanized work squads with capacity to be raised to 50,000 cases/year by 1990.

The proposed new company will be staffed with those 150 men and their supervisors. Creation of such new company will contribute to SLTD payroll cutback and service efficiency improvement.

3.1.1 New Company Service Line

The proposed new company is to carry out drop wire work to subscriber's premises in accordance with service

instructions from SLTD. Necessary work materials are supplied by SLTD. Payment for such work materials is made by the new company to SLTD after termination of each work.

The new company is to work for SLTD on contract basis. Service remuneration will be determined, based on unit rate per case, each time contract is concluded.

3.1.2 Organization

The proposed new company is to establish head office in Colombo. Branch offices will be opened in four Secondary Trunk Centers (STCs). Each branch office will provide service in each STC area.

3.1.3 Maneuverability

The proposed new company is to have best possible maneuverability. Each office will be equipped with as many service lorries as necessary, together with a full set of work tools and testers.

3.1.4 Standard Practices

The proposed new company is to consult with SLTD and determine Standard Practices whereby to provide service and ensure uniform quality of work done.

3.1.5 Training

The proposed new company is to administer employee training. The purpose is to familiarize all employees with Standard Practices.

3.1.6 Work Volume Forecast

Provided that project implementation progresses in full accordance with demand fulfillment plan, work volume for the proposed new company can be forecasted as under.

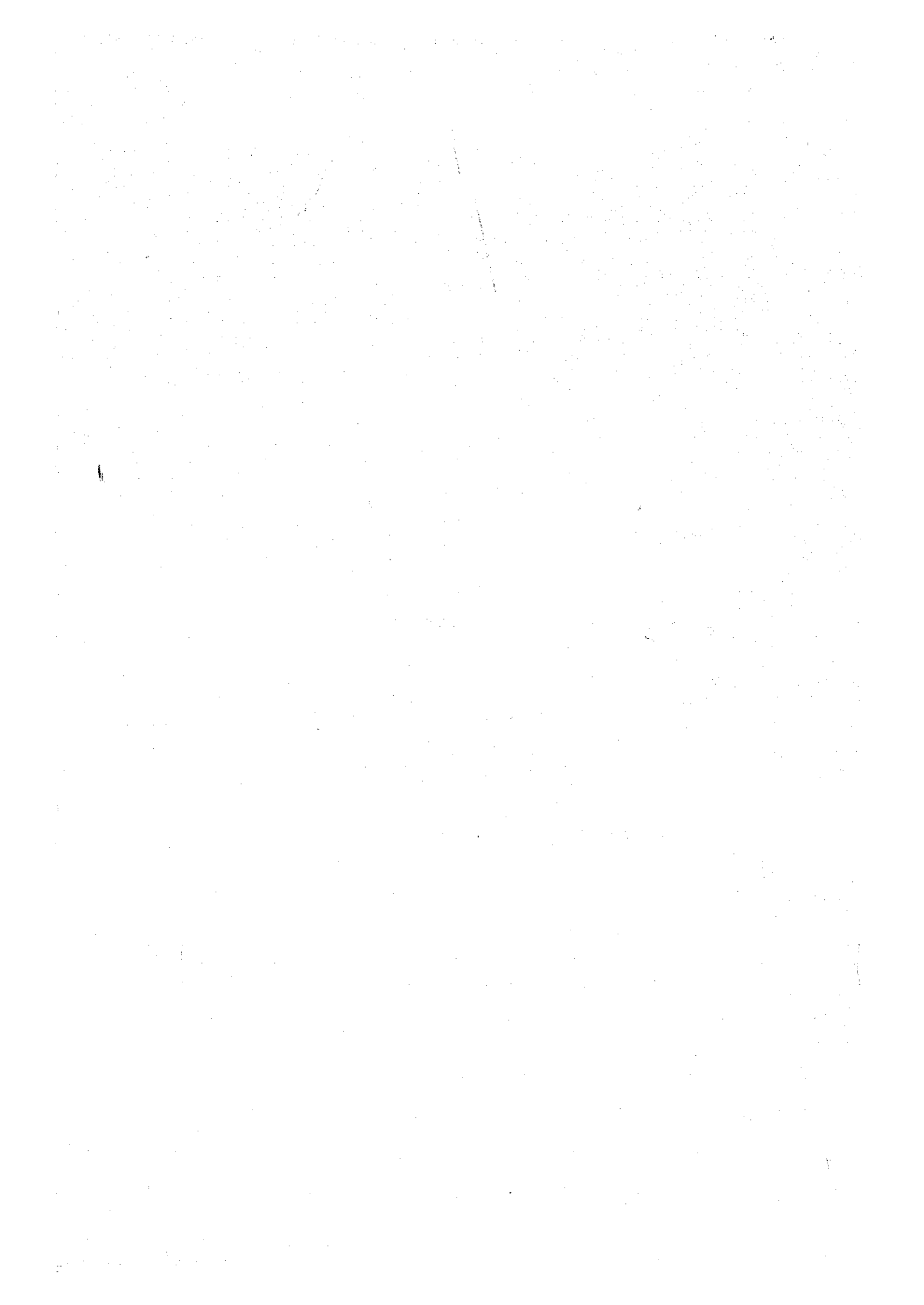
(Unit: 1,000 cases)

	Phase I	Phase II	Phase III
No. of work/year	40	82	148

3.2 Drawing and Reproduction Service

At present, in SLTD, Drawing Section takes care of drawing and reproduction service, as well as safe custody of all drawings produced. For drawing and reproduction service, manpower cost continues to increase annually though advanced technical is seldom required.

Hence the recommendation that drawing and reproduction service be separated from direct SLTD control and transferred to private source. By this means, high service efficiency at lower cost can be realized.



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