

CHAPTER 14

Project Evaluation

CHAPTER 14 PROJECT EVALUATION

14.1 Purpose

The project was evaluated to determine its viability and profitability from financial and economic points of view. The Study Team estimated the costs to carry out the Essential Project and the benefits it will generate. The results of our evaluation can be used by the government for its telecommunications network development plans.

14.2 Procedure

Financial analysis of the Essential Project is based on a cost-benefit analysis using internal rate of return. Since most of the MPTC's revenue and expenditure are settled in US\$, all the revenue and costs concerning the Essential Project were calculated in US\$. The Essential Project was evaluated by the following methods:

- (1) Identifying premises and assumptions in the Essential Project
- (2) Estimating capital expenditure and operation expenditure (cash outflow)
- (3) Estimating operation revenue (cash inflow)
- (4) Creating a cash flow table and calculating a financial internal rate of return (FIRR)
- (5) Performing sensitivity analysis
- (6) Estimating economic benefits and calculating the economic internal rate of return (EIRR)

14.3 Premises and Assumptions

The first step is to identify the premises and assumptions in the Essential Project. Realistic and simple assumptions make an evaluation more reliable and accurate. The basic premises and assumptions of this evaluation are as follows.

(1) Project Life

Project life is assumed to be 20 years. This takes the life of the facilities in each stage of the Essential Project into consideration.

(2) Salvage Value

The salvage value of the facilities having a longer service life than the project duration is entered as a negative cost at the end of the Essential Project. The salvage value of the equipment after the end of its service life is assumed to be nil.

(3) Inflation

The effects of inflation were basically not considered. Although price changes affect the project costs as well as revenues, if all prices increase at the same rate at home and abroad, their relative levels stay the same.

(4) Revenue and Costs Estimation

The present tariff rate (1994) was used to estimate the revenue in the Essential Project. Telephone revenue per main line in the Essential Project is shown in Table 14.4-4. To estimate costs, the study team used the data of actual projects in Cambodia.

14.4 Estimation of the Project Revenue

The project revenues consist of telephone installation fees, basic monthly charges, deposits, local call charges, long call charges and international call charges.

(1) Number of Main Lines from 1991 to 1993

The number of main lines from 1991 to 1993 according to the statistics of MPTC is shown in Table 14.4-1.

Table 14.4-1 Number of Main Lines (1991-1993)

Year	Annual	Increment
1993	7,528 (IDD: 1,835 Non IDD: 993 Cellular: 4,700)	4,570 (IDD: 1,457 Non IDD: -1,237 Cellular: 4,350)
1992	2,958 (IDD: 378 Non IDD: 2,230 Cellular: 350)	585 (IDD: 58 Non IDD: 177 Cellular: 350)
1991	2,373 (IDD: 320 Non IDD: 2,053 Cellular: 0)	—

- Note: (1) The data before 1991 is not valid for the financial evaluation, since there were no IDD main lines before 1991.
 (2) IDD is available with all cellular phones.

(2) Number of New IDD Main Lines

The estimated number of new IDD main lines in the subject areas is shown in Table 14.4-2.

Table 14.4-2 Number of New IDD Main Lines (2000-2010)

Year	Annual	Increment
2000	3,400	3,400
2001	3,400	6,800
2003	3,800	10,600
2004	3,800	14,400
2005	3,000	17,400
2006	3,000	20,400
2008	4,720	25,120
2009	4,720	29,840
2010	-2,080 (4,720 - 6,800)	27,760

Note: The exchange which will be installed in 1999 will be removed because of completion of its life.

(3) MPTC's Annual Telephone Service Revenue from IDD Telephone Subscribers (1991-1993)

The annual telephone service revenue from MPTC's IDD telephone subscribers from 1991 to 1993 is shown in Table 14.4-3.

Table 14.4-3 MPTC's Annual IDD Telephone Service Revenue (1991-1993)

(Unit: US\$1,000)

Year	International service	Long distance service	Local service	Other revenue	Total operating revenue	Revenue per mainline
1993	7,484	3	0	1,829	9,316	5.08
1992	5,215	1	0	47	5,263	13.92
1991	1,302	1	0	15	1,318	4.12

Note: (1) Other revenue; Installation fee, Basic monthly charge, Sales of telephone cards, Deposit and miscellaneous
 (2) Because of UNTAC's having been stationed in Cambodia, the revenue per main line in 1992 was irregularly high.

(4) Revenue per Main Line of the Essential Project

According to the field survey on the situation of telephone use, the average IDD telephone charges per subscriber per month are approximately US\$750 for large scale business use, US\$85 for middle scale business use and US\$35 for small scale business use and residential use. The estimated revenue per IDD main line in the Essential Project is shown in Table 14.4-4.

Table 14.4-4 Estimated Revenue per Main Line in the Essential Project

Commencement year	2000	2003	2005	2008
Rate of large scale business use (%)	2	5	1	3
Rate of middle scale business use (%)	8	15	4	7
Rate of small business & residential use (%)	90	80	95	90
Revenue per IDD main line per year (US\$)	640	939	530	719

14.5 Estimation of the Project Costs

In general, the project costs consist of investment cost (which include construction and procurement costs, consulting fees, etc.), operation and maintenance costs, working capital and taxes.

(1) Investment Costs

Investment costs examined and estimated in Chapter 13 include the price of facilities, equipment, land and buildings, vehicles, construction and installation fees, and consultant fees.

(2) Operation and Maintenance Costs

Expenses examined in Chapter 11 for the operation and maintenance of telecommunications network consist of personnel costs, administration costs, and repair costs. The MPTC's annual operation and maintenance costs of IDD telephone service from 1991 to 1993 are shown in Table 14.5-1.

Table 14.5-1 MPTC's Annual Operation and Maintenance Costs of IDD Telephone Service (1991-1993)

(Unit: US\$1,000)

Year	Payment to OTCI	Personnel	Utilities	Others	Total	Cost per mainline
1993	1,423	219	58	307	2,007	1.09
1992	783	21	5	23	832	2.54
1991	873	11	4	11	899	2.81

(3) Estimated Operation and Maintenance Costs of Telephone Service in the Essential Project

The estimated operation and maintenance costs of telephone service are shown in Table 14.5-2.

Table 14.5-2 Estimated Operation and Maintenance Costs of Telephone Service in the Essential Project

(Unit: US\$)

Year	Payment to OTCI	Personnel	Utilities	Others	Total
2000	242,760	125,000	364,112	246,730	978,602
2001	485,520	232,000	327,159	94,597	1,139,276
2002	485,520	242,000	1,368,367	85,849	2,181,736
2003	1,046,571	341,000	1,094,183	134,097	2,615,851
2004	1,607,622	421,000	1,347,045	252,239	3,627,906
2005	1,737,672	480,000	1,124,337	191,949	3,533,958
2006	1,867,722	534,000	1,398,521	234,349	4,034,592
2007	1,867,722	553,000	1,245,536	266,049	3,932,307
2008	2,299,814	623,000	1,469,252	299,749	4,691,815
2009	2,731,907	708,000	1,248,718	557,990	5,246,615
2010	2,678,479	634,000	1,505,690	350,117	5,168,286
2011	2,678,479	672,000	1,218,564	363,629	4,932,672
2012	2,678,479	709,000	1,478,620	427,777	5,293,876
2013	1,556,377	338,000	1,150,718	423,219	3,468,314
2014	1,556,377	355,000	1,437,844	329,129	3,678,350
2015	1,296,277	282,000	864,660	266,029	2,708,966
2016	1,296,277	295,000	931,848	266,029	2,789,154
2017	1,296,277	308,000	848,456	284,029	2,736,762

14.6 Working Capital

Working capital can be recovered within a short time through business activities. It includes current deposits as cash on hand, and accounts receivable as funds necessary until call charges are collected. Although working capital is counted as an annual expense, it should be recovered during the last year of the project life.

In this analysis, working capital is estimated by the following equation.

$$K_i = E_i - E_{i-1}$$

where

K_i = Working capital of the year of i

E_i = Operating and maintenance cost of the year of i

14.7 Taxes

Since MPTC belongs to the government of Cambodia, MPTC does not pay taxes.

14.8 Result of Financial Analysis

The objective of the financial analysis is to evaluate the financial viability of the project. This study applies the criteria of internal rate of return to evaluate the profitability of the project. The financial internal rate of return (FIRR) is the discount rate that makes the total present value of annual expenditure equal to the total present value of annual revenue.

Table 14.8-1 is a revenue and expenditure statement summarizing the operating revenue, operating expenditure and capital costs of the project over its total life-span.

The project will have an internal rate of return of 12.91%.

Table 14.8-1 Cash Flow Table for the Calculation of FIRR of the Essential Project

Year	Revenue per main line	Number of Subscribers		Subscription fee * Note2	Telephone revenue	Total revenue [A]	Investment (Telecom)	Investment (Others)	Operation & Maintenance Cost	Working capital	Total expanse [B]	Net inflow [A] - [B]
		(New)	(Cumulative) * Note1									
1998							8,379,147				8,379,147	-8,379,147
1999							8,332,375	18,025,990			26,358,365	-26,358,365
2000	640	3,400	3,400	880,000	2,176,000	3,056,000			978,602	978,602	1,957,204	1,098,796
2001	640	3,400	6,800	1,360,000	4,352,000	5,712,000			1,139,276	160,674	1,299,950	4,412,050
2002			6,800		4,352,000	4,352,000	11,245,137		2,181,736	1,042,460	14,469,333	-10,117,333
2003	939	3,800	10,600	1,520,000	7,920,200	9,440,200			2,615,851	434,115	3,049,966	6,390,234
2004	939	3,800	14,400	1,520,000	11,488,400	13,008,400	8,977,703		3,627,906	1,012,055	13,617,664	-609,264
2005	530	3,000	17,400	1,200,000	13,078,400	14,278,400			3,533,958	-93,948	3,440,010	10,838,390
2006	530	3,000	20,400	1,200,000	14,668,400	15,868,400	10,538		4,034,592	500,634	4,545,764	11,322,636
2007			20,400		14,668,400	14,668,400	20,277,350		3,932,307	-102,285	24,107,372	-9,438,972
2008	719	4,720	25,120	1,888,000	18,062,080	19,950,080			4,691,815	759,508	5,451,323	14,498,757
2009	719	4,720	29,840	1,888,000	21,455,760	23,343,760			5,246,615	554,800	5,801,415	17,542,345
2010	719	4,720 a)	27,760	1,888,000	20,497,440	22,385,440			5,168,286	-78,329	5,089,957	17,295,483
2011			27,760		20,497,440	20,497,440			4,932,672	-235,614	4,697,058	15,800,382
2012			27,760		20,497,440	20,497,440			5,293,876	361,204	5,655,080	14,842,360
2013			20,160		13,361,040	13,361,040			3,468,314	-1,825,562	1,642,752	11,718,288
2014			20,160		13,361,040	13,361,040			3,678,350	210,036	3,888,386	9,472,654
2015			14,160		10,181,040	10,181,040			2,708,966	-969,384	1,739,582	8,441,458
2016			14,160		10,181,040	10,181,040			2,789,154	80,188	2,869,342	7,311,698
2017			14,160		10,181,040	10,181,040			2,736,762	-2,789,154	-52,392	10,233,432

Note1 : a) The exchange which will be installed in 1999 will be removed in 2010 because of completion of its life.
 b) The exchange which will be installed in 2002 will be removed in 2013 because of completion of its life.
 c) The exchange which will be installed in 2004 will be removed in 2015 because of completion of its life.

Note2: US\$400 per subscriber fixed

IRR = 12.91%

14.9 Sensitivity Analysis

In order to see the effect of the variation of the conditions surrounding the project, a sensitivity analysis was done by changing the value of the parameters. The following factors were selected as the parameters in the sensitivity analysis.

(1) Telephone Revenues

The following two cases were studied.

- (a) Case where the telephone revenues increase 2% every year
- (b) Case where the telephone revenues increase 5% every year

(2) Operating and Maintenance Costs

The following two cases were studied.

- (a) Case where the operation and maintenance costs increase 2% every year
- (b) Case where the operation and maintenance costs increase 5% every year

The results of the sensitivity analysis are shown in Table 14.9-1.

Table 14.9-1 Results of Sensitivity Analysis (FIRR)

Case	FIRR
The telephone revenues increase 2% every year	13.34%
The telephone revenues increase 5% every year	13.96%
The operation and maintenance costs increase 2% every year	12.78%
The operation and maintenance costs increase 5% every year	12.57%

14.10 Economic Evaluation

In this section, the benefits and costs are evaluated from an economic point of view. So far most of the explanations concerning the economic benefits derived from the use of telephones have been qualitative because of the difficulty of obtaining a quantitative analysis of the benefits of telephone use. A universal method for quantitative analysis concerning the benefits of telephone use has not been established.

In this section, economic benefits are quantified and the economic internal rate of return (EIRR) is calculated by the following method.

(1) Economic Benefit

In this study, economic benefits are defined as the benefits which belong to the telephone users. The benefit which belongs to the telephone users is the benefit value minus the call charges that the users pay. In other words, economic benefit is the difference between the maximum willingness to pay of the users and the actual payment for the telephone use. This difference is called the "Consumers' surplus" in the field of economics. The following is an explanation of the "Consumers' surplus" with Figure 14.10-1.

Consider the demand curve D in Figure 14.10-1. Points on it show the prices that consumers would be willing to pay for various quantities. A market price is established at OP. Once determined, all buyers pay this uniform price. But in fact it is the price that only the marginal buyer was willing to pay. Other intramarginal purchasers, more eager for the product, would have been willing to pay higher prices, as indicated by points on the demand curve above A. Less eager buyers, whose preferences lead to points below A on the demand curve, do not purchase the product. Yet despite this differential eagerness, they all pay the same price. The difference between what consumers would have been willing to pay and the market price that they actually pay is known as consumer's surplus. In the diagram it is measured by the area of the triangle PAB.

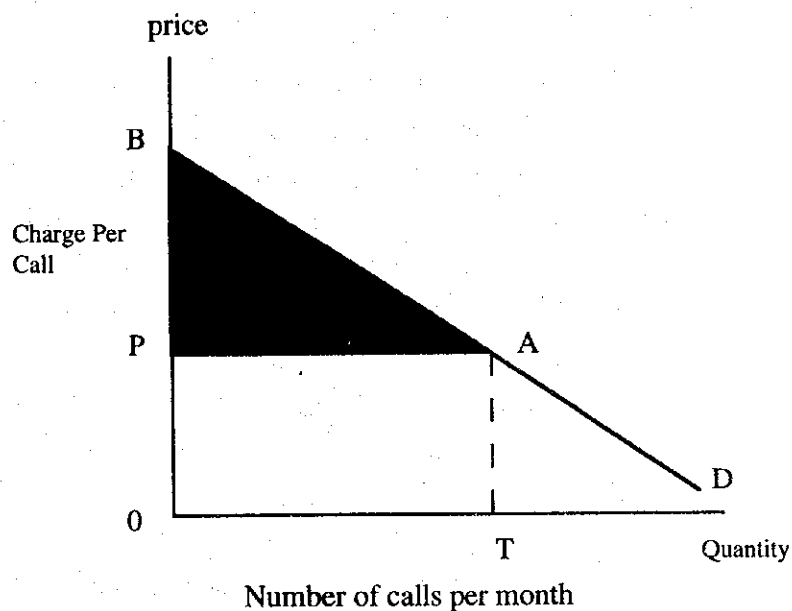


Figure 14.10-1 Consumers' Surplus

(2) Method of Evaluation

The idea of a consumer's surplus is convenient to explain the benefits to the users. In order to quantify the benefits, the benefits have to be grasped concretely. However, it is impossible to measure all of the benefits. Therefore, in general, the consumers' surplus is calculated from the demand function which shows the relationship between the price and the demand.

In this evaluation, based on the questionnaires to the subscribers, the demand function derived from the following steps is used in order to calculate the consumers' surplus.

(a) STEP-1 Data collection

The followings data were collected during the field survey.

- (i) Average call charges per telephone call
- (ii) Average monthly number of calls per subscriber
- (iii) Average monthly income per subscriber

(b) STEP-2 Derivation of the demand function

- (i) The demand function was derived by multiple regression analysis based on the data collected in the field survey.
- (ii) Generally the following equation, called the equation of Cobb-Douglas type function is used for the statistical method. In this analysis, the following equation is used to show the correlation among the data mentioned above.

$$\text{Log}(T) = a + b_1 \text{Log}(X_1) + b_2 \text{Log}(X_2) + \dots + b_n \text{Log}(X_n)$$

where

- T = the amount of calls (explained valuable)
- a = constant
- X_i = explaining valuable of T
- b_i = coefficient of X_i

in this analysis,

- T = Average monthly number of calls per subscriber
- X₁ = Average call charges per call (hereinafter referred to as "P")
- X₂ = Average monthly income per subscriber in the originating areas
(hereinafter referred to as "Y")

(3) Derivation of the Demand Function and Consumers' Surplus

The number of samples which are used in the multiple regression analysis is 221, and the total call charge per month of the 221 subscribers is US\$213,731. From the result of the multiple regression analysis, the following equation was derived.

$$\text{Log}(T) = 1.003 - 0.676 \text{Log}(P) + 0.511 \text{Log}(Y)$$

(3.284)* (-9.140)* (14.527)*

$$R = 0.719$$

The number of samples was 221.

Figures in () are T-value

"*" indicates a significance level of less than 0.5%

where

- T = Average monthly number of calls per subscriber
- P = Average call charges per call
- Y = Average monthly income per subscriber in the originating areas
- R = coefficient of determination

This equation shows the following.

- (a) A one percent increase in call charges per call causes 0.676 percent decrease in the monthly number of calls.
- (b) A one percent increase in the monthly income per subscriber causes 0.511 percent increase in the monthly number calls.
- (c) Consumers' surplus

The following equations are derived from above equation.

$$\text{Log}(P) = \frac{1.003}{0.676} - \frac{1}{0.324} \text{Log}(T) + \frac{0.511}{0.676} \text{Log}(Y)$$

or

$$P = e^{(1.003/0.676)} \times T^{(-1/0.676)} \times Y^{(0.511/0.676)} \quad (1)$$

By substituting the average value of T and Y of each subscriber in the above equation, the demand curves for each subscriber were obtained. Then, by calculating the amount of the triangle area between the demand curve and horizontal line which is drawn at the level of the actual payment for the charge of telephone use, the consumer's surplus for the 221 subscribers was obtained as US\$292,441.

Therefore, the amount of benefits which belongs to the consumers was US\$506,172 and it was estimated at 2.37 times as large as the call charge. (506,172 divided by 213,731 is 2.37.) In other words, the consumers' surplus is 1.37 times as large as the call charge because 2.37 minus 1 is equal to 1.37.

14.11 Result of Economic Analysis

The economic internal rate of return (EIRR) is calculated using the following procedure.

- (1) Identifying Premises and Assumptions
- (2) Estimating the Benefits
- (3) Estimating the Costs
- (4) Creating the Cash Flow Table
- (5) Calculating the EIRR (Economic Internal Rate of Return)

- (1) Identifying Premises and Assumptions

The identifying premises and assumptions are the same as that of the financial analysis.

Shadow price adjustment is not applied to this evaluation because of the following reasons.

- (a) Exchange rate

Since most of the MPTC's revenue and expenditure are settled in US\$, all the revenue and costs concerning the Essential Project were calculated in US\$.

- (b) Wage level

Under the circumstance that the unemployment ratio is very high, the wages of workers sometimes exceed the marginal productivity of labor. In this case, shadow price adjustment is needed for economic evaluation. However, this adjustment should be applied mainly to the wages of unskilled labor. The labor in telecommunications sector seems to be

skilled labor. Therefore, the wages applied to the financial analysis are also used for economic evaluation.

(2) Estimating the Benefits

The consumers' surplus which is generated from the completion of the project taken as benefit. Using the equation (1) derived in Section 14.10, the consumers' surplus was calculated to be 1.37 times as large as the call charges. (Total benefits to the users are 2.37 times as large as the call charged, so the surplus is 1.37 times as large as the call charges.)

(3) Estimating the Costs

The costs of the project are the same as that for the financial analysis.

(4) Creating the Cash Flow Table

Table 14.11-1 shows the cash flow table for the EIRR.

(5) Calculating the EIRR

The result of the calculation shows that the EIRR is 33.53%. This means the project will bring a large economic benefit to the Cambodian communities.

Table 14.11-1 Cash Flow Table for the Calculation of EIRR of the Essential Project

Year	Number of Subscribers		Revenue per main line	Subscription fee * Note2	Revenue + Consumer's Surplus	Total Economic Benefit [A]	Investment (Telecom)	Investment (Others)	Operation & Maintenance Cost	Working capital	Total expeance [B]	Net Economic Benefit [A]-[B]
	(New)	(Cumulative) * Note1										
1998							8,379,147				8,379,147	-8,379,147
1999							8,332,375	18,025,990			26,358,365	-26,358,365
2000	640	3,400		880,000	5,157,120	6,037,120			978,602	978,602	1,957,204	4,079,916
2001	640	6,800		1,360,000	10,314,240	11,674,240			1,139,276	160,674	1,299,950	10,374,290
2002		6,800			10,314,240	10,314,240	11,245,137		2,181,736	1,042,460	14,469,333	-4,155,093
2003	939	3,800	10,600	1,520,000	18,770,874	20,290,874			2,615,851	434,115	3,049,966	17,240,908
2004	939	3,800	14,400	1,520,000	27,227,508	28,747,508	8,977,703		3,627,906	1,012,055	13,617,664	15,129,844
2005	530	3,000	17,400	1,200,000	30,995,808	32,195,808			3,533,958	-93,948	3,440,010	28,755,798
2006	530	3,000	20,400	1,200,000	34,764,108	35,964,108	10,538		4,034,592	500,634	4,545,764	31,418,344
2007			20,400		34,764,108	34,764,108	20,277,350		3,932,307	-102,285	24,107,372	10,656,736
2008	719	4,720	25,120	1,888,000	42,807,130	44,695,130			4,691,815	759,508	5,451,323	39,243,807
2009	719	4,720	29,840	1,888,000	50,850,151	52,738,151			5,246,615	554,800	5,801,415	46,936,736
2010	719	4,720 a)	27,760	1,888,000	48,578,933	50,466,933			5,168,286	-78,329	5,089,957	45,376,976
2011			27,760		48,578,933	48,578,933			4,932,672	-235,614	4,697,058	43,881,875
2012			27,760		48,578,933	48,578,933			5,293,876	361,204	5,655,080	42,923,853
2013			20,160		31,665,665	31,665,665			3,468,314	-1,825,562	1,642,752	30,022,913
2014			20,160		31,665,665	31,665,665			3,678,350	210,036	3,888,386	27,777,279
2015			14,160		24,129,065	24,129,065			2,708,966	-969,384	1,739,582	22,389,483
2016			14,160		24,129,065	24,129,065			2,789,154	80,188	2,869,342	21,259,723
2017			14,160		24,129,065	24,129,065			2,736,762	-2,789,154	-52,392	24,181,457

Note1 : a) The exchange which will be installed in 1999 will be removed in 2010 because of completion of its life.

b) The exchange which will be installed in 2002 will be removed in 2013 because of completion of its life.

c) The exchange which will be installed in 2004 will be removed in 2015 because of completion of its life.

Note2: US\$400 per subscriber fixed

IRR = 33.53%

14.12 Evaluation of the project from the FIRR and EIRR Calculation

The FIRR of 12.91% is much higher than London Inter-Bank Offered Rate (LIBOR) of 6.25% (for one year ; as of May 17). It shows that the project is more profitable than a bank deposit, and the project will be worth investing for MPTC.

On the other hand, the EIRR of 33.53% is also very high. The anticipated maximum payment by the telephone subscribers reaches 2.37 times as large as the actual payment, so, the project is expected to bring a great amount of economic benefit to the whole of the Cambodian social economy. The project is very significant from the point of not only the financial but also the socio-economic aspect.

CHAPTER 15

Recommendation

CHAPTER 15 RECOMMENDATION

Starting with telegraph service in the first half of the 19th century, the telecommunications business was superseded by the era of telecommunications service in the latter half of the 19th century. From the 1970s up to now, a shift has been taking place towards the era of diversification and sophistication, such as data and visual communications other than telephones.

Unlike telegraphy that required certain skills for the origination and termination of information, telephones that can easily be used even by children have become widely accepted as a general means of communications. In terms of the development process of telecommunications in developed countries, including the major European countries, the US and Japan, the period up until the middle of the 1970s can be considered as a telephone - focused era that has lasted for over one century.

The development history of telephone service can be summarized in the following table.

Item	Development History
Technology	* Manual exchange → automatic exchange (local direct dialing → nationwide direct dialing → international direct dialing) * Analog → digital * Cable → wireless
Service	* Local → long distance → nationwide → international * Voice → data, images Fixed → Mobile
Service Coverage	* Government/large corporations → affluent households → small and medium sized corporation → general households * Urban area → villages → remote areas * Growth in demand → eliminating application order backlog (nationwide dissemination)

holds true in the situation of telecommunications in Cambodia.

In comparing the status-quo of the telecommunications services in Cambodia with the items in the above table, we can see in which area there is telecommunications development in Cambodia, how different the process of the development is from developed countries' and what should be done from now on.

15.1 Government's Responsibility

Since there are many kinds of telecommunication services provided at present, it is required to clearly discriminate telecommunications service fields in which the government has responsibility from those that can be left to private companies. In classifying telecommunications services roughly, they are divided into basic telecommunications service and non basic telecommunications services. Although the definition of the basic telecommunications service differs from country to country, it is basically considered to mean a telecommunications service conveying information purely in which the content and message of the information sent and received are of an unchanged and unprocessed nature with regard to the telecommunications network or facilities used and of which terminals are used in common at offices, home and so on. On the other hand, non basic telecommunications services are defined as telecommunications services arising as a result of enhancement of the characteristics and capability of telecommunications facilities using computers or other sets of apparatuses to process and / or store data and information. In addition, since the terminals may be portable, we can say that non basic telecommunications services are more valuable than a basic telecommunications service.

It is said that the concept of universal service started in the U.S., but nowadays this concept is used in many countries to mean some minimum level of telecommunications development in which the telecommunications service is supplied in good quality and available anywhere throughout the country with a reasonable price level. From this view, we can say that developed countries have achieved the universal service with the basic telecommunications service. In view of the impact of telecommunications on people's life, it is the responsibility of the government to achieve and sustain the universal service, regardless of it is whether in developed or developing countries.

15.2 Necessity of Establishing a Development Target

It is widely recognized that the development of telecommunications service is indispensable to socioeconomic progress, and that industrial development and the improved quality of people's life further promote the dissemination of telecommunication service. In the current situation of telecommunications in Cambodia, however, there are only facilities for a national network donated by UNTAC and the telephone density is very low. In addition, since most of the existing subscribers are concentrated in Phnom Penh, we cannot help mentioning that

the telecommunications network outside Phnom Penh is extremely poor. These conditions may have harmful effect on socioeconomic development in Cambodia. The MPTC must improve these situations as a body for telecommunications administration and operation entrusted by the Cambodian nation.

In the world of telecommunications from the middle of the 1980s, various services have been provided as rapid progress in technological innovations, globalization, diversification and the convergence of media occurred. After this, the difficulty of telecommunications development in developing countries is to expand a basic telecommunications service in quantity to the whole of the country while fulfilling people's requirements for new services.

What must be conducted presently for telecommunications development in Cambodia is not the provision of new services to specified customers for their satisfaction but the attempt to expand the basic telecommunications service through the country, what is called the achievement of universal service.

In reviewing the example of countries with success of telecommunications development throughout the whole of the country, we can see that they established the development target first and a medium and a long term development plans for the achievement of the target secondly and amended them if necessary. As a lesson from other country's experiences, it is required that an appropriate target for the telecommunications development should be set up in Cambodia.

Such targets, for example, are:

- establishment of the national network and
- installation of at least one telephone in all cities towns and villages.

It is preferable that the targets to be established can be easily understood by the people and staff of the MPTC, as exemplified by the above. It is natural that the achievement of the targets will be the responsibility of the MPTC to the nation.

15.3 Alteration of Operation Format

(1) Establishment of Autonomy

From around the time of the break-up of AT&T in 1982, moves aimed at promoting private participation and privatization in order to try to utilize the funds and know-how of the private sectors in the telecommunications field have been accelerated in developed countries. In the light of these trends in developed countries, there has been some confusion in the responses taken by developing countries. When we speak about developing countries, we must note that there is a major difference between those countries that lag far behind with a telephone density of less than 1% and those countries in which the overall telephone density is close to 10%. As these substantial basic differences cannot be ignored, it is not favorable to a sound growth of telecommunications sector that the developing countries introduce private participation or privatization as a panacea without fulfilling certain pre-conditions and requirements by which the success of private participation and privatization can be ensured. In the era in which the level of telecommunications service in the developed countries was almost equivalent to the present one in the developing countries, there were no alternatives of private participation and privatization. Furthermore, the speed of technological innovation then was not as fast as at present and the trends towards internationalization did not exist either. Accordingly, telecommunications sectors in most developed countries could concentrate on the development of basic telecommunications service by the leadership of the government. At present, however, the telecommunications sectors in the developing countries are confronted with the difficulties that they have to develop not only the basic telecommunications service but also new services concurrently. It is such a situation that Cambodia is now in.

The telephone density in Cambodia is less than 1% per 100 inhabitants which is one of the lowest rates in developing countries. What should be done with the highest priority by the government of Cambodia is to develop the basic telecommunications service to the whole of the country including rural areas. If private participation or privatization are employed under these circumstances, most investments would be concentrated in the lucrative areas and telecommunications markets and so-called cream-skimming would be generated. These matters would prevent the development of rural areas. Therefore, the government of Cambodia should neither employ private

participation in the basic telecommunications market nor let the operating body of the MPTC be privatized. The MPTC should have a monopoly over the basic telecommunications market under the moderate control of the government for the well-balanced development until the value of telephone density will reach a certain level.

Because of the following reasons, however, we recommend that the management format of the operating body in the MPTC will be changed to be a public corporation/an autonomy with a self-accounting system, which has a monopoly over the basic telecommunications market, to smoothly supply the basic telecommunications service in good quality and with cheap price to the whole of the country.

- A direct government operation format such as the MPTC is not appropriate for steadily developing telecommunications business in terms of a long range plan in response of the growth of telephone demand, because it is easily affected by politics and government intervention.
- The MPTC must pay all the revenue to the national treasury once, then it receives an annually required budget from the ministry of finance. The MPTC cannot establish a stable fund raising plan for the telecommunications development by itself on the basis of such budgetary system.
- Among the countries with per capita GDPs under \$1,500 annually, public corporation formats achieved a higher telephone density ratio than direct government operation ones did.

(2) Organization in Provinces

The sizes of telecommunications services in provinces are still small scale and extremely poor, because automatic long distance call service is not available there. Furthermore, since the provincial organizations of the MPTC belong to the provincial government as well, they are prone to be loosely related to the headquarters. The issue with the highest priority for the MPTC is to smoothly provide basic telecommunications service to the whole of the country. In order to do that, the organizations in provinces must be ones in which the MPTC's policies can be made perfectly understood. Therefore, the double jurisdiction in which the MPTC's provincial organizations belong to both the provincial

government and the MPTC's headquarters should be canceled and the provincial organizations of the MPTC should be completely internalized.

15.4 How private participation should be dealt with

In reviewing the entry of private participants into the telecommunications business in Cambodia, international telephone service is provided under the BCC scheme and mobile telephone services are supplied by three joint venture companies. In addition, subscriber access is available by a so-called WLL (Wireless Local Loop) service operated by a private participant utilizing a fixed cellular system, of which terminals are not portable.

From now on, paging service and long distance call service utilizing facilities donated by UNTAC will be operable as new telecommunications services and supplied under joint venture schemes between the MPTC and private participants. All the private participants that have provided / will provide these services are foreign investors but domestic investors are nil. This shows properly the present situation of Cambodia.

In classifying the telecommunications services that private participants have provided / will provide into basic or non basic as mentioned in chapter 15.1, international telephone and long distance call services and the service by WLL belong to the basic classification and mobile telephone service and paging to non basic.

Non basic telecommunications services are more valuable than a basic telecommunications service and the tariff is highly set up. The customers of non basic services, as is particularly true of developing countries, are relatively rich and the operators of non basic services are not obliged to provide its services to unprofitable areas. From these viewpoints, the government should have the tariffs diminished by the introduction of competition into the markets. It is not particularly a problem that the Cambodian government employs competition in the non basic telecommunications markets.

In regard to this, the basic telecommunications service is very important for the general public, therefore it is the duty of the operator to supply it to the whole of the country including rural areas. For the development of the basic telecommunications service to the unprofitable areas, the operator must establish cross subsidy mechanism in which the revenues accrued from profitable areas are invested into

unprofitable ones. The operator, therefore, which has the obligation of developing the unprofitable areas had better have a monopoly over profitable markets and areas at the initial stage of the basic telecommunications development.

The profitable fields in the basic telecommunications service of Cambodia are international telephone and long distance call markets and the profitable area is Phnom Penh city. However, since the international telephone service is provided under BCC scheme, the long distance call service will be supplied under joint venture scheme and the service in Phnom Penh city is provided under the competition between the MPTC and a joint venture company with WLL, some revenues which the MPTC should monopolize are taken up by the private companies. The above situation makes it difficult for the MPTC to set up the cross subsidy mechanism. Therefore, to establish the cross subsidy mechanism, the MPTC should investigate and implement the following items as the governmental organization, ensure financial resources for the investment in telecommunications facilities.

- (1) As for the international telephone service, the MPTC should deal with it by newly installing its own facilities, and provide the international telephone service by itself. In addition, the MPTC should positively expand the service to the countries which have a large traffic demand. In order to realize this goal, the MPTC must study the following.
 - the time when the new facilities are required
 - preparation of funding for the new facilities
 - security of know-how and technology on international telephone service during the validity of BCC
- (2) Since the long distance call network composed of the facilities donated by ex-UNTAC take advantage of PABXs and a satellite, it seems to be transitional. In the future, it is necessary that the MPTC construct a genuine long distance call network with terrestrial transmission. After the construction of the new network, the network donated by ex-UNTAC will be disused. Therefore the MPTC should transfer this network to rural areas to urgently establish a national network, even though it may mean changing the terms and conditions of the contract for the joint venture scheme.
- (3) The service utilizing WLL system in Phnom Penh city should have been provided under the MPTC's responsibility, because it is a basic

telecommunications service. The MPTC should install the WLL system, and provide the service so as to ensure the benefit by itself as well as the international telephone service.

15.5 Necessity of Toll Exchange

Although there are some automatic local exchanges outside Phnom Penh, automatic long distant calls are not available, except for a network of a cellular telephone service company, due to no transmission links for automatic connection and the exchanges with no toll connective function.

The connections between networks of cellular telephone services and the MPTC's network are made through an international exchange operated under BCC scheme. The trunk network utilizing facilities donated by UNTAC, which will be operable in the near future, is expected to be connected with a local network in Phnom Penh through the international exchange as well. The international exchange plays a part in the domestic telecommunications service. This is because there is no toll exchange in Phnom Penh City.

In addition, since the telecommunication services in Cambodia are too dependent on private participation, it is hard to say that the MPTC has a sovereignty in the telecommunications markets. In order for the MPTC to recover from such a situation, it is required to have its own toll exchange, which will be a nucleus of the telecommunications network, instead of the international exchange. Once the MPTC has that, the domestic services via the international exchange at the moment can be supplied through the new toll exchange.

It is desirable that the MPTC will install the toll exchange at the Central Exchange Office which will be a nucleus of Cambodian telecommunications network.

15.6 Improvement of the Collection of Telephone Charges

As stated in 3.5, the MPTC's collection of telephone charges is approximately 85%, a rate which we cannot say is very high. Enterprises receive payment from customers in exchange for sales of products and services. In order for businesses to be managed smoothly, it is necessary of course, for sales to expand. However, collection of charges is also an extremely important administrative procedure. This holds true for the MPTC as well. When this cannot be achieved, profits diminish and a sound financial base cannot be maintained, negatively effecting funds for investing in facilities.

Accordingly, it is no exaggeration to say that it is the MPTC's duty to improve its rate of telephone charge collection. Methods for raising the telephone charge collection rate can broadly be divided into two. The first method is to build an easier paying system for all customers and the second is to punish customers who are unwilling to pay.

The content of the first method, to build an easier paying system for all customers is as follows;

- (1) An automatic withdrawal of telephone charges from customers' bank accounts helps customers to not only save time to go out for paying but also prevent careless unpaying. It is effective that MPTC recommend customers an automatic withdrawal of telephone charges from customers' bank accounts, when they apply for the registration of a new telephone line.
- (2) Increase in the number of payment offices and prolongation of business hours for accepting payment can raise convenience for customers. In Japan, since customers could pay at widespread twenty four hour open grocery stores called " Convenience Store ", the rate of the collection of telephone charges has been improving. In Cambodia, by entrusting banks with the work of accepting payment, as well as post offices, the number of payment offices can be increased.

The content of the second method, to punish customers who are unwilling to pay is the suspension of telephone use and the cancellation of telephone subscription contracts for customers who do not pay their telephone bills.

Regarding the second punishment, rather than applying the measures immediately, it is necessary to implement the measures in steps. For example, if a subscriber does not pay his charges even after the due date is past, he will be telephoned or sent a reminder. If the subscriber still does not pay, he will be warned of telephone usage suspension, which will be implemented a few days later. If the customer further refuses to pay his charges, an investigative visit will be executed, and a warning will be issued that his telephone subscription contract will be canceled prior to cancellation of the subscription contract. In other words, measures such as confiscation of deposit money should be courageously taken. Ministries and government workers will not be exempt from such measures. In response to ministers who do not pay telephone charges, the Secretary of State of the MPTC who has the highest responsibility for operation of the MPTC must directly send payment requests. If even after such measures are taken, bills are not paid, then it is, and will continue to be, most important that the MPTC promptly applies the punishments listed above.

Such application of punishment, however, is only possible when there is mutual trust between the MPTC and customers. Accordingly, mistaken or unfair billing and punishment regarding telephone bills, namely applying billing and punishment to some subscribers and not to others must never take place.

There is no easy road to perfect charges collection, success will only be achieved due to the diligent hard work of the MPTC staff.

15.7 Review of Tariff System

Table 15.7-1 shows the present tariff system in Cambodia which is the flat rate charge consisting of only the monthly charge regardless of pulses. The flat rate is generally seen in the initial stage of telecommunications development in other countries.

Table 15.7-1 Tariff System in Cambodia

Basic Fee	Call Fee	Remarks
Installation fee* Penta Conta: R60,000 ~ R100,000 + R20,000 AXE: US\$200 + R20,000 (In the case of facsimile terminals, the price is doubled.)	Local: free Long distance: per minute (Manual) Public Pay Phone: US\$0.2/min. (Local)	US\$1 = R2,700 (R: Riel) As of Jan. '95

Note: * The variation in installation fee of Penta Conta subscribers is subject to the distance from the MPTC Head Office.

Additional R20,000 for Penta Conta and US\$200 + R20,000 for AXE means deposit charge.

As stated in preceding 15.4, the MPTC needs to secure a stable income through the format of an autonomy with a self-according system to develop basic telecommunications service to the whole of the country including rural areas. Therefore the MPTC will, in future, have to review the tariff system as below.

- Application of a meter pulse system in local network
- Introduction of a rise in price in line with inflation only to the extent that it does not affect traffic volume

In case that the introduction of meter pulse system would greatly affect the customers in terms of rise of monthly charge, gradual introduction of the system such as the charge up to certain pulses being included in monthly charge and charging the subscriber who uses more pulses equal to the exceeding pulses may be considered. The introduction of meter pulse system in local network also has the merit of preventing congestion caused by both poor maintenance conditions and a volume of unnecessary calls.

Looking at the past trend of developed countries, in the initial stage of development or until there is a telephone penetration of 10 percent, the telephone rate tended to rise.

It can be recommended in Cambodia, for the purpose of reinforcing financial conditions of the telecommunications operating body to carry out the positive investment, at the same time as establishing an autonomous organization, the revision of the tariff system will also be necessary.

15.8 Operation and Maintenance

The Essential Project following the Emergency Project requires the MPTC to soundly operate and maintain the facilities constructed. The establishment of a new operation and maintenance structure and procedure to cope with a number of subscribers after completion of both the Emergency and the Essential Project is to be given the highest priority by the MPTC. Chapter 11 of this report proposes issues necessary for the new structure and procedure mentioned above.

- (a) The establishment of a telephone office organization which is solely responsible for the facilities constructed under the Project as well as the structure for the operation and maintenance work in each exchange office apart from the Central Exchange Offices was recommended.
- (b) The establishment of a new training center was recommended for the introduction of new technology, for urgent human resource development to fulfill manpower mobilization for the new operation and maintenance body and following the plan to construct a new Central Exchange Office using the land of the existing training center.
- (c) The establishment of an outside plant maintenance center where manpower, tools and equipment and materials are to be arranged to make outside plant works efficient.
- (d) The establishment of a billing center for sound billing and charging as well as for the MPTC to win subscribers' confidence for invoice was recommended.
- (e) Fellowship to promote human resource development was recommended.
- (f) Technical assistance in order that the MPTC obtains the skills for operation and maintenance of newly introduced equipment was recommended.

- (g) Introducing a suitable technical standard for the subscriber connection work and carrying out the work following the said technical standard were recommended. To assure the suitable work procedures, obtaining technical assistance to introduce the said technical standard and obtaining field level technical assistance to upgrade the discipline were recommended.

It is again recommended that the execution of above proposals assure the MPTC to operate and maintain its facilities and the Study Team believes they are mandatory to the MPTC.

15.9 Radio Subscriber System

The Emergency Project currently formulated includes a radio subscriber system in order that the MPTC can provide telephone services to the important subscribers outside the exchange office areas under the said project to whom it is impossible for the MPTC to provide the services by cable. In connection with the establishment of new exchange offices under the Essential Project, it will be possible for the MPTC to provide the telecommunications services by the cable subscriber system to the subscriber having been provided the services by the radio subscriber system.

According to the current tariff system, there is no difference in charge between both systems so that the MPTC will have to advise the subscribers of the radio subscriber system to be transferred to the cable subscriber system. After the subscribers are transferred, the subscriber station equipment serving the subscriber should then be transferred to the areas where telecommunications service provision will not be available at the moment.

This should be managed and carried out by the MPTC in order that as many subscribers can take advantage of telecommunications services as possible and services by the radio subscriber system can complement the services provided by the facilities installed under the Essential Project.

Bibliography

Bibliography

Asian Development Outlook	Asian Development Bank	1994
Cambodia Numbering Plan - Area Codes	Ministry of Posts and Telecommunications	1993
Cambodia Numbering Plan - General	Ministry of Posts and Telecommunications	1993
CCITT Blue Book Recommendations : E 721 & 723, G 602 & 821	International Telecommunication Union	1989
Evaluation on the recent socio-economic situation in Cambodia	Ministry of Planning	1993
Final Report, the Study on Phnom Penh Water Supply System in the Kingdom of Cambodia	JICA	1993
Government Responsibilities in the Telecommunications Sector	NTT International Co.	1994
Preparation of Policies and Programs for Rehabilitation and Development for the Kingdom of Cambodia	Ministry of Post and Telecommunications	1994
Project Document for the UNDP/ITU project CMB/93/006-"Telecommunications Master Plan and Institutional Strengthening"	UNDP Cambodia Office	1994
Report on Frequency Management Mission to the Kingdom of Cambodia	UNDP/ITU	1994
The World's Telephone (A Statistical Compilation as of January 1991-92)	AT&T	1993
World Population Prospects 1992 revision	United Nations	1992
Yearbook of Common Carrier Telecommunications Statistics (20th edition)	International Telecommunication Union	1993

JICA