

CHAPTER 14 EVALUATION OF MASTER PLAN

14.1 Technical Evaluation

The technical contents of Master Plan are over-viewed from the various technical viewpoints of;

- 1) Efficiency
- 2) Reliability/stability/security
- 3) Flexibility
- 4) Serviceability
- 5) Productivity
- 6) Conformity with the current technical trend
- 7) Universal service
- 8) Maintainability

The Master Plan intends to study out the frame-work of the “Telecommunication’s Sector Development Plan” for the period up to year 2020 form year 2003.

14.1.1 Efficiency of the Investment

- 1) Balancing of the facility schedule

In the past scheme, the priority of the facility investment was given to the switching system, and such facility was kept idle for several years without receiving the fruits.

In this regard, Master Plan gives the strong emphasis on the investment for the local access networks so that the idle switching capacity is to be fully (95%) utilized receiving the new subscriber connections (DEL) by the year 2005.

The investments on the facilities are scheduled to keep the facility balance sound (full turn-key procurement, or advanced procurement of local access network considering the longer installation period of copper loops.) after the year 2005.

- 2) Weighting on facility investment among fixed-phone, mobile-phone and ICT network

Paying attention on the current international trend of the rapid increase of the mobile-phone and the internet service customers, Master Plan gives the priority on the development of mobile-phone and ICT.

While, respecting the Government policy as well as the socio-economic requirement (Tele-access within 10 Km walk), Master Plan also gives the priority on the investment to the rural network development, on which no financial return can be expected.

Considering the profitability and the high rate of growth of mobile-phone and ICT services as well as the heavy loss of rural network, the investment on the fixed-phone network, the profitability of which is to be decreasing due to the increase of the ratio of

the residential subscribers, is to be compressed to around 75% of the forecasted micro-demand (but still around 1.2 times of the figure approached through ITU statistic).

3) Priority area for the network capacity expansion

The priority is given to such exchange area that has the long waiting applicant list, and is supported by the basic design of the subscriber access network.

Considering the longer installation period of the subscriber access network, the implementation of the subscriber access network is to be commenced at least a half year ahead than the implementation of switching / transmission systems.

14.1.2 Reliability/Stability/Security

1) Transit nodes capacity

Depending on the current traffic routing rules, all traffic among 6 tandems and 8 primary centers are to be loaded on the backbone route giving the over-loads condition to NSC/ISC (secondary center) and some tandems by the year 2005 due to the heavily increased traffic volume (not only fixed-phone but also mobile-phone traffic.)

The Master Plan has paid the keen attention on the above over-load, and gives the direct routs among key big size local exchanges and NSC as well as gives the IP over-layer network by the year 2005 among PCs, NSC, and Tandems, which share the backbone routes traffic. The interface points between switched circuits and IP packets are at 8PCs and 6 tandems

In this concern, the master plan studied the traffic distribution matrix of the year 2005 for both demand base and expected subscriber connection base.

2) Addis Ababa optical fiber junction ring

Addis Ababa traffic is to be transported through the optical fiber junction rings (double ring with STM-16), which has the 100% redundancy, and will withstand for the traffic upto year 2020.

3) Optical fiber trunk cable between AA TR-III and Nazareth.

Considering the heavy concentration of the radio trunk routes at Mt.Furi repeater station, the traffic from south route and east route is to be transferred to the proposed O/F route (AA TR-III-Nazareth). The existing radio route will be used as the back-up system.

4) Ring configuration for the radio trunk route.

5) Second International Gateway Switch

The second international gateway switch with the stand-by Master Clock is proposed to be installed at Nazareth (on the new O/F trunk route).

The new gate switch will have the 100% capacity to deal with the international traffic, but will deal with 50% traffic sharing the traffic load with the existing gate-switch.

6) Mobile-phone network and its interface to fixed-phone

Mobile-phone network is to cover 13 cities including 9 cities of Primary center location.

Mobile-phone network is to be separately installed by radio technology, but is to have the gates to fixed-phone network at 3 A.A tandems, 4 PCs and NSC.

All mobile to mobile traffic are to be handled within mobile-phone network, but calls between mobile and fixed-phone are to be carried through gates and PC/Tandem/NSC.

As example, AA mobile-phone to AA fixed-phone and to 4PC areas (4,5,6&8) are respectively carried via tandem gates and PC gates.

Considering the rapid increase of the traffic between mobile-phone network and fixed-phone network, Master -Plan proposes to introduce the gate-switch at each Primary center, and to transfer the traffic to the big size local exchanges in Addis Ababa area.

14.1.3 Flexibility

1) High capacity network for AA Junction and Trunk Transmission route

Due to the proposed STM-16 for AA Junction and STM-1 x n for Trunk transmission route, the network will be strong against the variation of the traffic load.

2) Over - lay of Packet network on Trunk Transmission route

Traffic load processing by NSC can be shared by routers.

3) Direct mesh network among Local exchanges in PC areas and AA area. Traffic loads on PCs and Tandems are to be decreased, and accordingly the key-nodes will have the margin of the traffic handling capacity.

14.1.4 Serviceability

1) Replacement of Analog switches

82000 l.u. of obsolete analog switches are under operation currently with the heavy difficulty of maintenance mainly due to shortage of the spare parts.

Master Plan intends to replace 78500 l.u. Analog to Digital switch within its short term targets, accordingly CCS 7 signaling is to run over the network except some spur routs.

2) Rehabilitation of OSP/improvement of fault rate

Due to the involvement of the obsolete paper insulated lead sheathed cables in the out-side plant, fault (service interruption) rate is very high, and fault recovery takes very long period.

Under Master Plan, the obsolete OSP in the profit center (urban core area) is to be rehabilitated by the replacement of the paper insulated lead sheath cables (60,000 MDF pr. in Addis Ababa, and 60,500 MDF pair. in other cities)

3) Rehabilitation

Majority of the single line faults are caused by the poor workmanship of the dropwire / internal-wire installation.

Master plan proposes the rehabilitation of the service wires step by step.

4) Marketing effort to increase the hunting system, especially for the corporate subscribers.

In order to decrease the cases of “called party no response” and “called party busy”, master plan proposes the marketing efforts on the corporate customers to increase the number of telephone lines as well as to adopt the hunting system.

5) Elimination of the route busy

Master plan proposes the increase of the trunks of switching system as well as the introduction of the mesh network among LEs in order to make the smooth traffic flow and to lighten the traffic load on the key switching systems.

14.1.5 Productivity

1) Out-sourcing

Considering the rapid increase of the subscribers (Fixed-phone, Mobile-phone, Internet Data services), Master plan proposes the out-sourcing on the field of;

- Customer services of mobile-phone and internet services.
- New subscriber connections
- Net work expansion projects
- Part of the fault recovery work of Outside Plant

In order to maintain/develop the resources of the out-sourcing, the stable volume of works are to be given to the local contractors.

2) Stream-lining of O/M works

The responsibility of O/M works is proposed to be decentralized to the organization of each region. The region management is responsible for QoS improvement. Region to region competition will motivate the improvement of QoS and Productivity.

3) OPMC-Stream-lining of Outside Plant O/M

Master Plan proposes the establishment of OPMCs (Outside Plant Maintenance Center); Two in Addis Ababa, one in each Primary Centers and Harar. OPMC will modernize the O/M work of OSP, and will improve the workmanship.

4) Centralized and Integrated Management Information System(CIMIS)

ETC has commenced the phase of CIMIC installation as from July, 2002.

CIMIS intends to process the integrated information within the Enterprise.

The system will improve the procedure and time-span of customer service activities, the project implementation monitoring, the procedure of the site (O/M) information processing and will accelerate the motivation to accomplish the targets of QOS.

14.1.6 Conformity with the Current Technical Trend

1) Introduction of VoIP and interface to the switched network

The expansion of switched digital nodes will be ceased by the year 2005, and there after VoIP will be the major facility for fixed-phone expansion. VoIP network is to be connected to the switched network at each Gateway of PCs and Tandems.

The international calls are to be transmitted to PC/Tandem and to NSC/ISC via each Gateway, however.

2) Local Access Network

Considering the coming era of the broadband services, Master Plan intends to introduce uni-gauge (0.4mm gauge) short distance (2Km) copper loops applying the FTZ technology (DLC/RSU as sub-node)

3) Technical standard

New technology as well as the current trend of ICT/Mobile services are well introduced to the Master Plan such as the introduction of VoIP, priority on mobile-phone/ICT development, and preparation of local access network (FTZ) for broad-band services.

14.1.7 Universal Services (Rural PCOs)

Around 85% of Ethiopia population lives in the rural area (community size: less than 1,000 habitant), where no telecommunication access is available

Master Plan proposes to provide “Tele-access” for the wide rural area in accordance with ITU recommendation (Accessible to telephone services within the walkable distance).

The proposed target for year 2020 is that “86.4%” population of rural area is accessible to Telephone Services.

14.1.8 Maintainability

1) Spare parts

The procurement of spare parts for the circuit switching system will become difficult in near future.

Master plan proposes to apply VoIP (Soft switch) as from year 2005 instead.

The transmission components of the trunk transmission route are uniformed to SDH replacing PDH.

2) Improvement of Maintenance/operation efficiency

Master Plan proposes the following O/M supporting functions:

- a) Outside Plant Maintenance Center
- b) CIMIS

3) Technical Staff capability

Considering the rapid expansion of the new services of Mobile-phone and ICT, and the scale of the master plan, the organization is to be divided into 3 management groups for fixed-phone, mobile-phone, and internet services.

In this regard, Master Plan asks for the re-organization of technical staffs with the following actions:

- a) training of the existing staffs for the new assignment
- b) recruit and training of new staff
- c) demarcation of the works for out-sourcing and forming the management group
- d) introduction of clear-cut skill-path management for the encouragement of the technical staff.

14.1.9 Ecological Problem

No ecological problem will be foreseen in the Master Plan.

Due to the expansion of the telecommunications, considerable volume of energy and carbon-oxide will be reduced, however.

14.2 Financial Aspects

14.2.1 Investment Program

The investment program of the Master Plan should allow the number of connected subscribers to expand from present level of about 324,000 (2002) subscribers to 1,341,000 subscribers (Fixed-phone) and from 36,000 (2002) subscribers to 946,050 subscribers (Mobile-phone). In order to meet growth targets, expansion under the investment program will significantly increase the number of subscribers it connects each year. Especially, the first 3 years will be a heavy burden for ETC.

Total project cost is estimated at US\$1,782 million of which US\$ 336 million represent local cost and US\$ 1,446 million equivalent foreign exchange. The total project cost can be summarised as shown in Table 15.2-1 for the financial analysis. The total investment cost is distributed in each year of the Master Plan period as shown in Table 14.2-2.

Details of the investment costs by category are shown in Chapter 13. The evaluation includes cost estimates using 2002/03 prices, and does not take into account price fluctuations due to inflation or deflation. Price reductions due to technical innovations are taken into account within a predictable range as of September 2002.

Table 14.2-1 Total Project Cost by Facilities

Items	Total amount (US\$'000)	Share %
Mobile	368,063	20.6
PCO	386,337	21.7
OSP/FTZ/WLL	425,240	23.9
VoIP	180,398	10.1
Transmission/VSAT	261,274	14.7
Switch	41,950	2.3
Payphone	2,655	0.2
Others	116,969	6.5
Total	1,782,886	100.0

Source: Study Team

As is apparent from Table 14.2-1, PCOs and OSP would account for around 45% of the investment cost in the Master Plan. Investment in mobile is small at only 20% of the entire amount, although it will produce around 45% of total revenue from 2004/05 onward.

The high investment efficiency of mobile-phones is the same as for industrialized nations. Placing priority on investing in mobile-phones will therefore improve the investment efficiency of the Master Plan. However, as shown in Chapter 4, Ethiopia's telecommunications sector is already facing an investment imbalance. Investment in access systems commensurate with exchange equipment capacity is lagging behind, and so the number of subscriber is not currently rising as much as expected. Put another way, balancing investment plans for exchange equipment with overall investment was not considered. As can be seen from the Eighth Telecommunication Development plan, there are no plans to eliminate this imbalance. In the Master Plan, eliminating this investment imbalance is seen as contributing the most to improved investment efficiency, and so is included in the short-term program as a high priority project.

System selection was performed striving for maximum investment efficiency with minimum cost. The system selection does however; take into account as much as possible the necessary facilities in anticipation of future trends, if technical limitations arise.

Table 14.2-2 Total Project Cost in Each Project Year

Unit : US\$ 1,000

Year	Total Investment	Year	Total Investment
2003/04	173,726	2012/13	80,439
2004/05	173,726	2013/14	80,439
2005/06	173,726	2014/15	80,439
2006/07	91,463	2015/16	80,439
2007/08	91,463	2016/17	80,439
2008/09	91,463	2017/18	80,439
2009/10	91,463	2018/19	80,439
2010/11	91,463	2019/20	80,439
2011/12	80,439	2020/21	80,439
		Total	1,782,886

14.2.2 Financial Analysis on Master Plan

(1) Concept for Evaluating the Master Plan (M/P)

A considerable difference in profitability is expected between the existing network and the M/P network. To assert this, the evaluation focused only on the M/P related portion. The relevant diagram is shown in Fig.14.2-1. The evaluation covered total investment costs, revenues, and expenditures, as shown in the shaded part (M/P) of the diagram.

With this evaluation, it becomes possible to review the type of financial sources required and the degree of profitability expected whatever the characteristics of the M/P maybe.

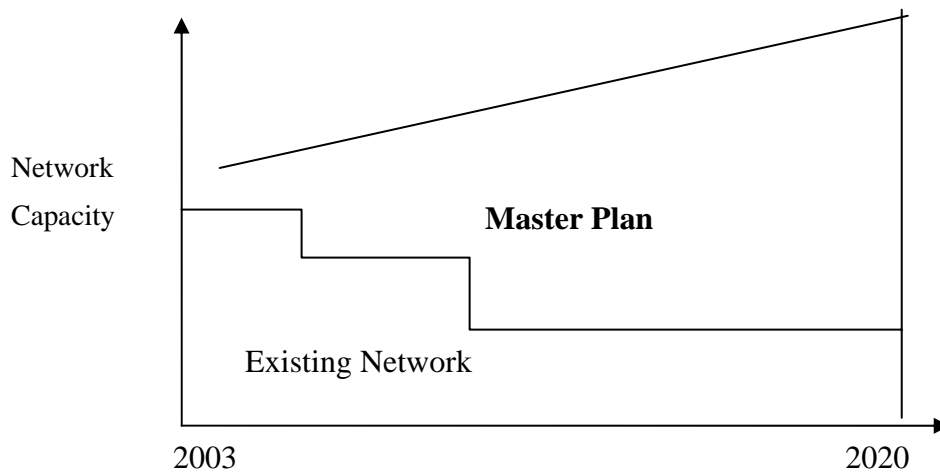


Figure 14.2-1 Concept Figure of Master Plan

The Master Plan is to be evaluated based on scenarios 1 and 2 described in Chapter 8. What both scenarios have in common is the fact that the Ethiopian telecommunications sector will be operated as a monopoly by ETC until 2007/8.

(2) Method of Financial Analysis

The method of financial analysis contrasts the total amount of the costs of construction, operation, etc. with the revenue obtained by the Call charge, Installation fees and Rental fees to calculate the profit and make the various financial statement, etc. The section deals mainly with the calculation of Financial Internal Rates of Return (FIRR) which, by definition, is the discount rate which achieves a net present value of zero, when discounting sets of financial cash flows expected in the Master Plan.

It is difficult to evaluate the degree of contribution of the new investment, while the existing facilities are still in operation. However, the Study team tentatively figured revenues and expenditures assuming realistic conditions, extracted the parts related to the project and used these parts as the evaluation target.

(3) Basic Assumptions for Financial Analysis

The Financial Evaluation has not dealt with nominal change of value such as inflation and fluctuation of currency exchange rate to reveal essential viability of the Master Plan.

In the sense, Net present value and Internal rate of return are typical means of evaluation tools under the appraisal prerequisite, for the Master Plan.

a) Fiscal Year

1st, July – 30th, June

b) Project Appraisal Period

2003/04 – 2020/21 (18 years)

c) Fixed Price Base

Financial Projections have been done based on 2002/03 constant price. This means, all costs shall be fixed at 2002/03 level. This price level, which was estimated to be the standard market price in 2002/03, will be adopted for all costs, such as construction costs and operating costs.

d) Exchange Rate

US\$1.00 = Brrs 8.56 (August. 2002)

US\$1.00 = Yen 120.0 (August 2002)

e) Revenue collection ratio

Based on 2001/02 figures, the ETC revenue collection ratio exceeds 90%. This information was obtained from the detailed research carried out by the ETC Finance Department. However, using this collection ratio in future plans pose a significant risk. The number of subscribers is projected to increase rapidly from fiscal 2003/4 onwards when private investors are involved in management, but it must be born in mind that most of the increased subscribers are general subscribers as described in Chapter 8. Revenue collection from general subscribers carries a

large risk, and so it is therefore assumed that the revenue collection ratio will fall to 80% by 2020/21.

Table 14.2-3 The Expected Collection Ratio

Year	Revenue Collecting Ratio
2003/04 - 2005/06	90%
2006/07 - 2010/11	85%
2011/12 - 2015/16	85%
2016/17 - 2020/21	80%

Source: Study Team

f) Long Term Loan

The long term loan will be lent to ETC on the following conditions;

Interest rate	:	4.0%
Repayment	:	20 time over 10 years
		Fixed principal payment
Grace period	:	none

g) Foreign Grant Aid

Since Ethiopia belongs to the LLDC, bilateral aids are available through foreign grant aids. The foreign grant aids should be real grants, not to be subsidiary loans. In the case of foreign grant aid injected into ETC, some is returned to the Ethiopian government in the form of lease revenue. However, foreign grant aid used in the Master Plan will not entail a repayment obligation, taking into account the nature of foreign grant aid intended to support projects with low profitability.

Duty	:	No duty, No charge
Belongings	:	ETC asset

h) Corporate Income Tax

30% of ETC's net taxable income.

i) Insurance

According to the current insurance system, the cost for insurance was assumed to be approximately 0.1% of the book value of equipment & facilities costs in each project year.

j) Depreciation

Full value of all asset items is depreciated without remaining salvage value, over the estimated useful lives of these assets. Depreciation is provided as follows;

Table 14.2-4 Depreciation Method

Items	Depreciation method (straight line)
Buildings	2.5%
<i>Plant</i>	
Switching Equipment	5.0%
Radio/Transmission Equipment	7.0%
Cable & Subscriber Network	8.0%
Air-conditioning Equipment	20%
Motor Vehicles & Others	20%

k) Working Capital

The amount of Working capital is assumed to be the following for each year of operation.

Account Receivable : Sales Revenue for 2 months

Account Payable : Operating costs for 2 month

(4) Total O&M Cost

The direct operation costs do not include interest payment and depreciation. The annual operation and maintenance (O&M) costs will be increased due to the increase in the number of terminals.

Table 14.2-5 Total O&M Cost for M/P Unit: US\$ 1000

Year	O&M cost	Additional Stuff cost	D. Insurance	Total O&M cost
2003/04	13,658	116	164	13,938
2005/06	15,098	582	463	16,143
2010/11	19,595	1,686	706	21,987
2015/16	24,756	2,762	792	28,309
2020/21	29,312	4,011	783	34,106

D. Insurance : Damage Insurance (Book Value x 0.1%)

(5) Total Revenue

As stated also in Chapter 8, the revenue per subscriber may be estimated to fall.

The reason for this is that the increase in the proportion of key customers is extremely low in comparison with the overall increase in subscribers, as mentioned previously. The profit structure in March 2002 indicates that approximately 5% of subscribers (key customers) generate 60% of the total revenue. These subscribers are people with an important position in the Ethiopian business sector, and their proportion cannot be easily increased. It is therefore clearly apparent that the revenue per subscriber will decrease in the future.

It is worth to note that general subscribers prefer to receive incoming calls than generating outgoing traffic.

Increasing the number of users receiving calls will have a major effect on traffic increase projections.

In the Master Plan, a figure of US\$215 p.a. has been calculated for revenue per fixed-phone subscriber, based on the ETC cash flow statement for 2001/02. The Master Plan has been formulated on the assumption that this figure will fall to US\$145 p.a. by 2020/21.

The same may be expected to happen in mobile-phones, i.e. all services charged by traffic volume would show a decline in revenue per subscriber. This is particularly true for the mobile sector, where the aim is to boost the number of subscribers from the current 36,000 (2001/02) to 946,050 (2020/21). The assumption is that revenue per subscription here would fall from US\$459 p.a. to US\$145 p.a.

One may argue that if charges fall, traffic will substantially increase, allowing current revenues to be sustained. However, the volume of international voice traffic will decline without any such recovery. This is due to a change in the type of subscribers comprising the market: an increase in residential subscribers means a decline in the average disposable income of subscribers and thus a decline in traffic per subscriber, leading to falling revenues per line.

Table 14.2-6 Total Number of Additional Subscribers by Service (Scenario 1)

Year	Fixed-phone	Mobile	Internet
Existing (Sept.2002)	310,230	60,000	10,000
2003/04	76,843	85,433	22,000
2005/06	230,528	256,300	66,000
2010/11	453,528	450,000	161,998
2015/16	723,978	668,025	258,499
2020/21	994,428	886,050	355,000

Source : JICA study team 2002

Table 14.2-7 Revenue Distribution for Master Plan Portion by Service (Billed amount) : Scenario 1

Unit: US\$1000

Year	Fixed-phone	Mobile	Internet	Installation	TTL
2003/04	13,316	17,808	8,800	10,348	50,272
2005/06	36,110	42,033	26,400	10,348	114,890
2010/11	66,223	67,205	48,599	5,398	187,426
2015/16	105,718	98,181	77,550	6,124	287,573
2020/21	143,703	128,414	106,500	6,124	384,741

Source : JICA study team 2002

Note: other : Installation fee, etc.

14.2.3 Evaluation Result for Scenario 1

Scenario 1

This scenario involves private sector investors participating by purchasing a 30% stake in ETC in 2002/03, with ETC remaining a monopoly until 2007/08. From 2008/09 onward, a number of private mobile-phone and ISP operators would join the telecommunications sector. Under this scenario, it is assumed that ETC will be offered an incentive in the form of a continuation of its monopoly for a period of five years, following the participation of the equity partner, and that during these five years ETC will have done enough to secure sound management capabilities.

Table 14.2-8 Condition of Scenario 1

Items	Condition
Business status (2003/04-2020/21)	State owned company with Strategic Equity Partner
Corporation tax	30%
Dividends	10%
Interest of L-T loan	4.0%
Repayment	15 yrs
Grace period	No grace period

In this scenario, the majority (70%) of the ETC capital structure is held by the Ethiopian government. The monopoly will continue for the first five years, at least, and it is necessary during this period to formulate a sound business scheme for the ETC management foundations and rural development while using ODA funds effectively.

The assumptions and predictions are shown below for the evaluation after 2008/09, when the ETC monopoly comes to an end and a competitive environment starts. Revenue predictions were performed based on these conditions.

Exactly what approach private operators will follow in their business strategy is unknown. So for the purpose of financial analyses the following assumptions are made about the situation among private operators from 2008/09 onward.

- (1) Charges will be set at a lower level than ETC's mobile-phone charges.
- (2) Operators will sell inexpensive mobile-phones to attract mobile-phone customers.
- (3) ISP charges were revised in August 2002, bringing them to more reasonably priced levels. It is assumed that private sector ISPs will operate with lower charges than at present, on the assumption that charges will somehow be set at feasible levels.
- (4) Corporate initiative will enable private operators to purchase equipment and materials at prices below the current ETC purchase prices.
- (5) Interconnection fees of Mobile-phone will be set using charge allocation.

The project appraisal period furthermore runs to 2020/21. The outcome of investment made in 2020/21 has therefore been taken into account, and the FIRR and NPV are based on the results of calculations up to 2030/31.

At present the Ethiopian government receives no dividend from ETC. However in Scenario 1, like any other strategic equity partner, it would receive an annual dividend of 30% of net profit. The financing plan is as shown in Table 14.2-10. Because ETC has little long-term loan funding at present, the annual ratio of borrowings has been set at 70% for the first five years, then 60% from 2009/10 onward for the purposes of the Master Plan.

Table 14.2-9 shows the results of a financial analysis. In the Master Plan profit by year would be expected from the first year, with dividends paid to the shareholders from this first year.

A look at cash flow for each year indicates cash flows would be negative for the first three (3) years of operation. This is due to strategic front-loading of investment in mobile-phones, meaning that cumulative cash flows would move into the black in 2012/13, ten years after launch of operations.

Cash flow of US\$ 37.3 million would be generated throughout the period of operation, with a financial internal rate of return on equity (FIRROE) of 21.19%. Even the FIRR figures alone indicate that the business would provide more than adequate returns for an operation with a high degree of public benefit.

Table 14.2-9 Result of Financial Analysis (Scenario 1)
FIRR has been calculated at 21.19% (FIRROE: 2003/04-2035/36)
NPV (Discount rate at 12%) has been calculated at US\$142,008,000
DIVIDEND Policy: 30% of net profit p.a.

UNIT : USD 1000

YEAR	INVESTMENT			REVENUE	O&M COST	DEPRE.	INTEREST	C.TAX (30%)	P/L A.TAX	REPAYMENT	DIVIDEND Levy	CASH FLOW
	LOAN	GRANT	Own Fund									
2003/04	86,863	17,373	69,490	44,453	13,938	9,692	1,737	5,726	13,360	2,895	4,676	-54,010
2004/05	121,608	17,373	34,745	73,592	14,878	19,384	5,733	10,079	23,518	9,844	8,231	-9,919
2005/06	121,608	17,373	34,745	101,025	16,143	29,076	10,122	13,705	31,979	17,952	11,193	-2,835
2006/07	64,024	0	27,439	113,414	16,909	34,160	13,036	14,793	34,516	24,139	12,081	5,017
2007/08	64,024	0	27,439	122,922	18,326	39,245	14,589	15,229	35,534	28,408	12,437	6,495
2008/09	64,024	0	27,439	131,095	20,371	43,135	15,971	15,485	36,132	32,676	12,646	6,507
2009/10	54,878	0	36,585	145,604	21,306	47,026	16,999	18,082	42,191	36,639	14,767	1,226
2010/11	54,878	0	36,585	157,659	21,987	50,917	17,692	20,119	46,944	40,298	16,431	4,548
2011/12	48,264	0	32,176	174,941	23,316	55,061	18,106	23,537	54,920	43,736	19,222	14,847
2012/13	48,264	0	32,176	191,746	23,957	59,205	18,255	27,099	63,230	46,953	22,131	21,176
2013/14	48,264	0	32,176	208,717	25,385	63,307	18,275	30,525	71,224	50,171	24,928	27,256
2014/15	48,264	0	32,176	225,875	26,703	67,409	18,167	34,079	79,517	53,389	27,831	33,531
2015/16	48,264	0	32,176	241,801	28,309	71,511	17,930	37,215	86,836	56,606	30,392	39,172
2016/17	48,264	0	32,176	257,718	29,982	75,272	17,564	40,470	94,430	59,824	33,051	44,652
2017/18	48,264	0	32,176	257,533	31,078	79,032	17,069	39,106	91,247	63,041	31,937	43,126
2018/19	48,264	0	32,176	272,499	32,091	82,341	16,446	42,486	99,135	63,363	34,697	51,239
2019/20	48,264	0	32,176	288,379	33,212	85,649	15,868	46,095	107,555	59,632	37,644	63,752
2020/21	48,264	0	32,176	304,385	34,106	88,957	15,462	49,758	116,102	54,742	40,636	77,505
TOTAL	1,114,543	52,118	616,225	3,313,356	431,996	1,000,380	269,020	483,588	1,128,371	744,310	394,930	373,286

When designing a financing plan, taking into account the fact that ETC has little record of borrowing, a plan is drawn up keeping the ratio of borrowed funds to a minimum, and deploying internal generated funds to the maximum extent. Moreover, because a strategic equity partner is to be brought into the business, the injection of subsidies etc. by the government could be discounted. Table 14.2-10 shows the financing plan.

Table 14.2-10 Assumption of Financing Plan

Items	US\$ (000)	Share %
Long-Term Loan	1,114,811	62.53
Foreign Grant Aids	52,118	3.00
Own Funds	616,225	34.47
Total	1,782,886	100.0

The Master Plan assumes the existing business to shoulder the cost of operations from 2003/04 to 2005/06. However, after these first four years of operation, it possible for the new operation to support the existing business. In other words, even if the projects designed to improve tele-access are carried out, the Ethiopian telecommunication sector possesses more than enough of a market to recover these costs.

Let us look now at actual operations, based on the results of the analysis. The problem is a cumulative shortfall of US\$ 66,763,000 in cash flows by year for the first three years from launch of operations. The question is how to overcome this problem.

The financing plan assumes a dividend is to be paid from the first year, however if no dividend is paid for the first three years and this amount is diverted to investment by internal generated funds, the situation takes a turn for the better, as shown in Table 14.2-11.

Moreover, it can be seen that cash flow will be greatly improved if 20% of the necessary investment can be covered with foreign grant aid over the first three years.

Table 14.2-11 Result of Financial Analysis (Revised Scenario 1)
FIRR has been calculated at 42.76% (FIRROE: 2003/04-2035/36)
NPV (Discount rate at 12%) has been calculated at US\$199,766,000

UNIT : USD 1000

YEAR	INVESTMENT			REVENUE	O&M COST	DEPRE.	INTEREST	C.TAX (30%)	P/L A.TAX	REPAYMENT	DIVIDEND Levy	CASH FLOW
	LOAN	GRANT	Own Fund									
2003/04	86,863	34,745	52,118	44,453	13,938	9,692	1,737	5,726	13,360	2,895	668	-32,629
2004/05	121,608	34,745	17,373	73,592	14,878	19,384	5,733	10,079	23,518	9,844	1,176	14,509
2005/06	121,608	34,745	17,373	101,025	16,143	29,076	10,122	13,705	31,979	17,952	1,599	24,132
2006/07	64,024	0	27,439	113,414	16,909	34,160	13,036	14,793	34,516	24,139	12,081	5,017
2007/08	64,024	0	27,439	122,922	18,326	39,245	14,589	15,229	35,534	28,408	12,437	6,495
2008/09	64,024	0	27,439	131,095	20,371	43,135	15,971	15,485	36,132	32,676	12,646	6,507
2009/10	54,878	0	36,585	145,604	21,306	47,026	16,999	18,082	42,191	36,639	14,767	1,226
2010/11	54,878	0	36,585	157,659	21,987	50,917	17,692	20,119	46,944	40,298	16,431	4,548
2011/12	48,264	0	32,176	174,941	23,316	55,061	18,106	23,537	54,920	43,736	19,222	14,847
2012/13	48,264	0	32,176	191,746	23,957	59,205	18,255	27,099	63,230	46,953	22,131	21,176
2013/14	48,264	0	32,176	208,717	25,385	63,307	18,275	30,525	71,224	50,171	24,928	27,256
2014/15	48,264	0	32,176	225,875	26,703	67,409	18,167	34,079	79,517	53,389	27,831	33,531
2015/16	48,264	0	32,176	241,801	28,309	71,511	17,930	37,215	86,836	56,606	30,392	39,172
2016/17	48,264	0	32,176	257,718	29,982	75,272	17,564	40,470	94,430	59,824	33,051	44,652
2017/18	48,264	0	32,176	257,533	31,078	79,032	17,069	39,106	91,247	63,041	31,937	43,126
2018/19	48,264	0	32,176	272,499	32,091	82,341	16,446	42,486	99,135	63,363	34,697	51,239
2019/20	48,264	0	32,176	288,379	33,212	85,649	15,868	46,095	107,555	59,632	37,644	63,752
2020/21	48,264	0	32,176	304,385	34,106	88,957	15,462	49,758	116,102	54,742	40,636	77,505
TOTAL	1,114,543	104,235	564,107	3,313,356	431,996	1,000,380	269,020	483,588	1,128,371	744,310	374,273	446,061

The cumulative shortfall in funds falls to US\$32.63 million, while the FIRROE rises to 42.76%. At this amount, there would be no need to request funds from the government, or engage in excessive borrowing. While only a simulation at this stage, the amount has thus been reduced to a more manageable level in terms of financing.

However, it must be remembered that this analysis assumes repayment of long-term borrowings over ten years at an interest rate of 4%. These are soft loan conditions, not easily applicable to private sector investors. Applying for soft loan (ODA) funding, which will require total cooperation from the Ethiopian government, is essential for the sustainable development of the telecommunication sector.

14.2.4 Evaluation Result for Scenario 2

Like Scenario 1, this scenario involves private sector investors participating by purchasing a 30% stake in ETC in 2002/03, with ETC remaining a monopoly until 2007/08. From 2008/09 onward, the telecommunications sector would be opened up to private operators. However, if private operators were not attracted to the market and decline to enter the sector, the ETC Group would continue operating with its three-company structure until 2020/21. Like Scenario 1, it is assumed that ETC will be offered an incentive in the form of a continuation of its monopoly for a period of five years following the participation of the equity partner.

However, as no private sector businesses is interested to enter the market, the process of splitting ETC into three companies (fixed-phone business, mobile-phone business, and ISP business) will takes on even greater importance.

The switch to scenario 2 means that private investors will decline to participate, and the Ethiopian telecommunications market is stagnating in comparison with scenario 1.

So, why private businesses will not be willing to participate? The PWC report describes the presence of sufficient demand, and the demand announced by ETC also shows sufficient figures. Sufficient demand ought to exist. So is it then the problems of subscriber characteristics? A market in which only subscribers paying annual usage fees of up to US\$100 are increasing, does not allow multiple businesses to maintain healthy profit structures.

Scenario 2 takes the first step toward privatisation by splitting ETC into three companies for the basic service (fixed-phone service), mobile-phone service, and ISP business, and then waits for market growth.

After fiscal 2003/04, it is highly likely that the management policy of ETC will progress in accordance with the wishes of a strategic partner. In the absence of competition with private sector businesses, it is not clear what kind of vision will appear. A financial evaluation of the situation for 2008/09 onward is therefore conducted based on the following assumptions.

Basically, it is considered that achievement of the roll-out targets announced by ETA will be the objective.

- (1) There is no competition between identical services, so call charges will be kept at 2002/03 levels.
- (2) The cost of mobile-phone handsets will fall with technological innovation.
- (3) Competition for subscribers between businesses will be lower than in scenario 1. Staff motivation is expected to fall, and as a result, the increases in subscribers from 2008/09 onwards will be retarded by approximately 20%.
- (4) The number of new mobile-phone and ISP subscribers from 2008/09 onwards will be 10% lower than in scenario 1. The organizations formed by the split-up of ETC will continue their efforts to maintain a profit base, and will secure subscribers strategically in a near-competitive environment. If the market tightens, they will secure subscribers by actively promoting a shift of subscribers from fixed-phones to mobile-phones.
- (5) The market will contract in comparison with scenario 1, and so investment costs are expected to increase by 10% from 2008/09 onward.
- (6) Call charges between mobile and fixed-phones are set in a charge allotment form.

Table 14.2-12 Result of Financial Analysis (Scenario 2)
FIRROE has been calculated at 20.21% (Scenario 2), 21.19% (Scenario 1)
NPV (Discount rate at 12%) has been calculated at US\$122,308,000
DIVIDEND Policy : 30% of net profit p.a.

UNIT : USD 1000

YEAR	INVESTMENT			REVENUE	O&M COST	DEPRE.	INTEREST	C.TAX (30%)	P/L A.TAX	REPAYMENT	DIVIDEND Levy	CASH FLOW
	LOAN	GRANT	Own Fund									
2003/04	86,863	17,373	69,490	44,453	13,938	9,692	1,737	5,726	13,360	2,895	4,676	-54,010
2004/05	121,608	17,373	34,745	66,233	14,878	19,384	5,733	7,871	18,366	9,844	6,428	-13,267
2005/06	121,608	17,373	34,745	101,025	16,143	29,076	10,122	13,705	31,978	17,952	11,192	-2,835
2006/07	64,024	0	27,439	113,414	16,909	34,160	13,036	14,793	34,516	24,139	12,081	5,017
2007/08	64,024	0	27,439	122,922	18,326	39,245	14,589	15,229	35,534	28,408	12,437	6,495
2008/09	58,954	0	25,266	128,371	20,365	42,757	15,869	14,814	34,566	32,507	12,098	7,452
2009/10	50,532	0	33,688	140,782	21,293	46,270	16,719	16,950	39,550	36,156	13,842	2,133
2010/11	51,468	0	34,312	150,859	21,969	49,861	17,279	18,525	43,225	39,556	15,129	4,089
2011/12	42,904	0	28,603	165,693	23,291	53,534	17,550	21,395	49,922	42,702	17,473	14,679
2012/13	42,904	0	28,603	180,134	23,925	57,207	17,530	24,442	57,031	45,562	19,961	20,113
2013/14	42,904	0	28,603	194,729	25,346	60,839	17,395	27,345	63,804	48,423	22,332	25,286
2014/15	42,904	0	28,603	209,493	26,658	64,470	17,145	30,366	70,853	51,283	24,799	30,639
2015/16	42,904	0	28,603	223,134	28,259	68,101	16,782	32,998	76,994	54,143	26,948	35,402
2016/17	42,904	0	28,603	236,777	29,927	71,391	16,303	35,747	83,409	57,003	29,193	40,001
2017/18	42,904	0	28,603	235,692	31,018	74,681	15,711	34,284	79,997	59,864	27,999	38,213
2018/19	42,904	0	28,603	248,534	32,027	77,519	15,004	37,195	86,789	59,829	30,376	45,501
2019/20	42,904	0	28,603	262,194	33,144	80,356	14,356	40,301	94,036	55,740	32,913	57,137
2020/21	42,904	0	28,603	275,964	34,035	83,194	13,895	43,452	101,388	50,493	35,486	70,001
TOTAL	1,048,119	52,118	573,150	3,100,401	431,449	961,739	256,757	435,137	1,015,320	716,500	355,362	332,046

Table 14.2-13 Assumption of Financing Plan (Scenario2)

Items	US\$ (000)	Share %
Long-Term Loan	1,048,119	62.6
Foreign Grant Aids	52,118	3.1
Own Funds	573,150	34.3
Total	1,673,387	100.0

Source: Study Team

Table 14.2-14 Total Numbers of Additional Subscribers by Service (Scenario2)

Year	Fixed-phone	Mobile	Internet
Existing (Sep. 2002)	310,230	60,000	10,000
2003/04	76,843	85,433	22,000
2005/06	230,528	256,300	66,000
2010/11	426,768	438,377	156,240
2015/16	643,128	634,602	243,090
2020/21	859,488	830,827	329,940

Source : JICA study team 2002

There are no major cash flow differences between scenarios 1 and 2, as shown in Table 14.2-12. This is due to the fact that the scenarios are identical for the period up until 2007/08, a period characterized by the greatest financial burden.

In scenario 2, ETC will be split in to three companies from fiscal 2008/09 onwards. ETC-HQ will become a communications business responsible for fixed telephone services, international telephone services, rural development services, and the operation and maintenance of the national backbone. From a national security standpoint, there is a continuing need for government involvement in the operation of this sector. As mentioned in Chapter 8, if the Ethiopian economy is to falter, private sector investment could easily disappear from the marketplace. Even if this occurs, the communications infrastructure must be maintained as a public service. The Master Plan therefore advocates the need for government involvement in the operation of ETC-HQ.

Mobile-phones and ISPs fall outside the category of “public service”, as their added cost is too high to be classed as the minimum essential communication systems. It is considered that these sectors can be entrusted entirely to the marketplace, and so government investment in mobile-phone and ISP businesses should ideally be kept to a minority level.

So, what needs to be confirmed in the evaluation of scenario 2? The results are identical to scenario 1 for the period up until fiscal 2007/08, and so the viability of operations is to be confirmed by checking the profit structure and cash flow for the telecommunications sector from fiscal 2008/09 onward. Mobile-phone and ISP business is treated as private sector, and so the use of ODA funding is not considered. ODA will only be used for ETC-HQ. This is not different from scenario 1.

Looking at the evaluation results, single-year profit and loss is forecasted to be black over the entire operating period. Looking at the individual annual cash flow, the borrowing rate is set at 60-70%, and so the cash flow will turn positive from the fifth year and be maintained from then on (excl. fiscal 2010/11). Positive effects are apparent from advance strategic investment into mobile-phones. The cumulative cash flow from this effect will go into the black in 2013/13, the 11th year after starting. The cumulative shortage of funds will be US\$70.1 million, with an FIRROI of 16.85%.

A cash flow of US\$ 332 million is created over the operating period, and the financial internal rate of return on Equity (FIRROE) is shown as 20.21%. From the FIRR figure alone, it can be seen that it has sufficient profitability as a business with high public nature. From the standpoint of the Master Plan, it is worth implementing.

In 2002/03, the equity strategic partner is to contribute a corresponding to 30% of the total ETC assets (These are determined by auction, and so the exact figures cannot be established.). If the government re-injects all of this investment into the ETC, the remainder of the fund shortage will come to recover. Looking at the ETC cash flow statement for FY 2001/02, there is little expectation of a surplus.

This is purely a simulation, but it is reasonable to assume that it will be difficult to raise large funds. It would be better to consider the injection of long-term loans. Government liability guarantee will therefore be necessary. In scenario 2, the telecommunications sector will be operated by ETC (a government-controlled company) until 2020/21, and so government support is readily available. It must however be noted that the long-term loan conditions in this evaluation are 10-year repayment with a 4% interest rate. These are soft loan conditions, and would not be readily achievable loan conditions without the cooperation of the Ethiopian government. Full cooperation from the Ethiopian government is therefore necessary to utilize soft loans. It is an essential condition for sustained development of the telecommunications sector.

14.2.5 Sensitivity Analysis

The effects on the profitability of the Master Plan due to changes of conditions assumed in this financial analysis have been analysed. The changes of conditions (variable factors) and their variable ranges have been assumed as follows:

The sensitivity analysis evaluates only the Master Plan portion, and does not include existing business organizations.

a) Total Investment Cost

+20% and -20% of the fluctuation of the Total Investment Cost at the construction stage excluding Interest during construction and Initial Working Capital.

b) Sales Revenue

+20% and -20% of the fluctuation of the sales revenue in each project year.

c) O&M cost

+20% and -20% of the fluctuation of the O&M cost in each project year.

d) Long - Term Loan condition

When the interest conditions are set to 13%, 8%, and 2.6%.

e) Dividend policy

When the Dividend ratios are set to 10%, 20% and 30% of net profit.

The result of the sensitivity analysis is summarised in Table 14.2-15.

Table 14.2-15 The Result of the Sensitivity Analysis for Master Plan (FIRROE)

Variable factor	Variation	Scenario 1	Scenario 2
Total Investment	+ 20%	13.38	12.68
	Base	21.19	20.21
	- 20%	37.34	35.60
Sales Revenue	+ 20%	31.47	29.99
	Base	21.19	20.21
	- 20%	13.38	12.67
O/M cost	+ 20%	19.88	18.90
	Base	21.19	20.21
	- 20%	22.60	21.61
L-T Loan condition 10 yrs repayment	Interest: 13%	14.05	13.27
	Interest: 8%	17.61	16.73
	Base Interest: 4%	21.19	20.21
Dividend ratio	30%	21.19	20.21
	20%	24.47	23.26
	10%	28.01	26.52

n.a : not applicable

Source: Study Team

The sensitivity analysis results are the same for both scenario 1 and 2, but show that the factor with the greatest effect is the investment cost fluctuation.

14.2.6 Major Findings

(1) Rural Funds and Government Support

The evaluation results show that implementing the Master Plan will place a burden on the existing business organizations between 2003/04 and 2005/06, but it will conversely be possible to support existing business organizations once this 3-year start-up period passed. In other words, the evaluation results indicate a profit base enabling healthy operations if projects with the difficult task of improving tele-access are resolved by locating PCOs.

The reason why profitability does not increase is that other profit is offset by rural projects in the form of cross subsidies, as in scenario 1.

From the detailed examination of these evaluation results, the creation of rural funds and continued government support is vital for achieving rural development in scenario 2, as is also the case in scenario 1. Details of the evaluation results are shown in the supporting report.

(2) Cross Subsidies

Implementing the Master Plan, after all, requires a strong awareness of cross subsidies. It is no exaggeration to say that, up until now, operation of the ETC has been supported by the key customers. On the other hand, it is a fact that taking advantage of the benefits of lower telephone charges compared with other countries leads to increase telephone demand together with economic growth. However, it must be firmly noted that most of this new demand will come from general subscribers for which annual usage charges of only around US\$91 are likely. Expanding the network will simply increase the proportion of general subscribers, and the profitability of the

Master Plan will be reduced in comparison with the present network. The revenue of US\$216 per fixed phone subscriber in 2001/02 will be an average of US\$145 in 2020/21. Investment costs cannot be reduced rapidly enough to cope with this shift.

The Master Plan goals cannot be achieved without cross subsidies within the telecommunications sector.

(3) Public and Private Sector Segregation

This Master Plan forms the first stage of the basic minimum access structure, and also embraces the Low Return Project (Rural Project) previously postponed until now. Continuous investment is required for the current development stage, and so the injection of funding from external sources including the strategic partner is vital, since ETC funding alone will not be sufficient.

As far as can be seen from the current Ethiopian telecommunications sector, the market is not yet mature enough to attract private sector operation alone, and government support is essential.

One of the conclusions of the Master Plan for public/private segregation is that the provision of basic services (fixed phone + international communications + national backbone maintenance an operation + rural development) is the responsibility of the public sector, while mobile phone service business and ISP business is the responsibility of the private sector. Given that one of the ultimate goals of the Master Plan is improvement of tele-access, the Master Plan cannot be achieved unless this burden sharing and public/private segregation is implemented.

Withdrawal by the government and increased privatisation beyond what is necessary will create over-competition for a limited number of subscribers, and ultimately destroy the business environment in the Ethiopian telecommunications sector.

The Ethiopian government must ensure that limited development funds are not used in duplicated investment, such as in building overlapping networks, and must give directions the organizations involved to return development investment primarily into tele-access improvements and eliminating demand.

14.2.7 Economic Evaluation

Telecommunication is almost universally recognised as an avenue for raising living standards and a key element of economic development. Thus telecommunication projects have an impact on individual and social welfare. As economic activity should be expanded on a national scale, telecommunications is acquiring strategic importance for growth and development. The telecommunication in Ethiopia, however, is prevented to become mature mainly due to the national treasury problems for development on large scale.

It is clear that there will be adequate demand for the telecommunication service in Ethiopia as the empirical evidence indicates that people place value on using telecommunications. In these circumstances, Government of Ethiopia has come to reconsider ways and means for the improvement of the telecommunication systems. More widely scaled services are to be provided by Ethiopian Telecommunication sector to satisfy the nation's needs. The necessity for planning new telecommunication networks is thus raised.

The economic appraisal is undertaken to ascertain the overall impact of **the M/P (Scenario 1)** on the Ethiopia economy. The Financial Analysis prepared in Section 14.2.1 – 14.2.6 was made from the view point of an investor, whereas the Economic Analysis is made from that of a government decision concerned with broader economic development objectives of the country.

The result of financial analysis of the M/P (Scenario1) suggests that the new investment programme is classified as low profitable project, although considerable efforts are still necessary. It would be a mistake, when evaluating the M/P (Scenario1), to assess and discuss only one issue whether the large-scale investment will pay off or not. It will also be necessary to recognise and assess other issues; for example, the benefits of a countrywide communications network, solving the demand fulfilment and providing services to rural areas.

(1) Method of Economic Evaluation

In this Economic Analysis, the economic effect expected from the performance of these projects will be assessed dealing mainly with the calculation of Economic Internal Rate of Return (EIRR) when discounting sets of economic cost and benefit streams for the M/P. Through elimination of the value of transfer items and application of appropriate shadow prices to the financial cost and benefit streams, the financial cash flows are transferred into economic cost and benefit streams to calculate the EIRR.

(2) Economic Benefit

Economic Benefit of the Master Plan will be divided into direct and indirect benefits, which will be assessed separately.

1) Direct Benefit

The direct benefit of these projects lays its importance in the economic value. Sales revenue in economic value to be generated by the Master Plan is estimated, based on investigation results concerning historical tariff level.

One problem concerns how the difference between mobile phone and fixed phone charges should be considered. In the current charge system, mobile phone charges are three times those for fixed phones. Subscribers accept the higher charges since mobile phones have the added value of allowing calls to be made on the move. However, the spread of fixed phones is not so advanced in developing countries, and in many cases, subscribers requiring a telephone purchase a mobile phone. These subscribers simply require a means of communication, and

would be happy with either a mobile or fixed phone. In this case, the cost of one call is the same for either. For fixed phones at least, the consumer surplus here arises as the cost difference with mobile phones.

2) Indirect Benefit

The improvement of Telecommunication networks will contribute a great deal to the improvement of the national well-being not simply in the form of economic benefit but also in term of social benefit.

Such indirect benefits conceivable are:

For Nations:

- Greater ease in emergency access to medical institutions
- Improved emergency communication, leading to upgrading and diversification of government and private services.
- Economic effects to enhance business activities.
- Increase in employment opportunities, improvement in security, etc.

For Ethiopia Telecommunication Sector:

- Nation-wide expansion of telecommunications service.
- Improvement of telecommunications service.
- Rapid innovation in telecommunications.
- Simplification of network management.
- Creating new services.

With the combination of above effects, national economic growth is promoted.

Implementing the Master Plan involves no factors that will negatively affect Ethiopian society. The transfer of control from benefits to costs is therefore not considered.

(3) Economic Cost

For the economic costs, the following items must be considered.

1) Initial Investment Costs for Implementation of the Projects

The Equipment and Facilities costs, Engineering services costs, Pre-operation costs and Initial working capital will be necessary as the initial cost for the economic value.

2) Operating and Maintenance Costs

As the operating and maintenance costs, the staff costs, general expenses and insurance charges are required. These expenses must be analysed economically considering their economic values.

3) Items of Transfer

The tax imposed on ETC is an actual expenditure for ETC. However, looking at the tax from a social perspective, it is only a transfer of cash from ETC to the government. Since it does not require any resources, it will not be considered as a cost.

For the same reason, the insurance to be paid to domestic companies is a transfer item and therefore is excluded from the cost.

(4) Economic Parameters

The financial value projected in the Financial Analysis will be converted to the economic value using the following factors.

1) Foreign Exchange Premium (FEP)

The foreign exchange premium used was that obtained by canvassing the black market dollar rate in Addis Ababa. Under normal circumstances, the standard conversion factor is calculated from the figure for imports and exports, the FEP being the inverse of the resulting figure, however where a black market dollar rate exists, this is used for the FEP because it is deemed to reflect market prices more accurately.

2) Shadow Premium

The financial values of costs items presented in 'Financial Evaluation' will be divided into local and foreign currencies. Although the value of national parameter is not announced the Government of Ethiopia, the value is set up for the Master Plan with the assumption that socio-economic environment in the country will reach the average level of the African region. Then the economic values will be calculated using the value of national parameters (premium of economic value) as shown below:

- Construction**	0.73
- Unskilled Labor**	0.50
- Working Capital*	1.00
- Foreign Exchange Premium*	1.03

* : Estimated by study team

** : These shadow price ratios were obtained in Uganda

The factor for construction is applied to all locally available sources of equipment and services and the factor for unskilled labour is applied to all local labour.

(5) Economic Analysis

Economic evaluation is more conceptual approach than the financial evaluation with the assumption that economic evaluation employs perspective of society while financial evaluation is

based on business entity's perspective. Therefore, Economic benefit and cost are not directly related to actual monetary flow.

1) Determination of Economic Direct Benefit

As clear from the example of neighbouring Uganda, the recent rapid growth in mobile phone use is transforming subscriber values with regard to telephones. In many countries the number of mobile phones already exceeds that of fixed phones, and what was once one phone per household is now becoming one per person.

In Bangladesh, under similar socio-economic conditions Ethiopia will be experiencing in 2020, the number of mobile phones had outstripped that of fixed phones by 2002. Despite mobile calling charges three times those of fixed phones, subscriber numbers are growing. Seen in terms of a social phenomenon, this means that Bangladeshis wanted a means of communication so much they were willing to pay triple the phone charges to obtain one.

In Addis Ababa, public payphones are limited, and so there are cases of subscriber phones being lent out illegally in front of stores. The charge for these is Brr0.75 for 6 minutes. Considering these two situations, *Economic Benefit Streams 1* is calculated with charges that Ethiopians are willing to pay being the same as for mobile phones, i.e. three times that for fixed phones.

Cost fluctuations due to changes in the exchange rate were next considered. The charge system for fixed phones has remained the same since charges were revised in 1993. However, comparing the exchange rates for 2001/02 with 1996/97 shows a change of approximately 30%. An *Economic Benefit Stream 2* is calculated with this as the consumer surplus latent within the charge system.

The total economic benefits are summarised as shown in Table 14.2-16.

Table 14.2-16 Economic Benefit Streams (Scenario 1)

Unit: US\$1,000

<i>Year</i>	<i>Financial Benefit Stream</i>	<i>Economic Benefit Streams 1</i>	<i>Economic Benefit Streams 2</i>
2003/04	44,453	61,376	50,590
2004/05	73,592	104,421	84,035
2005/06	101,025	144,749	115,500
2010/11	157,659	245,083	191,442
2015/16	241,801	379,618	293,986
2020/21	304,385	509,813	393,414

Source: Study Team

2) Economic Cost Streams

The total investment and O&M costs in each project year described in Table 14.2-17. The costs are converted into the economic cost using value of national parameter (Shadow premium)

Table 14.2-17 Economic Cost Stream

Unit : US\$ 1,000

Year	Investment	O&M cost
2003/04	170,204	14,174
2004/05	170,204	14,941
2005/06	170,204	16,075
2006/07	88,634	16,774
2010/11	88,634	21,700
2015/16	78,178	27,984
2020/21	78,178	33,801

Source: Study Team

(3) Assessment of Result of Economic Analysis

EIRR during the economic life span for the Base cases are calculated using the economic benefit and costs. EIRR, the measures to assess the economic viability, are summarised as shown in Table 14.2-18 and Table 14.2-19.

Table 14.2-18 Economic Cash Flow

Unit: USD 1000

Year	Investment	O&M cost	TTL Cost	Benefit Stream 1	Cash Flow 1	Benefit Stream 2	Cash Flow 2
2003/04	170,204	14,172	184,375	61,376	-122,999	50,590	-133,785
2004/05	170,204	14,941	185,144	104,421	-80,723	84,035	-101,110
2005/06	170,204	16,075	186,279	144,749	-41,529	115,500	-70,778
2006/07	88,634	16,774	105,408	164,274	58,866	129,841	24,433
2007/08	88,634	18,154	106,788	188,554	81,766	149,008	42,220
2008/09	88,634	20,185	108,819	203,791	94,972	159,185	50,366
2009/10	88,634	21,076	109,710	226,437	116,727	176,813	67,103
2010/11	88,634	21,700	110,335	245,083	134,748	191,442	81,107
2011/12	78,178	23,013	101,190	272,487	171,297	212,480	111,290
2012/13	78,178	23,623	101,801	299,435	197,635	232,969	131,168
2013/14	78,178	25,047	103,224	326,700	223,476	253,664	150,440
2014/15	78,178	26,360	104,537	354,326	249,788	274,594	170,057
2015/16	78,178	27,984	106,162	379,618	273,456	293,986	187,825
2016/17	78,178	29,670	107,848	404,888	297,041	313,367	205,519
2017/18	78,178	30,765	108,943	430,141	321,198	332,738	223,795
2018/19	78,178	31,778	109,955	455,375	345,420	352,099	242,144
2019/20	78,178	32,898	111,075	482,463	371,388	372,672	261,597
2020/21	78,178	33,801	111,979	509,813	397,834	393,414	281,435
	1,735,558	428,015	2,163,573	503,688	3,090,359	387,289	1,924,824

**Table 14.2-19 Net Present Value (Discount Rate 12%)
for M/P (Scenario 1)**

Unit: US\$ 1000

	Benefit Stream 1	Benefit Stream 2
Cost (C)	962,461	962,461
Benefit (B)	1,595,938	1,249,583
B – C	633,478	287,122
B / C	1.66	1.30
EIRROI	32.68%	21.52%

Source: Study team

The EIRR in the Master Plan is 32.68% or 21.52% and indicates the existence of economic effects. As may be seen from the figures used to calculate this EIRR, the EIRR figure itself provides no any absolute yardstick. It is not a major element in decision-making in the sense that "if the EIRR is above 20% this should be done", and is closer to a relative value. In other words, it must be remembered that this figure does entail some risk.

In qualitative terms, the Master Plan includes setting up 5000 PCOs for rural telecommunication development, the strategic objective being to achieve 87% tele-access. In terms of making communication more accessible, this is an extremely effective development plan. Mobile phones will become popular first in the capital Addis Ababa, start to function as part of the economic infrastructure, and become an indispensable business tool for economic development in and around the capital.

14.3 Aspect of Organization and Human Resource Development

The master plan is planned to meet increasing and varying demands for telecommunication service. Taking present organization and human resources capacity into consideration as fixed, the implementation of infrastructure development and subsequent operation and maintenance proposed in the master plan might be almost impossible. To fulfill the gap between present capacity and required one for the implementation of infrastructure development, operation and maintenance, organization and human resource development plan has been formulated.

During the formulation of the master plan, feedbacks were carried among the members of the Study Team. In the feedbacks, temporary evaluation was made and excessive loads on the organization or on parts of organization were avoided or organization strengthening and human resources development plans were reviewed. The proposed master plan is the results of these feedback processes.

It may appear to someone that the master plan or organization and human resource development plan are still too challenging. ETC has already started, however, some of the plans and programs for organization and human resource development. Most of the plans and programs recommended in the organization and human resource development plan are further improvement of their activities for organization strengthening and human resource development. ETC has a

base to carry out the recommended the plans and programs for organization and human resource development which will render possible of implementation of telecommunication network development and proper operation and maintenance of the net work proposed in the master plan.

14.4 Social Aspects

(1) Is the Project Planned in a Way Acceptable to the Local Community?

The master plan has been formulated on the assumption that a strategic equity partner will become joint manager of ETC in July 2002.

In Scenario 1 the telecom sector remains a monopoly until 2020, with no especially significant changes. The plan adopts measures such as charge rebalancing to remove to the greatest extent possible any negative effects of the monopoly situation.

Meanwhile, Scenario 2 has multiple private telecommunication operators entering the market from 2008/09 onward, allowing subscribers to select the operator best suited to their purpose. Charging levels in this scenario would be expected to reflect market prices more than in Scenario 1, allowing Ethiopians to enjoy access to inexpensive telecommunication services.

The master plan has been drawn up in a way likely to gain acceptance from the local community.

(2) Does It Serve the Needs of the Local Community?

As of 2002 the number of waiting subscribers for fixed-phones was 155,000, and the number for waiting mobile-phone subscriber was 33,000. Both numbers are high, indicating a strong need for these services among the local community. As shown in the demand forecasts, future need is also likely to be extremely high.

The local community also expects to receive high-quality telecommunication services at a low price. The master plan sets targets for service quality, and aims to improve the quality of service and bring in cost-based charges at the earliest possible stage. International telecommunication charges will be reduced by around 20% on 2002 levels.

The above shows that the master plan will serve the needs of the local community.

Table 14.4-1 will show the main target of the master plan.

Table14.4-1 Main Target of the Master Plan

	2005	2010	2020
Fixed-phone	616,000	841,000	1,341,000
Mobile-phone	317,000	510,000	946,000
Internet	109,000	192,000	405,000
Tele-density	1.27	1.62	2.16
Tele-access	13	41	87

Source: Study Team

(3) Have Rural Areas Been Taken into Consideration?

The issue of how to supply telecommunication services to rural areas is a major one for the master plan. Rural projects are uneconomical, so equipping every rural home with a telephone by 2020 would be impossible i.e. improving tele-density was found to be difficult. The master plan therefore has made improving tele-access as one of its goals, to be achieved by setting up 5000 PCOs nationwide.

This is designed to boost tele-access from 5% in 2001 to 87% by 2020.

(4) Will Any Stakeholders Be Disadvantaged?

The overall state of the telecom sector will be improved, therefore no stakeholders will be disadvantaged.

In Scenario 2, multiple private telecommunication operators enter the market in 2010. This would bring competition for customers not possible while the sector remains an ETC monopoly, sorting the winners from the losers in the Ethiopian telecom market by how well companies succeed in luring key customers.

From the viewpoint of ETC, although the company would have a head start as the first carrier on the scene, it would be disadvantaged by the shift to an environment of constant, daily competition. This is a drastic alteration in the operating environment, however a transformation essential for the future growth of the telecom sector.

If ETC and private telecommunication operators were to reduce international call charges and expand ISP services, and policing of illegal VoIP services was tightened, this would lead to deterioration in operating conditions for VoIP operators running illegal black-market services. These operators however are not counted as disadvantaged stakeholders.

(5) Will There Be Any Negative Impact on People's Lifestyles?

Implementation of the master plan will bring a major improvement in both the quality and quantity of telecommunication services, and allow Ethiopians to enjoy telecommunication services at a low cost. Implementation of the master plan will in fact improve people's lifestyles.

14.5 Overall Evaluation

The Master Plan has been formulated with the objectives of (1) Improving tele-access and (2) Eliminating the digital divide, and it must be reiterated that the aim is not necessarily to boost the financial status of ETC. This being the case, the Plan takes the view that active efforts should also be made to roll out uneconomical rural services to the extent that funds permit.

At the time the Master Plan was being formulated, the Ethiopian telecommunication sector faced the following problems: (1) Low levels of tele-access and tele-density, (2) Delayed take-up of mobile-phones, (3) Declining income from international telecommunications, (4) Stalled rural

development projects, (5) Delay in deregulating the telecommunication sector and lack of private sector activity, and (6) Retention of the ETC monopoly.

The Master Plan proposed the following strategies for solving these six problems.

- 1 Concentrating on promoting growth in the highly profitable mobile-phone business
- 2 Adopting a pre-paid formula for 80% or more of mobile-phones
- 3 Rolling out 5000 PCOs nationwide to improve tele-access
- 4 Splitting ETC to ease the way for introduction of private operators

Although long-term plans have been put forward for the training of personnel for the telecommunication sector and for business strategies, so far the Master Plan has only been assessed and motives assigned in terms of the financial indicators. Now, in addition to this financial assessment, the Master Plan has been evaluated from the customer, business process and learning and growth perspectives.

(1) Customer Perspective

The customer perspective ranks most highly among the strategic objectives of the Master Plan.

This strategy involves restoring customer faith in Ethiopian telecommunication services by improving both tele-access and tele-density. The plan is to raise tele-access from its current 5% (2002) to 87% by 2020, and tele-density from 0.5 (2002) to 2.16 (2020). The plan also aims to meet customer needs by working actively to provide mobile-phone and Internet services. Target subscriber numbers are shown in Table 14.4-1.

(2) Financial Perspective

The financial goal of the Master Plan is to secure the minimum level of profitability required to make the improvements to tele-access and tele-density needed to restore customer faith in Ethiopian telecommunications. The aim will be to reduce borrowings as much as possible and to fund projects internally.

As shown earlier in section 14.2, the Master Plan indicates a FIRROE of 21.19%, FIRROI of 17.56%. The Plan provides for a dividend of 30% of the net profit for the shareholders i.e. the strategic equity partner and the Ethiopian government, and as such may be considered an appropriate plan in financial terms.

(3) Business Process Perspective

After identifying strategic measurements from the customer and financial perspectives, strategic measurements were drawn up for business processes. This sequence of strategic measurements ensures that business processes are designed to meet the goals identified as beneficial to customers and shareholders.

The Master Plan sets the following four objectives for improving ETC business processes.

(a) Ensuring ETC Staff Understand the Market

First of all it will be necessary to propagate understanding among ETC staff that the ETC operation is part of the service industry. The plan for human resource development in the Master Plan includes staff training to effect a change in attitude among employees.

Only when staff understand the transformation of the market into a competitive environment and the services demanded by the market will ETC be able to provide telecommunication services to meet the needs of customers.

(b) Changing the Business Model

Projected changes in the revenue structure will see the business model replaced by a new strategic business model concentrating on mobile-phone and Internet services.

This new business model has ETC capturing a share of the mobile-phone and Internet markets early on to allow cross subsidies between rural and urban services.

(c) Providing Services in a Responsible Manner

Because the telecommunication sector has to date been run as a monopoly, a customer-oriented approach to service has been lacking, and no efforts made for example to identify customer requirements in future.

Assuming the sector is to be privatized, ETC needs to break this habit of reactive action, i.e. it needs to approach customers in a more proactive way. Doing so will enable it to identify trends in the market and become a leading company in the sector.

By segmenting its customers as suggested in the Master Plan, ETC will find out what customers want, allowing it to review the content of its services. Setting up a customer service unit specifically for key subscribers will also be essential if ETC is to stabilize and retain the core of its revenue structure.

(d) Improving Productivity Has Been Made a Strategic Objective

ETC takes a long time to collect its accounts receivable - around 150 days. The probable reasons for this lie in a breakdown in communications between the billing process, customers and the customer service section. Possible factors include improper billing and delays in sending out bills.

In a Master Plan that involves a major increase in subscribers from here on, problems in collecting charges will undoubtedly arise. From a financial perspective the Master Plan endeavors to improve the collection rate by making the strategic decision to adopt a pre-paid system for mobile-phones, which will form the nucleus of the revenue structure.

From the perspective of business processes, the Master Plan advises an overhaul of the precision, frequency and stringency of billing.

In terms of enhancing productivity, the Master Plan advises out-sourcing OSP (outside plant) operations. As of 2002 ETC installation capacity is believed to stand at around 30,000 connections, however by out-sourcing this work, ETC would be able to install 50,000 connections per annum.

(4) Learning and Growth

Learning and growth form the structural foundations for achieving ETC objectives from the three perspectives described above.

If ETC is to make enhancing profitability one of its objectives in the long term, it must work on the following three main areas.

(a) Employee Capabilities

Technological innovation in the telecommunication sector occurs at a rapid rate, and unless active efforts are made to absorb information and know-how concerning new technologies, ETC will find itself behind the times. The Master Plan includes plans for installation of an IP network in 2005, and expansion of ISP operations, and presents a plan for developing the human resources required to maintain these.

(b) Information System Capabilities

ETC does offer an ISP (Internet service provider) service, and has commenced the establishment of internal IT tool called CIMIS (Centralized and Integrated Management Information System), which is expected to improve the wide-range of management including customer services has appreciated CIMIS as a highest priority project and expects ETC to develop the new business field of IT. The estimated cost of this is given as US\$17.5 million and the project can be funded from within ETC.

(c) Improving Motivation

Once the telecommunication sector is opened up to competition, ETC staff must be motivated to direct their activities toward achieving the company's strategic objectives.

The Master Plan identifies attracting mobile subscribers and Internet subscribers as part of ETC strategy, however this will require an internal structure enabling staff to work positively toward these goals.

Table 14.5-1 Strategic Objective and Measurement

Strategic Objectives	Strategic Measurement	
	Core Outcomes	Performance Driver
1)Customer perspective Restoring customer faith in service Enhancing customer satisfaction	Eliminating subscriber waiting lists Improving Tele-access Improving Tele-density Attracting and retaining subscriber (in each segment) Identifying Key subscribers	Number of subscriber per region Increase in number of mobile-phone subscribers Increase in number of Internet subscribers Number of Key subscribers
2)Financial perspective Securing stable sources of revenue Diversifying sources of revenue Investment strategy Meet Shareholder Expectation	Sales profit ratio Boosting revenues Efficiency of Investment Payment of dividends	Mobile-phone sales Internet sales Revenue collection period Dividend rate
3)Internal-Business process perspective Understanding the market Changing the business model Providing services in a responsible manner Improving productivity	Share of customer segments Identifying future customer needs Revenue from mobile-phone and Internet Share of Pre-paid Mobile-phone market Time taken to recover from faults Call completion rate Expense ratio Precision, Frequency, and stringency of billing	Surveys of customer satisfaction Changes to revenue structure Identifying causes of faults Expense management, moving staff Out-sourcing Quality of billing Communicating with customers Work of Key customer service unit
4)Learning and Growth perspective Setting individual goals for employees Improving information system capabilities Boosting staff capabilities	Revenue per staff member Proposals per staff member Staff satisfaction Staff retention Number of employees per PC Staff productivity	Improving motivation Developing staff skills

14.6 Conclusion

The results of analysis to this point confirmed the following:

- (1) If ETC implements the Master Plan in a rational and proper manner, it will be able to generate a large financial profit in the form of local currency.
- (2) In Ethiopia, where demand exceeds supply, even under a policy involving lower charges than other countries, all the costs of providing and expanding telecommunication services including the cost of capital could be recovered from charging revenues.
- (3) There has been cross subsidizing of domestic calls by international calls. The development of Internet technology will make it difficult to sustain these cross subsidies, and it was found that these would change to cross subsidies between mobile-phone, Internet and fixed-phone services.

The results of this analysis indicate that if this were a business run by the government as part of the country's social infrastructure, it would offer more than sufficient returns. However, the strategic equity partner will be a private investor. In Scenario 1 no dividend is paid for the first three years. Some doubt remains as to whether private investors would show any interest in implementing the Master Plan in a country with a national discount rate of 10.0% - 12.0%. The Master Plan proposed here would deliver a comprehensive and balanced network. Naturally the character of some of the projects involved would require cross subsidies, and if these projects were not carried out because it was uneconomical to do so, this would mean failure to achieve the objectives of the Master Plan. Efficient means should be chosen to bring the Master Plan to fruition, taking into account the need to achieve its objectives, and seeking the understanding of the strategic equity partner regarding this need.