CHAPTER 9

ANALYSES OF FINANCIAL, ECONOMIC, AND SOCIAL ASPECTS

CHAPTER 9

ANALYSES OF FINANCIAL, ECONOMIC, AND SOCIAL ASPECTS

1. Financial Analysis

1.1 Objectives

A financial analysis is conducted for the basic plan up to the year 2010. The objectives of the financial analysis are the following.

- to confirm the profitability of the basic plan by deriving a financial internal rate of return (FIRR)
- to check the soundness of financial management by analyzing an income statement and a cash-flow statement of the basic plan

1.2 Assumptions

The following are the assumptions applied to the financial analysis.

Overall Assumptions

a) The financial analysis is conducted from the point of view of a notional unit of MCAC and MTC combined, respectively responsible for development and operation of the new telecommunications system. In this regard, Project number 2. "Governmental Network Rehabilitation" is excluded from the financial analysis. Figure 9-1-1 shows organizational relations and flows of money concerning development and operation of telecommunications services.

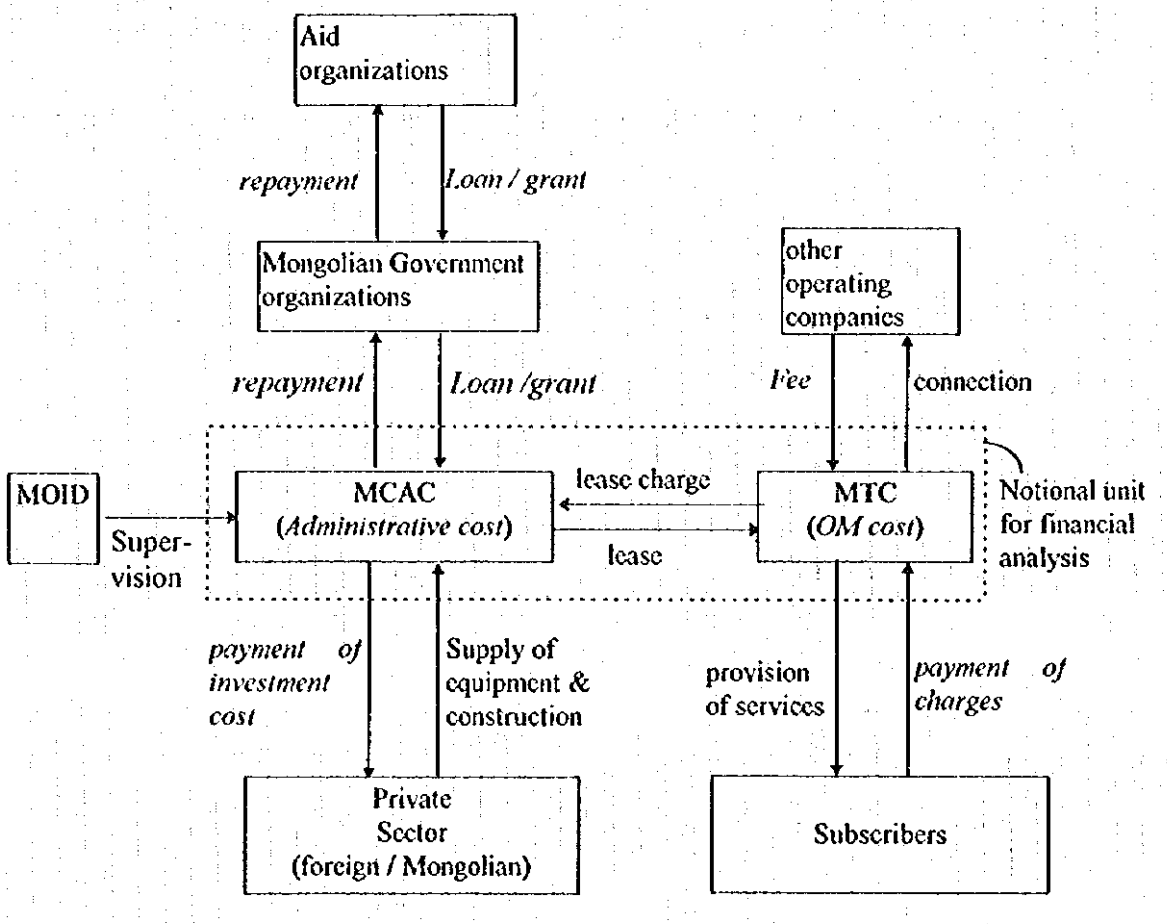
b) The analysis focuses only on the portion of the telecommunications network to be added by the investment from 1998 until 2010. The existing portion, including that of the ongoing ADB project, is excluded from the analysis.

c) An evaluation period is 20 years. Since the last investment proposed in the basic plan appears in 2010, the final year of the evaluation is 2030.

d) The analysis is carried out on a real term basis, taking no account of inflation and foreign exchange rate fluctuations. It is assumed that tariff level be adjusted in proportion to cost increase or revenue reduction caused by inflation or tugrig devaluation to achieve the forecast financial management performance.

e) Exchange rate applied is 490 Tg. per US$, which is the average in April 1996.

f) An FIRR is derived as the rate of return to the planned investments from 1998 to 2010.



Note : Money flows in italic letters are to be focused in financial projection.

Figure 9-1-1 Organizational Relations and Flows of Money in the Telecommunications Sector

Revenue

g) A number of assumptions applied to the MTC's financial projection made in the Business Plan by the ADB project team were referred to. Table 9-1-1 presents the MTC's operating revenues and expenditures in 1995 and a projection for 2000 made by the ADB project.

Table 9-1-1 Present and Projected Operating Revenues Expenses of MTC

Item	1995		2000	
	Total	(%)	Total	(%)
Operating Revenue				
Rental	1,457.0	19.0	1,545.4	13.8
Residential	-	-	245.6	2.2
Government	-	-	500.8	4.5
Business	-	-	799.0	7.1
Calls	4,186.0		8,735.3	78.0
Local	0.0	0.0	643.0	5.7
Long Distance (UB,D,E)	-	-	952.9	8.5
Long Distance (Others)	-	-	790.2	7.1
Long Distance (Sub-total)	1,125.0	14.7	1,743.1	15.6
International	3,061.0	39.9	6,349.2	56.7
Additional Telephone Services	94.0	1.2	11.0	0.1
Public Call Offices	0.0	0.0	52.6	0.5
International Settlement			4,245.3	-
In	-	-	4,245.3	-
Loss Out			-4,227.9	-
Net	546.0	7.1	17.4	0.2
Connection Fees	110.0	1.4	0.0	0.0
Telegram and Telex	192.0	2.5	150.0	1.3
Leased Channels	648.0	8.4	380.0	3.4
Access Charge	0.0	0.0	0.0	0.0
Other Revenue	162.0	2.1	300.0	2.7
TV & Radio	282.0	3.7	0.0	0.0
Total	7,677.0	100.0	11,191.7	100.0
Operating Expenses				
Rental Charge from MCAC	961.0	21.3	3,823.2	49.1
License Fee	0.0	0.0	9.2	0.1
Personnel	1,548.0	34.2	2,137.5	27.4
Insurance	321.0	7.1	0.0	0.0
Utilities	396.0	8.7	507.4	6.5
Transport	129.0	2.8	191.0	2.5
Materials	108.0	2.4	169.0	2.2
Fuel	295.0	6.5	283.7	3.6
Repairs	142.0	3.1	166.8	2.1
Satellite Charges	127.0	2.8	159.3	2.0
Circuit Rental	0.0	0.0	0.0	0.0
Administration	98.0	2.2	203.4	2.6
Miscellaneous	402.0	8.9	137.9	1.8
Sub-Total	4,530.0	100.0	7,791.4	100.0
Foreign Exchange Loss	92.0	-	18.4	-
Bad Debt Provision	59.0	-	1,067.2	-
Depreciation	774.0	-	566.4	-
Total	5,455.0	100.0	9,443.4	100.0

Source : Draft Business Plan for MTC by the Asian Development Bank Project Team (Dec. 1995)

Note : Revenues and Expenditure for 1995 given by MTC

h) Revenues are estimated for call revenues, rental revenue, installation charge revenues, and other revenues.

i) Call revenues include local call, long-distance call, and international call revenues. Revenue for local calls are estimated based on the estimated traffic and a new tariff planned to be introduced soon, Tg. 3 per minute beyond 150 minutes per month.

j) Revenue from long-distance call is estimated based on the average long-distance call revenue per subscriber in 1995 in Ulaanbaatar, Tg. 11,050 / subscriber per year and the number of subscribers to be added. The unit rate of Tg. 11,050 per subscriber, derived as below, is adjusted by applying rates of annual change in traffic generation per subscriber estimated as part of traffic forecast.

Revenue in 1995	:	Tg. 487.1 million*
No. of subscriber	:	44,079
Revenue/subscriber	:	Tg. 11,050 per year

* That of Ulaanbaatar, Erdenet and Darhan estimated by multiplying 43.3% (actual proportion in the first half of 1995) to the total long distance call revenue.

k) Revenue from international calls is estimated based on the average international call revenue per subscriber in 1995 in Mongolia, Tg. 43,100 / subscriber per year and the number of subscribers to be added. The unit rate of 43,100 Tg. per subscriber, derived as below, is adjusted by applying rates of annual change in traffic generation per subscriber estimated as part of traffic forecast. Two downward adjustments in the international call tariff level are assumed, first in 1996 and the second in 1998, following the ADB's recommendation. The level of international call tariff in Mongolia will become equivalent to those of other Asian countries as a result of the two adjustments.

Revenue in 1995*	:	Tg. $3,061 \times 10^6$
No. of subscriber*	:	70,908
Revenue/subscriber	:	Tg. 43,100 per year

* That in Mongolia

l) Rental revenue is estimated based on the following existing charges and the number of subscribers of each category.

- non-budgetary(business): Tg 6,600 / subscriber / month
- budgetary (government) : Tg 3,900 / subscriber / month
- residential : Tg 420 / subscriber / month

m) Installation charge revenue is estimated based on the following existing charges.

- business /government : Tg 2,400
- residential : Tg 12,000

n) Revenue from other sources is assumed to be 9.0 % of the sum of call revenues and rental revenue based on the revenue pattern projected for 2000. It is assumed that the proportion at 9.0 % will remain constant as a result of mixed effects of both decreasing services such as telegram and telex and increasing services such as leased channels and access charges.

Expenditure

o) Expenditures are estimated for personnel expenditure and non-personnel expenditure.

p) Personnel expenditure is estimated based on the assumed number of MCAC and MTC employees to be added for operating the proposed network and per-employee expenditure of MTC in 1995. The MTC's per-employee cost is assumed to grow in real term at 5.0 % per year since 1996 until 2010 taking into consideration the need for maintaining high quality personnel.

The MTC's per-employee cost was about 328,000 Tg per employee in 1995 (Tg. 1,548.0 million/4,720 employees). The number of employees to be additionally hired for an incremental investment is 15 to 16.

q) Non-personnel expenditure is estimated based on MTC's per-subscriber cost in 1995, Tg 24,000 (Tg. 1,697 million/70,908 subscribers = Tg 23,932/subscriber rounded) per subscriber. Cost items included are utilities, transport, materials, fuel, repairs, satellite charges, administration, and miscellaneous cost. An annual increase of 1.8 % is assumed to take into account the expected real term rises in transport, repair, and materials costs.

Other assumptions

r) Income tax is 53 % of income before tax based on the record in 1995.

s) It is assumed that the loan for investment fund be procured by the Mongolian government from overseas sources and relent to MCAC. In preparing a cash flow statement, the conditions of loan are set following the case of the ongoing Asian Development Bank project, interest at 6.7 % year and a repayment period of 20 years including no grace period.

1.3 Results of Financial Analysis

Based on the costs and revenues estimated as shown in Table 9-1-3, a financial internal rate of return (FIRR) is calculated. FIRR is derived at 8.5%. A summary of revenues and expenditures are given in Table 9.1.2. The following points can be made.

- An FIRR at 8.5% is considered moderate for a public investment program. This FIRR is an average of all the investment components until 2010 including both cost-efficient projects and cost - inefficient projects.

- Externally the basic plan will generate sufficient revenue to repay a loan provided that the same conditions as those attached to the existing ADB telecommunication project are given : service charge at 0.75% per year and a repayment period of 40 years with a 10-year grace period.

Table 9-1-4 presents an income statement and a cash flow statement of the basic plan. The following are the findings.

- The income statement of the basic plan shows the plan will generate deficits in the initial 3 years. Further effort is needed on the part of MTC and MCAC in reducing costs and increasing revenue. Since the cause of deficit, however, is the depreciation cost, these deficits are not problematic in terms of actual financial management.

- In terms of cash flow forecast with the loan conditions of the relending arrangement between MCAC and the Mongol Bank for the ongoing ADB loan (interest at 6.7% per year and a repayment period of 20 year with no grace period), the basic plan will generate single-year deficits until the year 2008. On an accumulation basis, it will be the year 2013 when the deficit disappears.

Based on this finding, it is judged to be necessary for the Mongolian government and MCAC to settle a different set of conditions for relending the loan for implementing the basic plan. Table 9.1.5 shows an alternative cash flow assuming an interest rate at 5.0% per year and a repayment period of 20 years including a 10-year grace period. This alternative cash flow shows there will be no year when deficit appears. The following points need to be clarified in settling down on a set of conditions for relending arrangement between MCAC and the government.

- tax exemption
- provision of a grace period
- adjustment of interest rate

Table 9-1-2 Summary of Revenues and Expenditures of the Basic Plan up to 2010

Item	(Unit : million US)				(%)			
	2000	2005	2010	2020	2000	2005	2010	2020
Revenue								
Local call revenue	0.401	1.754	4.314	6.782	15.3	15.6	15.3	15.5
Long distance call revenue	0.377	1.829	5.198	8.529	14.4	16.3	18.5	19.5
International call revenue	1.064	4.800	12.465	19.730	40.7	42.7	44.3	45.0
Rental fee revenue	0.374	1.529	3.200	5.150	14.3	13.6	11.4	11.8
Installation charge revenue	0.298	0.426	0.719	0.000	11.4	3.8	2.6	0.0
Other revenues	0.199	0.892	2.266	3.617	3.9	7.9	8.0	8.3
Sub-total	2.714	11.230	28.161	43.808	100.0	100.0	100.0	100.0
Expenditure								
Personnel cost	0.024	0.097	0.191	0.167	0.7	0.9	1.2	1.0
Non-personnel cost	0.635	2.678	6.414	9.391	17.3	25.6	39.2	57.2
Depreciation	3.016	7.683	9.742	6.864	82.1	73.5	59.6	41.8
Sub-total	3.675	10.458	16.347	16.422	100.0	100.0	100.0	100.0
Income before tax	-0.961	0.772	11.814	27.386	-	-	-	-
Income tax	0.000	0.409	6.261	14.515	-	-	-	-
Income after tax	-0.961	0.363	5.553	12.871	-	-	-	-

Note : income tax: 53% of pre-tax income

Source: Chapter 6 "Data on Expenditure and Revenue Estimates", Volume V.

2. Economic Analysis

2.1 Economic Internal Rate of Return

An economic internal rate of return (EIRR) of the basic plan is derived to confirm the economic viability of the basic plan from the point of view of the economy as a whole. The following are the assumptions.

- An evaluation is made on a real term basis taking no account of inflation and foreign exchange rate fluctuations.
- An evaluation period of 20 years is applied.
- Investment and operation and maintenance costs applied to the financial analysis are modified to eliminate a transfer payment. A coefficient of 0.895 is multiplied to the costs estimated for financial analysis. This coefficient is derived based on the cost estimate for the ATC-6 project.
- Based on the findings of the Socio-Economic survey, the portion of consumer surplus was estimated and included in economic benefit. The following are the coefficients multiplied to financial revenues.
  - calls (local, long distance, international) : 1.31 *
  - installation charge:
    residential :1.75
    business :1.48
  - rental fee :1.0(no consumer surplus)

  *weighted average of residential and business subscribers (1.12 and 1.77) estimated based on the data on call minutes of residential and business subscribers.
- Income tax is not derived since it is a transfer payment.
- An EIRR is derived as a rate of return to the planned investments between 1998 and 2010.

EIRRs are derived for various cases as follows. A cost-benefit flow for the normal case is presented in Table 9-2-1.

- normal case :	14.9%
- costs 10 % up :	13.7 %
- revenue 10 % down :	13.6 %
- costs 10 % up and revenue 10 % down	12.4%

The EIRR under the normal case is derived at 14.9%, which shows sound economic viability of the basic plan. This level of EIRR is higher than an estimated opportunity cost of capital in Mongolia at around 12%.

2.2 Anticipated Economic Benefits of the Basic Plan

The EIRR calculation in the previous subsection captures only those benefits that could be measured. Overall there are a wide range of benefits that will be realized by implementing the basic plan, but not quantified.

Telecommunications services plays an important role in economic development and the upgrading of living standard in Mongolia, especially in Ulaanbaatar which will lead the development of the country. The role of telecommunications services is particularly essential for a country like Mongolia characterized by a vast land area, sparse population, stretched but underdeveloped transportation network and severe climate in winter time. The improved telecommunications services by the implementation of the basic plan is anticipated to generate a number of economic benefits in the aspects such as follows.

- to foster a transition to a market economy by ensuring better communication among producers, retailers and wholesalers and consumers
- to create a better environment for business operations enhancing operational efficiency and encouraging investment, both by improved telephone services and provision of various new services
- to create a better environment for international business activities, expected to spearhead economic development of Mongolia, by ensuring better links with overseas partners, thus encouraging integration of Mongolia into world economy
- to enhance efficiency in transportation systems operation and saving in energy use
- to encourage a better regional and urban development pattern such as reduced isolation of remote areas and decentralization of economic activities
- to improve access to various social services such as health, education and social welfare
- to improve access to communication for emergency cases, especially for remote and rural areas
- to increase efficiency in providing various government services

3 Social Analysis

The Socio-Economic Survey conducted during the second survey in Mongolia provides an insightful view into the expected improvement of people's life by the implementation of the basic plan.

In response to a question concerning the improvement people feel after installing a phone, the following answers are given.

- Easier to communicate with people
- Saves a lot of time and travel expenses
- Easy to call an ambulance and a doctor
- Speedier and more successful work
- Life became interesting and comfortable.
- Easier communication, especially for old people

It is found that the life becomes easier and more comfortable by having a phone through reduced time, money and energy for travel, more efficient work made possible and an increased sense of security in emergency cases. The improvements in these aspects have even greater positive impact especially for socially vulnerable people such as old people and children. These benefits would be strongly felt especially in a place like Mongolia and Ulaanbaatar where public transportation system is underdeveloped and climate is severe.

The Socio-economic Survey revealed that in the absence of telephone people spend plentiful time and energy for traveling in order to communicate with people. Some people spend almost 2 hours for traveling 20 kilometers to see somebody. It is common for people having no phone to travel several kilometers spending 20 to 30 minutes just to see someone. Avoidance of these travels by having a phone at home or a public phone close to home would substantially reduce the burden for communication, resulting in longer time being able to be spent for other activities, thus securing a more comfortable and enriched life.

An important point made clear by the Socio-Economic Survey is the need for improving access to telephone for emergency cases. Many respondents mentioned that they had a trouble in calling an ambulance in the case of sickness, baby delivery and injury. Some people could not call the police when they were burglarized or broken in into their ger plot. Although the frequency for making calls for emergency cases is lower than general calls, it is very in these crucial moments when telecommunication plays the best role.

they were burglarized or broken in into their ger plot. Although the frequency for making calls for emergency cases is lower than general calls, it is very in these crucial moments when telecommunication plays the best role.

With the implementation of the Basic Plan, the telephone penetration ratio in Ulaanbaatar is planned to reach 21 telephones per 100 population in 2010 as opposed to present 7.1. This means that such social benefits as mentioned so far will be felt by most of the population in Ulaanbaatar estimated to reach about 779 thousand in 2010.

Table 9-1-3 Financial Internal Rate of Return of the Basic Plan

FIRR = 1) normal case : 8.51%
2) cost 10% up : 7.57%
3) revenue 10% down : 7.47%
4) 2) plus 3) : 6.56%

(Unit : million US$)

No.	Costs			Revenue	Income before tax	Income tax	Income after tax plus depreciation*
	Investment**	OM	Depreciation				
1998	19.395	0.000	0.000	0.000	-19.395	0.000	-19.395
1999	27.221	0.326	1.368	1.479	-27.436	0.000	-26.068
2000	24.563	0.659	3.016	2.714	-25.524	0.000	-22.508
2001	18.841	0.999	4.455	4.001	-20.294	0.000	-15.839
2002	10.162	1.375	5.655	5.492	-11.700	0.000	-6.045
2003	10.576	1.794	6.255	7.174	-11.451	0.000	-5.196
2004	9.909	2.259	6.985	9.083	-10.070	0.000	-3.085
2005	8.092	2.775	7.683	11.230	-7.320	0.000	0.363
2006	7.436	3.382	8.189	13.826	-5.181	0.000	3.008
2007	8.442	4.060	8.688	16.741	-4.449	0.000	4.239
2008	5.002	4.816	9.251	20.067	0.998	0.529	9.720
2009	3.849	5.661	9.528	23.866	4.828	2.559	11.797
2010	2.514	6.605	9.742	28.161	9.300	4.929	14.113
2011	0.000	7.221	9.880	30.813	13.712	7.267	16.325
2012	0.000	7.886	9.880	33.917	16.151	8.560	17.471
2013	0.000	8.604	9.880	37.208	18.724	9.924	18.680
2014	0.000	9.379	9.880	40.700	21.441	11.364	19.957
2015	0.000	10.217	9.880	44.405	24.308	12.883	21.305
2016	0.000	10.217	9.880	43.808	23.711	12.567	21.024
2017	0.000	10.217	9.880	43.808	23.711	12.567	21.024
2018	0.000	10.217	9.880	43.808	23.711	12.567	21.024
2019	0.000	9.890	8.512	43.808	25.406	13.465	20.453
2020	0.000	9.557	6.864	43.808	27.387	14.515	19.736
2021	0.000	9.218	5.426	43.808	29.164	15.457	19.133
2022	0.000	8.841	4.226	43.808	30.741	16.293	18.674
2023	0.000	8.423	3.625	43.808	31.760	16.833	18.552
2024	0.000	7.958	2.895	42.627	31.774	16.840	17.829
2025	0.000	7.442	2.197	41.391	31.752	16.829	17.120
2026	0.000	6.835	1.691	40.106	31.580	16.737	16.534
2027	0.000	6.157	1.192	38.642	31.293	16.585	15.900
2028	0.000	5.400	0.629	36.991	30.962	16.410	15.181
2029	0.000	4.555	0.352	35.115	30.208	16.010	14.550
2030	0.000	3.612	0.139	33.005	29.254	15.505	13.888
total	156.002	196.557	197.603	949.218	399.056	287.194	309.465

Note :
Income tax : 53.00%
* Depreciation is added to income after tax to derive FIRR to investment.
** Investment costs do not include that for government network rehabilitation project.

Table 9-1-4 Income Statement and Cash Flow Statement of the Basic Plan up to 2010 : Basic Case

(Unit : million US$)

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
(Income Statement)																	
Revenue	0.000	1.479	2.714	4.001	5.492	7.174	9.083	11.230	13.826	16.741	20.067	23.866	28.161	30.813	33.917	37.208	40.700
Personnel & other cost	0.000	0.326	0.659	0.999	1.375	1.794	2.259	2.775	3.382	4.060	4.816	5.661	6.605	7.221	7.586	8.604	9.379
Depreciation	0.000	0.970	2.331	3.559	4.501	5.009	5.538	6.033	6.438	6.810	7.232	7.482	7.674	7.800	7.800	7.800	7.800
Income before tax	0.000	0.183	-0.276	-0.557	-0.384	0.371	1.286	2.422	4.006	5.871	8.019	10.723	13.882	15.792	18.231	20.804	23.521
Income tax	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.283	2.123	3.112	4.250	5.683	7.357	8.370	9.662	11.026	12.466
Income after tax	0.000	0.183	-0.276	-0.557	-0.384	0.371	1.286	1.138	1.883	2.759	3.769	5.040	6.524	7.422	8.569	9.778	11.055
(Cash Flow Statement)																	
Sources :																	
Income after tax	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.138	1.883	2.759	3.769	5.040	6.524	7.422	8.569	9.778	11.055
Depreciation	0.000	0.970	2.331	3.559	4.501	5.009	5.538	6.033	6.438	6.810	7.232	7.482	7.674	7.800	7.800	7.800	7.800
Loans	19.395	27.221	24.563	18.841	10.162	10.576	9.909	8.092	7.436	8.442	5.002	3.849	2.514	0.000	0.000	0.000	0.000
Total	19.395	28.191	26.894	22.400	14.663	15.585	15.447	15.264	15.757	18.011	16.003	16.371	16.713	15.222	16.369	17.578	18.855
Applications :																	
Investment	19.395	27.221	24.563	18.841	10.162	10.576	9.909	8.092	7.436	8.442	5.002	3.849	2.514	0.000	0.000	0.000	0.000
Loan repayment	0.000	1.556	3.741	5.712	7.223	8.039	8.888	9.683	10.332	10.929	11.606	12.007	12.316	12.518	12.518	12.518	12.518
Total	19.395	28.777	28.304	24.553	17.385	18.615	18.797	17.775	17.768	19.371	16.608	15.856	14.830	12.518	12.518	12.518	12.518
Cash surplus for Year	0.000	-0.587	-1.410	-2.153	-2.722	-3.030	-3.350	-2.511	-2.011	-1.359	-0.605	0.514	1.882	2.704	3.851	5.060	6.337
Accumulated profit		-0.587	-1.996	-4.149	-6.871	-9.901	-13.251	-15.762	-17.773	-19.132	-19.738	-19.223	-17.341	-14.637	-10.786	-5.726	0.611

Item	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
(Income Statement)																
Revenue	44.405	43.808	43.808	43.808	43.808	43.808	43.808	43.808	43.808	42.627	41.392	40.106	38.642	36.991	35.115	33.005
Personnel & other cost	10.217	10.217	10.217	10.217	9.890	9.557	9.218	8.841	8.423	7.958	7.442	6.832	6.157	5.400	4.555	3.612
Depreciation	7.800	7.800	7.800	7.800	6.830	5.469	4.241	3.299	2.791	2.262	1.767	1.362	0.990	0.568	0.318	0.126
Income before tax	26.388	25.791	25.791	25.791	27.088	28.782	30.349	31.668	32.594	32.407	32.183	31.912	31.495	31.023	30.242	29.267
Income tax	13.986	13.669	13.669	13.669	14.356	15.254	16.085	16.784	17.275	17.176	17.057	16.913	16.692	16.442	16.028	15.512
Income after tax	12.402	12.122	12.122	12.122	12.731	13.527	14.264	14.884	15.319	15.231	15.126	14.999	14.802	14.581	14.214	13.756
(Cash Flow Statement)																
Sources :																
Income after tax	12.402	12.122	12.122	12.122	12.731	13.527	14.264	14.884	15.319	15.231	15.126	14.999	14.802	14.581	14.214	13.756
Depreciation	7.800	7.800	7.800	7.800	6.830	5.469	4.241	3.299	2.791	2.262	1.767	1.362	0.990	0.568	0.318	0.126
Loans	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	20.202	19.922	19.922	19.922	19.562	18.997	18.505	18.183	18.110	17.493	16.893	16.361	15.793	15.149	14.532	13.881
Applications :																
Investment	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Loan repayment	12.518	12.518	12.518	12.518	10.962	8.777	6.806	5.295	4.479	3.630	2.835	2.186	1.589	0.912	0.511	0.202
Total	12.518	12.518	12.518	12.518	10.962	8.777	6.806	5.295	4.479	3.630	2.835	2.186	1.589	0.912	0.511	0.202
Cash surplus for Year	7.684	7.404	7.404	7.404	8.600	10.219	11.699	12.888	13.631	13.863	14.058	14.175	14.203	14.237	14.021	13.680
Accumulated profit	8.295	15.699	23.103	30.507	39.107	49.326	61.025	73.913	87.544	101.407	115.465	129.639	143.843	158.080	172.101	185.780

Notes : Assumpn Income tax : 53% of pretax income interest : 5.00% / year (loan from the Mongl Bank to MCAC)
repayment period : 20 years grace period : 0 years Tariff increase : 0% /year

Table 9-1-5 Cash Flow Statement of the Basic Plan up to 2010 for an Alternative Case

1. Grace period of 10 years for loan to MCAC and interest rate at 5%/year

Interest rate : 5.00% per year

(Unit : million US$)

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Sources	19.395	28.191	26.894	22.400	14.663	15.585	15.447	15.264	15.757	18.011	16.003	16.371	16.713	15.222	16.369	17.578	18.855
Applications	19.395	27.221	24.563	18.841	10.162	10.576	9.909	8.092	7.436	8.442	5.002	5.405	6.255	5.712	7.223	8.039	8.888
Investment	19.395	27.221	24.563	18.841	10.162	10.576	9.909	8.092	7.436	8.442	5.002	3.849	2.514	0.000	0.000	0.000	0.000
Loan repayment	0.000	0.970	2.331	3.559	4.501	5.009	5.538	6.033	6.438	6.810	7.232	7.818	8.642	9.384	9.954	10.262	10.581
Total	19.395	28.191	26.894	22.400	14.663	15.585	15.447	14.125	13.874	15.252	12.234	11.667	11.156	9.384	9.954	10.262	10.581
Cash surplus (defecit) for year	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.138	1.883	2.759	3.769	4.703	5.557	5.838	6.414	7.316	8.273
Accumulated profit (defecit)	0.000	0.000	0.000	0.000	-0.000	0.000	0.000	1.138	3.021	5.781	9.550	14.253	19.810	25.648	32.062	39.378	47.652

Item	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Sources	20.202	19.922	19.922	19.922	19.562	18.997	18.505	18.183	18.110	17.493	16.893	16.361	15.793	15.149	14.532	13.881
Applications	9.683	10.332	10.929	11.606	12.007	12.316	12.518	12.518	12.518	12.518	12.518	12.518	12.518	12.518	10.962	8.777
Investment	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Loan repayment	10.881	11.126	11.351	11.606	12.007	12.316	12.518	12.518	12.518	12.518	12.518	12.518	12.518	12.518	10.962	8.777
Total	10.881	11.126	11.351	11.606	12.007	12.316	12.518	12.518	12.518	12.518	12.518	12.518	12.518	12.518	10.962	8.777
Cash surplus (defecit) for year	9.321	8.796	8.571	8.316	7.554	6.680	5.987	5.665	5.592	4.975	4.375	3.843	3.275	2.631	3.570	5.104
Accumulated profit (defecit)	56.973	65.769	74.340	82.656	90.210	96.891	102.878	108.543	114.135	119.110	123.485	127.328	130.603	133.234	136.804	141.908

Table 9-2-1 Economic Internal Rate of Return of the Basic Plan

EIRR = 1) normal case : 14.93%
2) cost 10% up : 13.70%
3) revenue 10% down : 13.57%
4) 2) plus 3) : 12.38%

(Unit : million US$)

Year	Cost			Benefit				Net benefit
	invest-ment	OM	Total	calls	Rental	Installa-tion	Total	
1998	17.359	0.000	17.359	0.000	0.000	0.000	0.000	-17.359
1999	24.363	0.292	24.655	1.182	0.181	0.509	1.872	-22.783
2000	21.984	0.590	22.574	2.413	0.374	0.508	3.295	-19.279
2001	16.863	0.894	17.757	3.697	0.575	0.508	4.780	-12.977
2002	9.095	1.231	10.326	5.175	0.789	0.555	6.519	-3.807
2003	9.466	1.606	11.071	6.858	1.019	0.608	8.485	-2.586
2004	8.869	2.022	10.890	8.791	1.265	0.665	10.721	-0.169
2005	7.242	2.484	9.726	10.982	1.529	0.727	13.238	3.512
2006	6.655	3.027	9.682	13.643	1.817	0.844	16.304	6.622
2007	7.556	3.634	11.189	16.682	2.126	0.928	19.736	8.547
2008	4.477	4.310	8.787	20.180	2.459	1.021	23.660	14.873
2009	3.445	5.067	8.511	24.208	2.816	1.122	28.146	19.635
2010	2.250	5.911	8.162	28.789	3.200	1.234	33.223	25.061
2011	0.000	6.463	6.463	31.821	3.545	0.799	36.165	29.702
2012	0.000	7.058	7.058	35.037	3.912	0.847	39.796	32.738
2013	0.000	7.701	7.701	38.447	4.301	0.898	43.646	35.945
2014	0.000	8.394	8.394	42.065	4.713	0.953	47.731	39.337
2015	0.000	9.144	9.144	45.904	5.150	1.011	52.065	42.921
2016	0.000	9.144	9.144	45.904	5.150	0.000	51.054	41.910
2017	0.000	9.144	9.144	45.904	5.150	0.000	51.054	41.910
2018	0.000	9.144	9.144	45.904	5.150	0.000	51.054	41.910
2019	0.000	8.852	8.852	45.904	5.150	0.000	51.054	42.202
2020	0.000	8.554	8.554	45.904	5.150	0.000	51.054	42.500
2021	0.000	8.250	8.250	45.904	5.150	0.000	51.054	42.804
2022	0.000	7.913	7.913	45.904	5.150	0.000	51.054	43.141
2023	0.000	7.539	7.539	45.904	5.150	0.000	51.054	43.515
2024	0.000	7.122	7.122	44.722	4.969	0.000	49.691	42.569
2025	0.000	6.661	6.661	43.490	4.776	0.000	48.266	41.605
2026	0.000	6.117	6.117	42.206	4.576	0.000	46.782	40.665
2027	0.000	5.511	5.511	40.729	4.361	0.000	45.090	39.579
2028	0.000	4.833	4.833	39.045	4.131	0.000	43.176	38.343
2029	0.000	4.077	4.077	37.113	3.885	0.000	40.998	36.921
2030	0.000	3.233	3.233	34.922	3.622	0.000	38.544	35.311
total	139.622	175.919	315.540	985.333	111.291	13.737	1110.361	794.821

Note :
Coefficient for adjusting costs : 0.895

CHAPTER 10

OPERATION AND MAINTENANCE PLAN

CHAPTER 10

OPERATION AND MAINTENANCE PLAN

1. General

1.1 Definition

Operation and maintenance activities are essential in order to maintain telecommunications facilities in good condition. This chapter describes and aims of Operation and Maintenance (O&M) of the telephone system in Mongolia. In order to avoid confusion, some definitions of the words used in this Chapter are clarified below.

The purpose of **maintenance** is to ensure that the equipment and network in kept in good working condition.

Operation covers the daily activities necessary to run the telecommunications facilities effectively and efficiently for the provision of satisfactory customer services. These services include new subscriber connection and small scale installations.

Network management supports a wide variety of functions covering the operation, administration, maintenance, and provision of the telecommunication network.

1.2 Consideration to Operation and Maintenance

An assessment of the current O&M situations in Mongolia was carried out in 1993, and the results of that review are summarized in the Master Plan.

An assessment of the present O&M situations in Mongolia could not be accurately judged due to the critical shortage of spare materials for repair. In addition, the definition of O&M works is not cleared in the management structure and responsibilities. O&M activities at present are on a very low level.

1.3 Introduction of preferable O&M method

To improve the current O&M activities, it is recommended that MCAC/MTC adopt " **Maintenance Quality Control**" method which can be effective and efficient to carry out O&M activities. The "**Maintenance Quality Control**" method sets the targets to be achieved and maintenance staff has to make maximum efforts to attain the target adopting the "**Total Quality Control**" (hereinafter called TQC) concept.

The "**Maintenance Quality Control** " method can be summarized in three basic phases as follows ;

- To determine marginal target values and maintain those values,
- To determine an effective lifetime for each type of equipment,
- To determine an action plan utilizing statistical data processing.

The marginal targets are normally selected from important items which directly affects the services quality and system performance. The four main items for consideration are as follows:

a) Service level values

These values are determined in order to examine complaints from customers which directly reflects the level of service provided by the telecommunications system concerned. These service targets are fixed at the lowest acceptable levels for customer satisfaction and its figures should be achieved through daily O&M activities. Such items are listed in Table 10-1-1.

Table 10-1-1 List of Service Level Value

Telephone Type	Measuring Unit	Measuring Period	Target Value (Reference Value)
Plain Telephone	No. of complaints	per100 sub/month	5 - 10
Plain Telephone	No. of complaints	per sub/ 3 months	2 - 5
Pay Phone	No. of complaints	per100 sub/month	10 - 15
Pay Phone	No. of complaints	per tel/ 30 days	3 - 7
PBX	No. of complaints	per100 tel/month	4 - 8
Telegraph Service	No. of complaints	per sub/ month	20 - 30

The number of items could be increased depending upon the capability of the O&M organization and items as ISDN will be required for future digital era.

b) Facilities control values

This target value indicates the stability of a system independent of the overall telecommunications network. The target value will be decided based upon the number of unusual failures which occur in the system, and it is used to anticipate possible failure before they occur. The figure indicates the replacement time of the main components of the each system. The items to be considered with targets are shown in Table 10-1-2 below.

Table 10-1-2 List of Facilities Control Value

Individual System	Measuring Unit	Measuring Period	Target Value (Reference Value)
Overhead Sub. Cable (Plastic cable)	(Reported+found) Number of Faults	per Cabinet area/ year	7 - 10 (600 pair cable)
9.5mm Cox. Cable	Same as above	per route / year	5 - 8
Local Switch System	All Faults	per shelf/ month	0.04 - 0.06

The Service level value is determined for subscribers, while the facilities control values are for O&M staff use. Special efforts should be made to provide the suitable action plan in order to solve the problems through this O&M activities.

c) Unacceptable facilities level

This target figure indicates the limits which determine the acceptability. Some facilities seem to be operating within target, but may have potential problems which would cause a serious damages and increase the maintenance cost of the facilities. Such items are wooden poles, terminal blocks, and so on. By using such values the O&M staff can determine the time when such facilities have to be replaced. Some unacceptable facilities are shown in the Table 10-1-3.

Table 10-1-3 List of Unacceptable Facilities Level

Facilities	Threshold Level of Unacceptable facilities	Remarks
Wooden Pole	Surface of pole: damaged More than 20%	
In-station Cable	Insulation resistance: less than 200 kΩ	
Outside Cable	Reasonable distance from High-tension lines	
Terminal Block MDF	Insulation resistance: less than 5 MΩ Contact by mistake: over 2 times per year	

d) Extraordinary failure control value

Extraordinary failure values are used to indicate the occurrence of possible major failures which could result in more than 30 minutes of interruption of telecommunications services. These failures are divided into two types by magnitude of the damage anticipated. Extraordinary failure control aims at prevention of the failure recurrence. By analyzing past failure data, O&M organizations should be able to provide the action program to prevent the future similar failures.

Special attention should be paid to the outside plant management and operation systems in Ulaanbaatar city. In connection with the subscriber line management, it is proposed to set up an outside plant O&M system which should bring about the following:

a) Improve efficiency and effectiveness of subscriber line maintenance function using limited human resources.
b) Implement controlled maintenance policy or preventive maintenance for subscriber line maintenance, shifted from the corrective maintenance being carried out presently.
c) Enhance the quality of service to subscribers by carrying out maintenance on outside plant even before they are aware that a fault has occurred.

Along with outside plant management and operation system, the computerized OSP facilities management system which is to deal with the following functions should be introduced:

a) Demand forecast system
b) Telecommunications facility design system
c) Information control system (Plant record, facility data, etc.)

1.4 Maintenance Management Method

Actual O&M works consist of three methods as described in the following:

- Preventive Maintenance

  The maintenance works are carried out at predetermined intervals or in according with prescribed criteria. This method is intended to reduce the probability of failure or the degradation of the function of each item.

- Corrective Maintenance

  The maintenance works are carried out after fault recognition and this system intends to restore to the state that each item can perform required functions.

- Controlled Maintenance

  A method to maintain the desired quality of service by the systematic application of analysis techniques using centralized supervisory facilities and/or sampling to minimize preventive maintenance and to corrective maintenance works. The controlled maintenance should be applied to switching and Transmission system maintenance in the future.

As the reliability of the telecommunications equipment has been improved considerably, the adoption of the digital system has changed the maintenance work to the centralized maintenance system.

2. Present Status and Problems on Operation and Maintenance

2.1 Operation and Maintenance Situation at Present

ADB Master Plan made an investigation regarding the current O&M condition. As a result of the investigation, their recommendations are summarized as follows:

a) Organization and structure;
b) Review of O&M procedure at Headquarters and regional levels;:
c) Operation and maintenance routines and fault clearance practices;
d) Information system (data collection, quality of service);
e) Support services (transportation, materials, spare parts, repair center);
f) Staffing, training and refresh training.

2.1.1 Organization and Structure

In Mongolia, the O&M activities are mainly supported by Headquarters, and their activities are too much centralized. This situation causes confusion on the O&M activities, because the definitions and its responsibility of the organization are not formulated clearly. For example, Ulaanbaatar O&M activities are merged into Headquarters organization. The present organization chart is illustrated in the following Figure 10-2-1.

As a results of the assessment, the current organization has the structural problems. Since the definition and responsibility of each organization are not formulated at present, the O&M activities are not effective and efficient. The restructure of the O&M organization is indispensable to solve the above problems.

2.1.2 Review of O&M procedures at Headquarters and Ulaanbaatar

Since the introduction of digital E-10B switching system in Ulaanbaatar in 1992, the traffic flow observation was done in order to evaluate the QoS condition. The above traffic investigation is carried out only in Ulaanbaatar E10B switching system, and the obtained data are very useful for future network planning.

Fig 10-2-1 Organizational chart for Operation and Maintenance

No close relationship has been settled between Ulaanbaatar administrative section and headquarters at present despite of the coordination effort which was made among the organizations.

Through the analysis of the investigation, the following problems were found;

- Insufficient coordination works between headquarters and Ulaanbaatar and other Aimags organization concerned.
- No standard practice manuals of method and procedure to carry out the O&M works.

2.1.3 O&M Routines and Faults Clearance Practices

The aim of O&M works is to unify all the actions required to maintain equipment and system in satisfactory level, taking into account of service quality and cost-effectiveness for the telecommunications network.

In contrast with the switching and transmission, faults in outside plant frequently occur and they are reported mostly by the customers after the services have already been interrupted. Considering the above circumstances, the preventive maintenance is preferable and recommendable for outside plant system in terms of cost and effectiveness.

The major factors to evaluate the degree of the QoS situation in telecommunications system generally utilize the following indexes:

a) Call completion rate
b) Fault occurrence rate
c) Faults clearance rate

The above indexes essentially reflect the degree of the QoS of the existing network for customer, however in Mongolia the proper assessment could not be made because of the critical shortage of spares, which could not remedy the damaged equipment and facilities.

2.1.4 Information System

This information system deals with the data collection in the field of O&M. There are two different forms of daily and monthly reports, and both reports are sent to O&M headquarters in Ulaanbaatar.

Traffic data can be obtained only through E10B switching system. A lot of the meaningless data were found in the both reports, and the investigation showed that the reason seemed to be by unskilled staff and software's bug in E10B. Since the E10B staff could attend only short period of O&M training program, they could not get enough knowledge how to cope with software troubles in program.

2.1.5 Support Services (Transportation, Materials, Spare Parts and Repair)

As mentioned previously, most of telecommunication facilities were manufactured in the former Soviet Union, and spare parts are not available after the collapse of Soviet Union. In addition to the above problems, the following problems have to be solved.

Shortage of
- Tools and materials
- Measuring equipment
- OSP cable and shrinkable closures
- Car and vehicles

Considering the size of the Mongolia and its poor road condition, the vehicles for O&M are absolutely insufficient at present For example, only one vehicle is available covering 10,000sq.km with 12,500 subscribers and 40 staff in a Aimag center.

Most of the faults clearance staff, therefore, move to the sites by bus or on foot without having adequate tools and devices. This fact further detracts the quality of services.

2.1.6 Staffing, Training, and Refresher Training Courses

The rate of manpower per thousand of subscribers is used as index figures to evaluate the efficiency of the telecommunications organization. In Mongolia, telephone density is 3.2 per 100 inhabitant and 80 staffs per 1,000 subscribers. The Table 10-2-1 indicates the relationship between telephone density and staff rate in three level of countries in the world.

Table 10-2-1 The Relation of Telephone Density and Productivity

Type of Country	Telephone Density	Staff number per 1,000
LLDC	Less than 1.0	50.0 - 110.0
Developing Country	0.8 - 30.0	20.0 - 60.0
Developed Country	More than 30.0	Less than 10.0

Number of staff in Mongolia is big comparing with those of other countries. To reduce the staff number is the target to be solved in the long term plan considering the recruitment and training policies.

2.2 Quality of Service

According to CCITT Recommendations, two categories of performance measurement, i.e., Quality of Service and Network performance (NP) are defined. The QoS is measured on customer-to-customer basis, while the NP, between the network termination point A and the other termination point B, except customer's premises.

As mentioned previously, the quality of service is most comprehensive factor to assess the existing telecommunication network. Customers always expect to enjoy the clear conversation whenever desired. It is also necessary that MCAC/MTC should convince the importance of the QoS to all of their staff.

The measurement of QoS performance is not regularly carried out in the actual telephone network, but the traffic measurement should be done as the first priority.

2.2.1 Switching Network Performance

Team of ADB M/P made field survey to gauge the level of customer satisfaction during one week. The result of the survey is described some important data that successful first call rate reached 19% in average, and it was observed a failure to obtain dial tone when first lifting the telephone receiver in 35% of call attempts.

The further examination of the exchange and junction network performance in Ulaanbaatar was carried out. The results showed that successful connection rate achieved was between 57% and

85%. This level of successful first time connection is seemed to be acceptable. The further monitoring of traffic flow in E10B system is preferable to collect the traffic data.

2.2.2 Fault Rates

According to the statistical data in 1991, cable fault rate was about 0.16 per exchange connection per annum. However, Fault rates obtained by the field survey were almost ten times more than the above figure 0.16. The above data did not properly reflect the actual condition, because measuring and reporting are not made on the same basis.

The fault rate per 100 customers per month are shown in the Table 10-2-2.

Table 10-2-2 Subscriber Line Faults and Service

Service Items	Figures in Mongolia	Standard Figures
Faults Line Rate per 100 sub.	More than 200%	10% - 20%
Fault Clearance Time	69.4% within next day	87% within 2day 95% within 3day
Repetition of Faults(%) (more than 2 faults per month)	1 Faults repeated 7 times within 10days	Less than 10% per year

2.3 Operator Service

After the examination of operation service, some problems are found in the field of O&M activity. Most of the problems come from shortage of understanding concerning the Quality of Service concept among the operators. The findings for operation services are described below.

- Many call timers for operator were not working, which makes less revenue,
- Some operators were connecting same specific routes, which makes no flexibility,
- More than half of the calls handled by operators were calling to people who did not have telephone.

2.4 Transportation

Mongolia has a very restricted railway network and travel on road is also not easy.

Road surfaces are poor or non-existent, and even the main roads linking to major cities are in very bad condition which makes traveling slow and hazardous to the vehicle.

The availability of official MCAC/MTC vehicles is very low, and there are only two or three vehicles at each Aimags to cover an area of about 20,000sq.km. There is also a shortage of vehicle fuel throughout the country. The above situation is also one of major reasons to obstruct the effective O&M activities.

3. Urgent Status and Problems on Operation and Maintenance

3.1 General

As a result of analysis in the foregoing paragraph, action plans are urgently required to improve the existing telecommunication network in Mongolia and Ulaanbaatar city. The action plan is categorized as shown below:

- Strategy (Objectives, O/M operation plan, Budgeting Process)
- Organization (Ulaanbaatar O&M organization, Centralized O&M center)
- Methods and Procedures (Outside Plant, Switching and Subscriber line)
- Resources (Staffing, Training, Logistical resources, Material management)
- Information system (Definition of the operating flow for O&M and Custom service)

3.2 Strategy

The gradual change from analogue to digital system will lead the maintenance organization to the fundamental restructure. The digital system will normally be unstaffed and maintenance free oriented.

Whatever may be the activity of a corporation and organization, there is a unavoidable process in the field of O&M activity as mentioned below.

- Definition of the activity objectives;
- Definition of financial system.

The existing telecommunications system is considerably poor in performance because of the serious shortage of the spare parts for repair. This situation causes an obstruction to formulate the basic strategies in O&M activities.

The first step, therefore, must be to remedy the fundamental weakness which comes from the poor management structure, lack of statistical management, poor quality and shortage of spares.

In conclusion, it is recommended that MCAC/MTC should set up achievable target of QoS concerned from the higher priority.

3.3 Organization

Firstly, the existing O&M organization is not suitable for digital telecommunication era, and the restructuring has to be focused on the clear definition of its structural hierarchy in order to demarcate the obligation and responsibility for headquarters and each organization .

Faults in outside plant directly affect the customer's impression in telecommunications service. To solve the above problem, it is effective to establish the Outside Plant Maintenance Center in Ulaanbaatar city.

a) Maintenance Organization Structure

The activities of the present O&M organization is not systematic and effective, so the O&M organization should be functionally divided into three levels as follows:

- National Management Center (NMC)
  NMC will be responsible for all aspects of controlling traffic flow including coordination with other carriers at the international level.
  It will be a non-stop center (24 hours operation).

- Regional Management Center (RMC)
  RMC will be established at very later stage. They will be in charge of the supervision and management of the regional switching network, including local transmission equipment. They will be also non-stop centers.

In addition to the organization restructuring , it is required to provide the standard practice and procedure for each level.

b) Outside Plant Maintenance Centers (OPMC)

To enhance the efficiency in maintenance works, the establishment of the OPMC is very necessary, and the functions are outlined as below.

- Improvement of working environment
  - Shorter preparation time
  - Better safety control
  - Efficient training
  - Raising morale

- Realization of large-scale repair work and installation/construction.

As the results of the above ;

- Manpower saving can be achieved by lowering the fault rate and upgrading productivity.
- Increased revenue can be expected.

3.4 Methods and Procedure

The organization should be restructured into three levels, and the definition and responsibility are finalized for each maintenance center. However, some problems in the actual activities will occur if common operational standard practices and procedures are not provided.

3.5 Resources

Resources means here material and human resources including training system. For the organization, the resources are the fundamental item, and there are many big problems involved. First priority is given to formulate the staffing policy and material management, respectively.

a) Staffing and Training

As mentioned previously, the O&M rate is 8.4 personnel per 1,000 lines in Ulaanbaatar, and this figure shows poor productivity. It is requested that number of personnel should be reduced in line with an adequate policies of recruitment and training. The poor productivity is caused by the low skill level of O&M staff, shortage of spare parts and tools, and shortage of vehicles. To compensate the above obstacles, additional staffs have been assigned.

As for the training concerned, there is no own training facilities in MCAC/MTC, and training program is not adequate, particularly for top management class. Only on-the-job training is available for technical staff, but the training equipment is obsolete and because of that , they can not be used for training.

In order to improve the present poor situation, it is recommended to establish MCAC/MTC own training center in Ulaanbaatar city. The training program should be provided including at least following two objectives:

- Network planning, installation and maintenance with technical standard practice.
- High-management level

b) Material Management

The shortage of spare parts seriously obstructs the normal O&M activities. Even the latest E10B system has no sufficient spares. At present, MCAC/MTC have no standard regulation for stocks of spare parts, tools and test equipment and so on.

The introduction of the computer system will improve enormously material management to be efficient and economical. The adoption of computer system is divided into three stages.

- first stage ; database for all materials
- second stage ; information and management processing
- third stage ;decision making function

3.6 Information system

As the contents of daily and monthly reports are not appropriate, MCAC/MTC can not properly analyzed the traffic data. MCAC/MTC staff does not perceive the present network condition regarding customer's satisfaction. From this point of view, there are three important functions to be considered.

- the performance of the network i.e. the traffic flow and call completion,
- the QoS of the local cable, i.e. fault clearance performance,
- the billing process and operators response time.

Customers generally expect to use the high quality telephone services and they pay special attentions to the following items:

- Waiting time to get dial tone
- Waiting time for call completion after dialing
- No calls early disconnected
- Faults incidence in number and in time delay for clearance
- Charging or billing error

4. Future Operation and Maintenance Improvement Plan

4.1 General

Various proposals are given to improve the existing network in the previous paragraph 3 of this chapter. To achieve these objectives, a lot of cost and installation period would be necessary, and it will be difficult to complete the objectives in short term. So, the action plan should formulate to solve the problems considering all circumstances.

The concept of the network management is described by ITU-T Recommendations, which is to operate and maintain overall telecommunication system such as switching, transmission and radio system under the integrated philosophy. This NMC concept also should be formulated in the basis of the long term period.

TQC method will be very helpful to achieve the objectives, and an explanation will be made for easy introduction for Mongolian telecommunications sector.

4.2 Target Quality of Services

This subject has been discussed in this basic plan. The Table 10-4-1 shows the actual target for QoS until 2010.

Table 10-4-1 Target Quality of Service

Item/Year	1994	2000	2005	2010
Call Completion Rate	42%	60%	70%	80%
Faults Occurrence Rate	39%	30%	20%	10%
Faults clearance rate (Within 24 hours connection)	70%	85%	90%	95%

More breakdown of the items for QoS assessment could be available. However, the above three indexes will be enough to manage and control the telecommunication network in satisfactory conditions at present situation in Mongolia.

4.3 Total Quality Control System

The following is a brief explanation of Total Quality Control System. The explanation is mainly extracted from "Kaizen, the key to Japan's competitive success", author Mr. M. Amai, issued by McGraw-Hill Publishing Company.

4.3.1 Quality Control System

(1) Definition to Quality Control

The terms of Quality control, Total Quality Control, and Quality are defined as follows:

Quality Control is a system of means to economically produce goods or services that satisfy customer requirements. When QC was first introduced in 1950, the main emphasis was on improving product quality by applying statistical tools in the production processes.

Now, QC is used as a tool to build a system of continuing interaction among all elements responsible for the conduct of a company's business so as to achieve the improved quality that satisfies the customer's demand.

Total Quality Control is the organized QC activities involving everyone in a company - managers and workers - in a totally integrated effort toward improving performance at every level. This improved performance is directed toward satisfying such cross-functional goals as quality, cost, scheduling, manpower development, and new product development. It is assumed that these activities ultimately lead to increased customer satisfaction. (also referred to as CWQC - Company-Wide Quality Control).

In TQC, the first and foremost concern is with the quality of people. A company able to build quality into its people is already halfway toward producing quality products. The three building blocks of business are Hardware, Software and Humanware. Only after the Humanware is squarely in place should the hardware and software aspects of business be considered. According to the JIS (Japan Industrial Standards), the term of TQC is also explained as follows:

Implementing quality control effectively necessitates the cooperation of all people in the company, including top management, managers, supervisors, and workers in all areas of corporate activities such as market research and development, product planning, design, preparation for production, purchasing, vendor management, manufacturing, inspection, sales and after-services, as well as financial control, personnel administration, and training and education. Quality control carried out in this manner is called company-wide quality control or total quality control.

In order to satisfy customer requirements, essential 3 conditions to QC system are QCS (Quality, Cost, Scheduling). Quality products or quality service within a certain reasonable costs have to be delivered to customers within a certain limited period.

(2) PDCA Cycle

The PDCA (Plan, Do, Check, Action) Cycle is an adaptation of the Deming wheel. Where the Deming wheel stresses the need for constant interaction among research, design, production, and sales, the PDCA Cycle asserts that every managerial action can be improved by careful application of the sequence: plan, do, check, action.

As for refinement of the PDCA Cycle, it will be useful to apply SDCA (Standardize, Do, Check, Action) Cycle, i.e., management decides first to establish the standard before performing the regular PDCA function.

Steps of Plan, Do, Check and Action are explained as follows:

a) Plan: It begins with a study of the current situation, during which data are gathered to be used in formulating a plan for improvement.
The study is made by using statistical tools such as the seven tools of QC as shown in later part.

b) Do: Once this plan has been finalized, it is implemented by applying the above plan.

c) After that, the implementation is checked to see whether it has brought about the anticipated improvement.

d) When the experiment has been successful, a final action such as methodological standardization, institutionalization of the improvement is taken to ensure that the new methods introduced will be practiced continuously for sustained improvement.

The series of PDCA activities are cyclic and the improvements/upgrading should be continued. PDCA Cycle and Problem solving cycle are illustrated in the Figures 10-4-1 and 10-4-2.

(3) Standardization of Results

Any kind of implementation, i.e., planning, designing, manufacturing, installation, operation, maintenance, consist of 4M elements (Man, Machine, Material, Method). There must be a precise standard of measurement for every manager, every worker, every machine, every material, and every process. Without standards nobody knows the starting point of work improvement exactly. Management have to understand where the company stands and what the work standards are. Management's job is to establish standards and then to introduce discipline so that the standards are maintained.

So as to proceed the improvement in an effective way, to take the following 3S actions becomes very important works to be elaborated by managers:

- Standardization of the elements,
- Simplification of a series of jobs,
- Specialization of work fields.

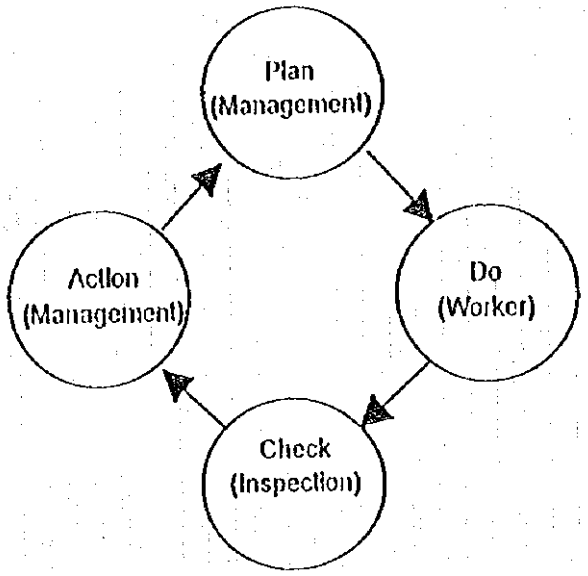


Figure 10-4-1 PDCA Cycle

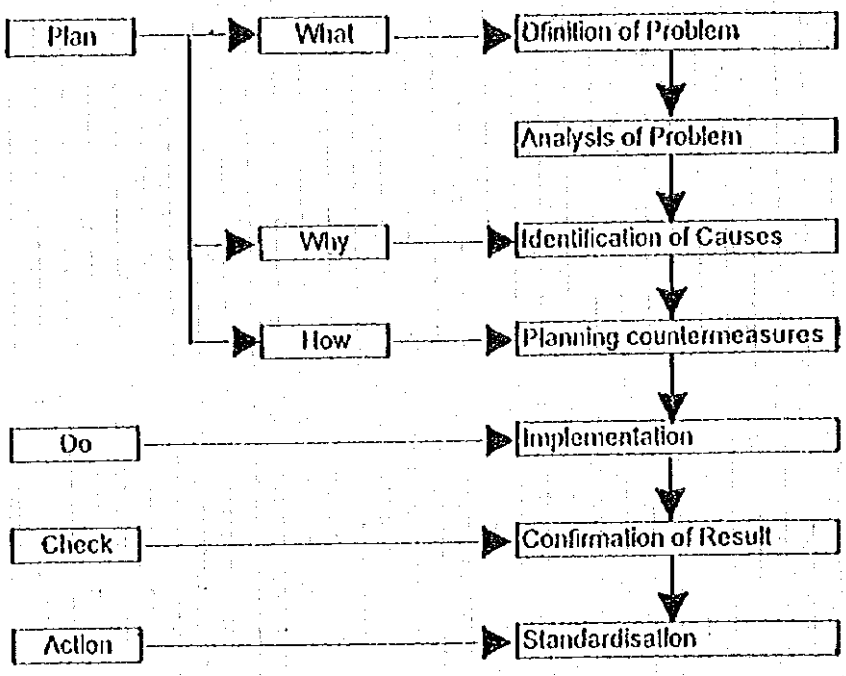


Figure 10-4-2 Problem Solving Cycle

(4) The Seven Statistical Tools (Problem Solving Tools)

This approach is applied when data are available and the job is to analyze the data to solve a particular problem.

a) Pareto Diagrams

These diagrams classify problems according to cause and phenomenon. The problems are diagrammed according to priority, using a bar-graph format, with 100 percent indicating the total amount of value lost.

b) Cause-and-effect Diagrams

These diagrams are used to analyze the characteristics of a process or situation and the factors that contribute to them. Cause-and-effect diagrams are also called "Fishbone Graphs" or "Godzilla-bone Graphs".

c) Histograms

The frequency data obtained from measurements display a peak around a certain value. The variation of quality characteristics is called "Distribution", and the figure that illustrates frequency in the form of a pole is referred to as a Histogram. This is used mainly to determine problems by checking the dispersion shape, center value, and nature of dispersion.

d) Control Charts

There are two types of variations: the inevitable variations that occur under normal conditions and those that can be traced to a cause. The latter are referred to as "abnormal". Control charts serve to detect abnormal trends with the help of graphs. These graphs differ from standard line graphs in that they have control limit lines at the center, top, and bottom levels. Sample data are plotted in dots on the graph to evaluate process situations and trends.

e) Scatter Diagrams

Two pieces of corresponding data are plotted in a scatter diagram. The relation between these plotted dots illustrates the relationship between the corresponding data.

f) Graphs

There are many kinds of graphs employed, depending on the shape desired and the purpose of analysis. Bar graphs compare value via parallel bars, while line graphs are used to illustrate variations over a period of time. Circle graphs indicate the categorical breakdown of values, and radar charts assist in the analysis of previously evaluated items.

g) Checksheets

These are designed to tabulate the results through routine checking of the situation.

(5) The New Seven QC Tools

In many management situation, the necessary data are not always available and what data available are in the minds of people concerned and not in the status of quantitative but rather subjective. Therefore, it is necessary to go beyond the analytical approach and to use a design approach to problem solving. The New Seven QC Tools are useful tools to find solutions for these cases.

a) Relations Diagram

This diagram clarifies the interrelations in a complex situation involving many interrelated factors and serves to clarify the cause-and-effect relationships among factors.

b) Affinity Diagram

This is essentially a brain storming method. It is based on group work in which every participant writes down his ideas and the ideas are then grouped and realigned by subject matter.

c) Tree Diagram

This is an extension of the value engineering concept of functional analysis. It is applied to show the interrelations among goals and measures.

d) Matrix Diagram

This format is used to clarify the relations between two different factors. The matrix diagram is often used in deploying quality requirements into counterpart (engineering) characteristics and then into production requirements.

e) Matrix Data-analysis Diagram

This diagram is used when the matrix chart does not provide sufficiently detailed information. This is the only method within the New Seven that is based on data analysis and gives numerical results.

f) PDPC (Process Decision Program Chart)

This is an application of the process decision program chart used in operations research. Because implementation programs to achieve specific goals do not always go according to plan, and because unexpected developments are likely to have serious consequences. PDPC has been developed not only to arrive at the optimum conclusion but also to avoid surprises.

g) Arrow Diagram

This is often used in PERT (Program Evaluation and Review Technique) and CPM (Critical Path Method). It uses a network representation to show the steps necessary to implement a plan.

4.3.2 TQC Application as Management

(1) Definition of Management

Management by Policy is an integrated management system with a group of actions, PDCA, in order to achieve the company's Annual Policy which is prepared by the Managing Director based on the company's objectives, Corporate Plan and Long/Medium term Plans.

Subjects are selected according to the priority of urgency, and importance.

a) **Plan:** The Action Plan is prepared based on the Corporate Plan (basic concept and business strategies), Long and Medium Term Plans and Annual Policy instructed by Managing Director of the company and deployed to every organizational level.

Review results of former PDCA cycle and the change of environment should be incorporated in the Action Plan.

The Action Plan utilizes all company's business resources, i.e., Personnel, Materials, Funds and Information and plans, they have to be the most appropriate combination of quality, quantity and cost. The Plan schemes for level up and strengthening of the potential of the company, participation by all personnel and to expect continuous improvements.

b) **Do:** Implementation of the Action Plan is followed and checked. PDCA cycles should be repeated during the implementation period.

c) **Check:** Implementation results are evaluated by Divisions/Regions and commented by the Managing Director (diagnosis), and the problems encountered are analyzed.

d) **Action:** Review and improvement to the above results are made and reflected to the following Action planning period. Review includes countermeasures to the problems, improvement of procedures and standards, check points and management levels.

(2) Procedures to Solve Problems under Management by Policy

Procedure to solve the problem will be started from the selection of the subject and be proceeded in accordance with QC Story described below.

QC Story:

Plan:

a) Selection of subject
b) Reason of the selection of subject
c) Grasp of present situation, status
d) Set up of target
e) Analysis of the present status

Do:

f) Planning of countermeasures and implementation with PDCA cycle

Check:

g) Confirmation of the effects

Action:

h) Standardization of the countermeasures, procedures
i) Remaining problem and improvement planning hereafter

(3) Features of Management by Policy and its Effects

a) Improvement of communications (Top down and Bottom up)
During planning stage, explanation of annual policy and discussions will be executed between top management and middle, lower Management.
b) Education, level up of personnel

Discussions are made regarding management levels, check points, pick up problems, evaluation, standardization

c) Weighting to Process

Assessment of the Process is given more weighting. If some problem is found, the weighting is given to pursuit of causes rather than pursuit of responsibility.

d) Participation of Top Management

Top management diagnose the implementation results. Intention of the top management can be comprehensively communicated up to lowest level of the organization.

e) Administration by data

All processes are made based on QC system. Therefore, the administration is proceeded in accordance with data processing system.

f) Human resources development

Cultivation of capability to human resources and level up of organizational activities are expected through the PDCA cycles.

Figure 10-4-3 shows a Flow of Management by Policy.

(4) Management Items

Improvements of performance indicators, Call completion rates, Number of faults per month per 100DELs, Faults clearance within 24 hours, New connections, Human resources and training, International telephone services, Revenues, Telecommunications projects, are being proceeded by MCAC/MTC.

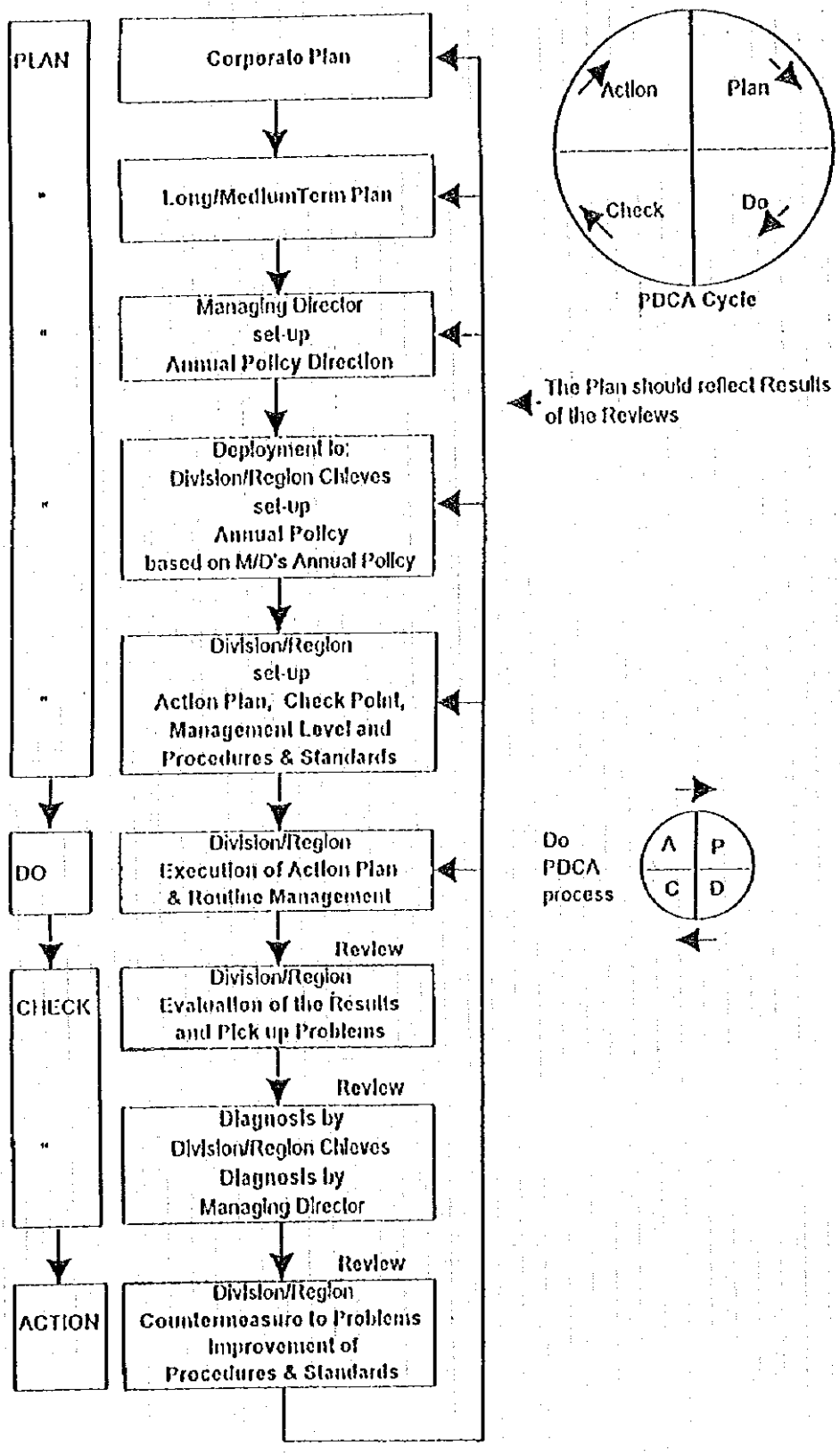


Figure 10-4-3 Flow of Management by Policy

CHAPTER 11

INSTITUTION, ORGANIZATION, AND MANAGEMENT PLAN

CHAPTER 11

INSTITUTION, ORGANIZATION, AND MANAGEMENT PLAN

1. Situation, Analysis, and Proposals for Problem Solution on The Institutional Aspects

1.1 Summary of The Current Institutional Situation

(1) Department of Communications of Ministry of Infrastructure Development (MOID) is in charge of administration of the Mongolian telecommunications sector. The department consists of 7 staff at present.

(2) The Mongolian Telecommunications Sector Policy Statement was issued on April 19, 1994.

(3) Mongol Post company was separated from the previous MTC in November 1994.

(4) The previous organization of Mongolian Telecommunications Company (MTC) has been divided into two on September 1st, 1995 and

① Mongolian Communications Asset Company (MCAC)
② Mongolian Telecommunications Company (MTC)

were established.

(5) MCAC is the asset holding organization solely owned by the Mongolian Government and in charge of rehabilitation and expansion of the network. MCAC and MTC are directed to have close consultation on the planning of rehabilitation and expansion of the basic telecommunications network. The number of MCAC staff was reportedly increased to 40 lately and more increase up to 50 is prospected. The charter was bestowed to MCAC.
The communications development plan of MCAC is on the way to be completed.

(6) MTC is classified as a privatized share holding company. The company is to provide basic telecommunications services to the public by operating and maintaining the basic telecommunications network leased from MCAC for the term of 20 years.
The basic telecommunications services are monopolized by MTC, and MTC is prohibited to provide value added services.

(7) Loans and grants from donor countries are channeled to the Sub-borrowers through Mongol Bank under the Subsidiary Loan Agreement. The sub-borrower's status occupied by MTC so far is scheduled to be transferred to MCAC.

(8) Regulatory Council was established by the Ministerial Order of MOID issued on August 4th, 1995 and commenced activities since beginning of 1996. (Ref. Supporting Documents Vol. IV Chap.4)

(9) Telecommunications Act of Mongolia passed through parliamentary deliberation and became effective on November 17th, 1995. (Ref. Supporting Documents Vol. IV Chap.2)

(10) The primary relationship among the bodies and the entities in the telecommunications sector is as follows;
MOID holds sole ownership of MCAC and nominates Executive Director of MCAC.
MOID holds majority of shares of MTC and nominates Managing Director of MTC.
MOID issued license to MTC.
MCAC and MTC concluded the lease agreement on the basic telecommunications network .
MOID approved and issued licenses to the New Common Carries of value added services.
MTC and the New Common Carries interconnect networks and MTC lease the lines to the New Common Carriers.

(11) In order to make the basic telecommunications asset holding organization more consistent and functional, the reorganization involving Department of Communications of MOID and MCAC is reported to be studied. The naming of the organization may also be reconsidered.

1.2 Analysis on The Institutional Aspects

(1) The Mongolian telecommunications sector selected different stage of privatization and foreign capital invitation among each telecommunications entity in the light of realities in which each entity is located presently.
The stages of privatization generally could be classified as follows:

1st stage	: Operation totally by the government itself.
2nd stage	: Public corporation separately organized but fully owned by government.
3rd stage	: Privatized organization under major holding of the government.
4th stage	: Privatized organization under minor holding of the government.
5th stage	: Fully privatized organization.

In parallel with transition in privatization, progress of foreign capital participation is often checked in the recent international society as a yard stick to measure openness of the market.

1st stage	: Participation of foreign capital prohibited.
2nd stage	: Limited minor participation of foreign capital permitted.
3rd stage	: Major participation of foreign capital permitted.
4th stage	: 100% foreign capital permitted.

MTC, as an operation and maintenance company, is under major governmental ownership with 40% foreign capital participation.
MCAC, as a corporation holding the governmental assets, is at the stage of full governmental ownership.

(2) The current deployment of staff and the actual activities being conducted do not exactly conform to the published distribution of functions among MOID, MCAC, and MTC yet.

(3) Planning, fund-raising, tender, procurement, implementation, and depreciation of the basic telecommunication network should preferably be handled by consistent single organization because the organization in this case could have an ability to give a full account of usage of the fund raising upon its direct involvement.
MCAC seems to need to strengthen its organization further to undertake those tasks consistently.

(4) The current Mongolian basic telecommunications situation has to pay attention to the subjects which should be taken up not exactly by its cost efficiency but by other social needs. Aimags were traditionally approved certain autonomy on the local telecommunications planning in the past. On introduction of the market economy, institutional arrangement to attend the local telecommunications needs which are not always cost efficient will be required. Universal services and life-line services may also require special attention outside commercialism.

1.3 Summarized Enumeration of The Problems on The Institutional Aspects

(1) Planning function of MCAC as the asset holding corporation is not clear.

(2) The development plan of MCAC as the asset holding corporation is still on the way to be drafted.

(3) Deployment of the planning staffs in MCAC is on the way to be reinforced.
Functional organization building for such reinforcement also is the subject to be carried out.

(4) Division of functions and coordination of functions between MCAC and MTC are not quite clear.

(5) In consideration of transfer of the sub-borrower's status from MTC to MCAC for loans and grants channeled through Mongol Bank, review to MCAC's accountability is urged.

(6) Institutional arrangement to cater for needs of Aimag Somon levels is not sufficient. Institutional arrangement for how to address the problems of social needs which are not exactly cost efficient is not enough.

1.4 Proposals for The Solution of Institutional Problems

(1) MOID is requested to stipulate and clarify further the functions of MCAC so that MCAC could consistently undertake planning, fund-raising, tender, procurement, implementation, and depreciation of the basic telecommunications asset and take accountability for it.

(2) MCAC's completion of the development plan is awaited. Acquisition of the sufficient planning staff should be considered by the sector as a whole.

(3) It is recommended that distribution of the functions among MOID, MCAC, and MTC be reviewed.

MOID is expected to review the national target of telecommunications development from time to time and set the basic policy for how telecommunications facilities should be offered to the nation's economic development as well as to social welfare. It is proposed that MOID reinforces and utilizes MCAC's functions to conduct those administrative duties.

MCAC as the asset holding public corporation standing close to the government should consistently be in charge of the development plan of the basic telecommunications asset and its implementation.
Fund-raising is the important function that MCAC is expected to undertake. For that purpose, MCAC should require ability to give a full account of the projects and take responsibility for utilization of the raised fund.
To fulfill those duties, MCAC should be authorized to conduct consistently planning, fund-raising, tender, procurement, implementation, and depreciation of the basic telecommunications asset. Those authorities provide MCAC with accountability for the projects promotion.

MTC's functions in this regard is to be concentrated on service provision of the basic telecommunications. MTC should endeavor to provide the best services to the public utilizing the asset leased from MCAC on the long term and providing varieties of tariffs welcomed by the market. Activities for due maintenance of the leased asset is within the scope of function of the operation and maintenance company. The operational plan in reflection of the market needs is to be drafted by the operational company and is to be finalized in consultation with the asset holding corporation.

(4) Several social needs of telecommunications services which are dropped off the objectives of commercialism due to its cost inefficiency must be addressed separately. Institutional arrangement to cater for such needs is necessary.

MCAC as the asset holding corporation closely acting with the government under the governmental policy is considered to be standing at the proper position to cater for those social needs through its planning activity.

2. Situation, Analysis, and Proposals for Problem Solution on The Organizational Aspects

2.1 Summary of Current Organizational Situation

(1) The organization concerning basic telecommunications consists of four bodies.
MOID Department of Communications, Communications Regulatory Body , MCAC (recently expanded up to 40 and further up to 50 shortly), and MTC (4870 staffs as of November 1995).

(2) In MOID, Department of Communications is situated on the same flat level with Road Department, Transport Department, Construction related Departments and directed by the MOID minister.

(3) MCAC organization has Finance & Economic Division, Technical Development & Planning Division together with Radio Frequency Laboratory, the positions for Human Resource & Legal Matter and International Cooperation.
Those Divisions and the positions are directed on the same flat level under the General Director.
Board of Directors is established as the highest decision making organ.
The members of Board of Directors of MCAC are not known to the public yet.

2.2 Analysis on The Organizational Aspects

(1) MTC mobilized a substantial number of planning staff for drafting its business plan to cover 1996~2000. Given that fact, deployment of the planning staff in MCAC is observed to be insufficient to take positive action to complete the rehabilitation and expansion planning of the basic telecommunications network.
There also arises necessity to review the total scale of the MCAC organization in order to prove to the parties concerned, both domestically and outside the country, its consistent accountability for planning, fund-raising, tender, procurement, implementation, and depreciation of the basic telecommunications asset in their rehabilitation and expansion.

(2) The current organizational structure of MCAC basically is centralized around the General Director flatly, probably due to its smaller scale so far.
For expansion of its organization, however, a hierarchical structure accompanied by proper distribution of authority will be necessary.

Expansion of the organization also requires the center division functioning as integrator of organizational activities. The reporting rule for smooth communications and maintenance of integrity in the organization become indispensable at the same time.

(3) The following positions and staff will be required if MCAC is to play more positive role in the telecommunications sector.

The staff for overall computerization of the activities in future including those for software developments.
The staffs for ever increasing utilization of radio frequencies for telecommunications.
The accounting staff to keep hold of the voluminous computerized asset data.
The financial staffs to cater for increasing demand for funds.
The staffs to address local needs of telecommunications services in the vast country side. The staff for international relationship.

2.3 Summarized Enumeration of The Problems on The Organizational Aspects

(1) It is necessary to review to the total scale of MCAC as the asset holding corporation playing positive role in the telecommunications sector.

(2) Effective organizational structure and inside organization integration method after expansion of the MCAC organization will be necessary.

(3) It is necessary to refocus the functions of MCAC in the positive meaning and consequent position making and staffing.

2.4 Proposals for The Solution of Organizational Problems

(1) It is recommended to make over all review to the organizational structure and deployment of the staff of MOID Department of Communications / MCAC / MTC in relation with sorting out basic functions of each organization. The following common procedure for effective formation of modern organizations should be recommended to be taken strictly in this order.

① Target setting
② Division of functions

③ Position making
④ Description of jobs
⑤ Staffing

It is recommended a telecommunication agency should be establish in this context.

(2) As an example, Figure 11-2-1 organizational structure of MCAC could be suggested for efficient and integrated activities after expansion of the organization.

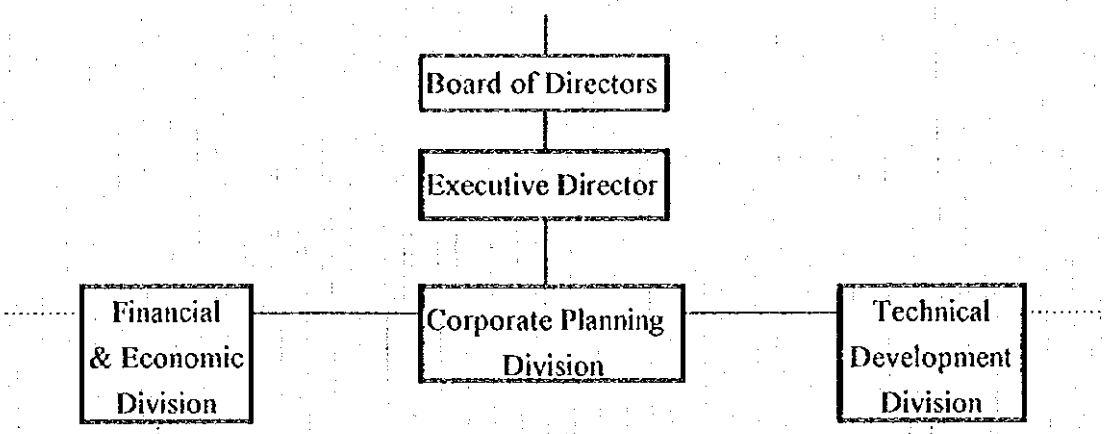


Figure 11-2-1 Establishment of Corporate Planning Division

The procedure of organization formation mentioned in 2.4 (1) above should be applied to the inside corporation work either. Firm setting of functions of each division is particularly important.

(3) In consideration of positive role of MCAC in the future, it is recommended to establish Computing System Department, Radio Department, Rural Affair Department. Depending upon the scale of those departments, they could be initiated at the corners of the existing divisions and expanded to independent divisions in the future.
Reinforcement of research function will be required for planning activities of MCAC.
The research division could be installed either inside the corporate planning division or separately. An annexed laboratory for the research activity will become necessary.

The reinforcement of the accounting staff to keep hold of ever increasing data bases describing the position of the voluminous asset will be necessary.

The reinforcement of the financial staff to cater for increasing demand for funds is necessary.

As to international relationship, there are two ways of choices. One is to organize the international division and let it be the face of MCAC toward international society. The other is to enhance the level of international communications ability across the organization and go without particular organization.

(4) MCAC had better be prepared for management of outside activities of construction as well as of inside cooperation construction work.
It is recommended to install a center organization to supervise and promote smooth progress of outside construction work conducted either by the direct contractors or by contracted outsiders. Ability of related inspection jobs must be enhanced.
Not only construction work, out-sourcing procedure will be more effective to MOID and MCAC than handling everything inside the organizations. Out-souring method is recommendable in such cases but excessive out-sourcing deteriorates planning capability and eventually harm the supervisory ability of the organizations.

3. Situation, Analysis, and Proposals for Problem Solution on The Managerial Aspects

This section is stated for MCAC.

3.1 Summary of The Current Managerial Situation

(1) In the basic telecommunications organizations, promotion of the income standard of the personnel is impossible to catch up fully with price hike or those of some other businesses, although the best effort to improve the general standard should be continued. In this regard, creation of non-monetary incentive is emerging as a subject of corporate management.

(2) In the market economy as that of Japan, directive command in the command economy as a drive for corporate activities is replaced by satisfaction of employee realized by self- actualization through jobs.
How to create environment where self actualization of the personnel is possible is a subject to learn in the current Mongolian reality.

(3) As the organizational management method, followings are yet to be introduced and mastered.
- The horizontal staff functions to integrate activities by vertical line-organizations.
- Distribution of authority to downward in the organization.
- Reporting and communicating system to integrate inside corporation activities.
- Job descriptions to stipulate all those procedures as well as rights and duties of jobs.

(4) As a dynamic aspect of corporate management, the concept of Plan-Do-See cycle has been introduced in Mongolia already but actual practices on job site is not yet popular.

(5) The basic concepts of the market economy will take some time before people in Mongolia really master. Those are, for example, market- in concept against product - out concepts, reality of market -oriented development of products and services, why customer services are important and so forth.

3.2 Analysis on The Managerial Aspects

(1) There is no comparison between the basic telecommunications business and some hyper-profitable commercial activities in terms of income standard but the basic telecommunications organizations are still to make best effort to increase employee's salary standard as it provides the basics for the betterment of organizational management.
Together with the income standard, there is a necessity to consider the structure of income so as to make it more stimulus to mobilize personnel for betterment of telecommunications services.

(2) MCAC is currently in small size and organized by high level brain workers only.
Motivation of the staff at present is satisfactory but still there is a necessity to pay attention to create non- monetary incentives for their contribution to the corporation.
If motivation to the staff inside the basic telecommunications organization is unsatisfactory, its influence goes to the morale of undergraduates.
To the high class brain workers like MCAC staff, self - actualization materialized through jobs is considered to be the best non-monetary incentive.

(3) Stronger educational advertisement by the government and others is observed to be necessary to make general public as well as the staff telecommunications know the fact that the telecommunications activities have a great social significance. It is necessary from the view point of corporate management of telecommunications in order to motivate the staffs and workers.

(4) The organization managed on the basic principle of distribution of authority and self-autonomy of individual employee needs various management method concerning how to integrate activities inside the organization. The staff functions to integrate activities by vertical line-organizations must be established for that purpose. The staff functions as such are often contrasted as horizontal functions against vertical line-activities. In the organizational activities, proper balance of both functions are necessary.
Distribution of authority on one hand and duties of reports and communications on the other are in one set of the management procedure. Both must be stipulated in the job descriptions.

(5) As the dynamic side of corporate management method, Plan-Do-See cycle for integrating planning activity and its implementation effectively could be practiced in the organization like MCAC. It must be worth trying through the procedure indicated in 3.4.(5) thereunder.

(6) The economy based upon the market economy must be learnt and mastered as an integrated culture. Partial understanding of it will be difficult. Where we should seek for the ideal opportunity is the question. (Refer to Vol. II chapter 12 "Human Resource Development Plan")

3.3 Summarized Enumeration of The Problems on the Managerial Aspects

The following points are enumerated as the problems on the managerial aspects.

(1) Necessity to enhance the income standard of telecommunications employee as the basic for the better corporate management.
At the same time, some needs of modification in the salary structure.

(2) Creation of non-monetary incentives to motivate advance in jobs.
- Management to create employee's satisfaction of self-actualization through jobs. For that purpose, arrangement of job-descriptions to stipulate rights and duties such as distribution of authority and duties of reporting and communications.
- Reinforcement of the public relations activities by the government as well as the corporation to advertise significance of telecommunications services.
- Stability of jobs by maintaining labor intensive part exceptionally in the light of reality in Mongolian telecommunications operation.

(3) Introduction of Plan-Do-See cycle and its implementation as the dynamic aspect of corporate management method.

(4) Understanding of the basic concepts of the market economy such as market-in management.

3.4 Proposals for the Solution of Problems in Managerial Aspects

(1) In the well motivated organization like MCAC, the best effort to enhance income standard for personnel should also be made.
Some modification of the income structure is worth studying. For instance, introduction of seniority system to the certain extent so that personnel could have long term expectation or introduction of some remuneration for acquired status or skills.

(2) As a non-monetary motivation, the government had better promote advertisement of significance of telecommunications in future society so that the telecommunications personnel could have their pride for jobs.
In response to that, the corporation like MCAC should publish the corporate target and make it possessed in common among the personnel.

(3) It is proposed to organize the job site as the place where self-actualization through jobs are possible. For that purpose, distribution of authority is necessary.
On the other hand, personnel in such organization are obliged to make reports and communications properly. All those should be stipulated in the job description. In this meaning, the job description should be completed as soon as possible.

(4) When the organization is expanded and the vertical integration of the lines are strengthened and self autonomy of personnel provides basics for the organization, the problem of corporate integration comes up alternatively.
Installation of the coordination center and understanding of horizontal staff-functions become necessary. Corporate Planning Division is a typical and common solution.

(5) The Plan-Do-See cycle which functions as a integration method of organization and at the same time as an effective mobilization system of organization will be useful in the organization like MCAC.

Following steps make a cycle between planning and its implementation.

① Establishment of the corporate policy. (By drafting corporate plan etc.)
② Setting of the target. (By the annual planning etc.)
③ Execution of the plan.
④ Checking of the progress. (By monthly meeting etc.)
⑤ Measure for discrepancy between the plan and the result.
Feed back actual development to the original plan.

CHAPTER 12

HUMAN RESOURCE DEVELOPMENT PLAN

CHAPTER 12

HUMAN RESOURCE DEVELOPMENT PLAN

1. General

Business essentially requires three elements: human resources, capital and equipment. Especially ready made human resources are often unavailable and it takes time to develop human resources. In the telecommunications industry where it is necessary to introduce very rapidly advancing technology and improve services by its own manpower, it is essential to make full effort to develop human resources.

Although the Scope of Work of this report is confined in Ulaanbaatar city, this chapter is applicable to whole Mongolia.

For a past decade, the market of telecommunications services in almost every region of the world have more or less been washed by waves of privatization and liberalization, although there are differences in the degree of progress and in timing of inception. This world-wide trend gives birth to the enormous number of new common carriers who started operation from the scratch.

Almost all those common carries initially faced a bewildering problem of acquiring human resources qualitatively and quantitatively competitive to those of the early starter. In most cases, the problems have not been settled yet and are being addressed by so many newly borne carriers.

This world wide situation means that the human resource development problem is not the peculiar problem to Mongolian telecommunications services but one of the most common problems shared by the common carriers in the world. The current world, in a sense, is a show case of solutions for human resource development problems of telecommunications carriers. Close watch to the cases in the outside world and composition of the best method for Mongolian society by Mongolian people themselves will be recommendable.

Our initial cooperation at this juncture is to inform a part of actual experience in the competitive market of Japan for the reference of Mongolian counterparts to consider future telecommunications services enhancement. This part is not exactly focused on MOID and MCAC matter but often is applicable to the wider range of telecommunications concerns.

2. Necessary Human Resources

In order to establish the common carrier which is self-sustainable and capable of making healthy growth, what kind of human resources will primarily be necessary.

In the typical case of actual experience of new common carriers in Japan, human resources at the initial stage of the new common carries were filled by the staff dispatched from shareholders companies. Electric power companies, railway companies, shipping companies, etc. had the staff who had experienced telecommunications services for their own needs and when they participated in the new common carries as shareholder, they shared and dispatched their staff to the new common carriers for certain period.

Technological capacity of those new common carries was also sustained by cooperation of telecommunications equipment manufactures. Therefore, the manufactures were selected and invited not only as equipment providers but as shareholders to support the carriers engineering wings.

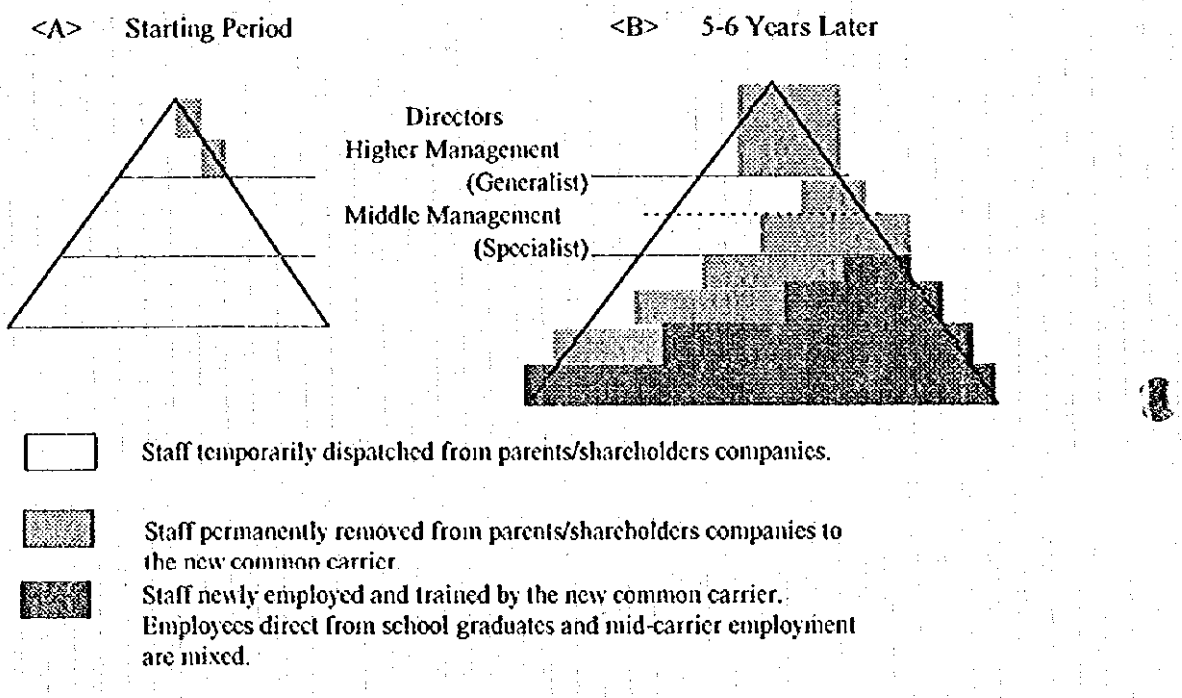


Figure 12-2-1 An Example of Human Resource Composition of New Common Carrier (Out of the case in Japan)

The figure 12-2-1 illustrates

① At the starting point, almost whole man power was provided by the shareholders companies. The core shareholding companies were closely interested in fostering the new company as parents because they held serious stake in the new company through their heavy investment. The staff dispatched were generally well experienced in the requested lines of jobs or well trained for the requested management in the newly organized carriers.

② Provision of staff from established shareholder companies was a very expedient system available in Japan but the new common carriers must make strenuous effort to replace those staff by their own employees within the limited time of dispatching contracts. Delay in replacement threats to cause serious shortcoming in necessary human resources of the new common carriers or affects the acquisition of independence from the influence of parents companies by the new common carrier.

③ Several years after inauguration, new common carriers were generally successful in replacement of younger staff mainly direct from school graduation and mid-carrier employment in the general labor market. NTT and KDD also contributed as the supply sources of telecommunications experts as their own restructuring program to reduce their staff were fortunately proceeding.

Important part of replacement was accomplished by permanent removal of the staff from parents companies to the new common carriers and those staff filled largely from lower to middle class position in the new common carriers. The motivation of that removal was generally the staff's own discretion that they found more preferable and promising position in the new common carriers than in the established organization they had belonged to.

④ Permanent removal from the established companies to the new born companies also happened in the position of the directors class especially in such cases as retirement age in their home companies are close or prospects for remaining carriers are not exactly satisfactory to them.

⑤ After all, the positions which remained uncovered until latest were middle and upper middle management who are engaged in corporate planning and direct management of the lower organizations as the promoters the executors of the plan. Those positions of the new common carriers are in many cases still temporarily covered by the staff from outside organizations. Those positions require not only longer experiences and expertise in their special fields of jobs but also good sense of balance in management as generalist.

3. Situation in Each Category of Personnel

Although the situation and environment of Mongolian entities of telecommunication services are in many aspects different, some recommendations or suggestions about human resource development may be offerable through actual experiences in Japan and the observation of the current Mongolian situation.

This section discusses about three categories of personnel, corporate planners, technical staff, and field workers/service fronts. It is a very vast grouping of the personnel but for the purpose of discussing human resource development here, expediently made those three categories by the common nature of their jobs.

Corporate planners : In the industrial organizations situated in the competitive market economy, each staff has planning functions and implementation duties within given scope of jobs. Those functions augments their weight when the positions are promoted. The upper middle management such as chiefs of sections or managers of departments are all corporate planners as well as line managers. We treat classes of those staff as corporate planners. In other words, they are upper middle staff of organizations, who practically support company executives through planning and implementation of corporate activities.

Technical staff : Staff who undertakes engineering and technological aspects of corporate activities. They also have chances to participate in planning activities but their main field is on technological specialties.

Field workers and service fronts : Field workers are telecommunications technicians who work at the site of telecommunications facilities. Service fronts are the staff who directly provide services to the customers and also all the staff for supporting their activities. All other common workers are included in this class.

3.1 Corporate Planners

In the competitive economy, capability of the corporate planning division or the core group which is engaged in the corporate planning is crucial to the development of the organization.

Even for the decision belonging to the top management, the corporate planning division must provide the proper materials for their judgment and sometimes even act as the balancing gyroscope of the organization in case the opinions inside is losing balance by reason of certain biases.

The corporate planning division does not consist only of senior staff but selected younger staff are alternately assigned for miscellaneous jobs in the division and it provides those younger staff with the ideal training ground to obtain planning skills and whole picture of the corporation.

In Mongolia, the remarkable advancement in organizational structure of the telecommunications service provider was carried out in September 1995 and previous MTC was divided into MCAC and MTC. The newly reorganized MTC is the operator of equipment and the provider of telecommunications services. MCAC (Mongolian Communications Asset Company), as the name of the company indicates, is the holder of telecommunication equipment as governmental assets and in accordance with definition of the scope of its work, it is state owned and responsible for rehabilitation and expansion of the telecommunications network.

This is a very significant step forward to market economy on the part of telecommunications services in Mongolia following the recommendation of the ADB and the master plan derived therefrom. From the viewpoint of human resource development, this organizational stepping forward exposes new aspect of the problem especially in the career development of the corporate planners level.

Reorganized MTC, is a monopolist in the current scope of telecommunications services for the time being and by that reason it will bear more responsibility for social welfare than ordinary private companies in the market economy. However, the new MTC is basically a private company prepared to participate in multi-parties competition whenever the time comes and must independently take responsibility for the result. For that purpose, corporate ego must be unleashed to the extent normally accepted in the market economy. Spontaneous exchange of goods and services is a theoretical basics of free market economy for its effective functioning. MTC and other telecommunications service providers or newly coming out common carriers are situated on the same private status. The corporate planners of those privatized companies are in principle allowed to act for the private benefit of the companies.

It is here that the survey of this time found necessity of a different type of planners for Mongolian telecommunications development as a whole. As is represented by the welfare economy theory of neo-classic school, the optimum distribution of limited national resources is in the way to maximize total welfare of the society which consists of suppliers surplus and consumers surplus. The needs of both surplus must be fairly represented and balanced.

The planners acting on the total benefit of the society belong to the administrative regulators like MOID or it is considerable that substantial portion of the planners of this quality be located within MCAC.

The reasons could be provided by announced roles of MCAC which is defined to hold governmental asset of telecommunication equipment and to be responsible for rehabilitation and expansion of the network. By that very role and duty, MCAC will be in need of corporate planners to implement the governmental pole in future unless it stays at the position of mere procurement and maintenance department telecommunications equipment.

3.2 Technical Staff

Rapid technical advance is characteristic to telecommunications industries. Through the survey of this time, the fatal lack of engineers or other technical personnel for the current telecommunications operation was not found out nor appealed from the site of telecommunications service operation. It is when the advanced new equipment or system are introduced that the lack of staff is surfaces as the problem. This is not specific problem for Mongolian telecommunications activities.

World-widely the operational guidance for new equipment accounts for more and more important part of duty to equipment providers. One of the important check items in selection of equipment providers or operational partners is to be the skill and willingness of technical transfer to the purchasers including training programs of the staff.

The quickest restoration of services are requested when accidents happen and the system breaks down in the type of service provision like telecommunications. Stationing of equipment suppliers' staff for certain period at as close position as possible to the equipment is indispensable for that purpose. What is important in this case is that local staff should make a team with the staff from the equipment suppliers and move around together even when it is unnecessary in view of manpower because it is the best chances for on-the-job transfer of the practical technology.

There is one real case of technical transfer which we consider to be worth informing to this country. An automobile assembly industry was once established in Malaysia as a joint venture between a Japanese leading auto-manufacturer and Malaysian government-sponsored business concerns. The project included special purpose of technical transfer from Japan to Malaysia aiming at general leveling-up of assembly for the sake of future development of Malaysian manufacturing industries as a

whole. The nuts-and-bolt technologies really useful on the assembly lines are not in the hands of Japanese engineering staff of college graduates level but held by the foremen or lower management in the factories who are mostly inexperienced in the international communications. The solution in this case was to select Malaysian staff also from the head of workers level and let them study minimum necessary Japanese language under the sponsorship of Japanese partners. Those Malaysian staff received useful nuts-and-bolt technologies direct from the technology holders and transferred them direct to Malaysian workforce through Malaysian language. The result was reportedly successful.

The leading Japanese companies generally have overseas training programs to their own staff. Promising staff are selected from young generation and the companies send them to the overseas countries. The first one year is in the colleges or other institutes mainly for the purpose of language training. Following one or two years in the nearby branch offices or the available business organization for actual business experiences in the overseas culture. The trainees come back with linguistic ability, knowledge about foreign culture and personal channels with friends and acquaintances of those countries. The number of trainees annually sent out is not large but by continuing in the program every year, the accumulation of the regional experts in international affairs reaches substantial volume in the company.

Following findings in the actual cases of technical transfer to the developing countries will also be of some reference to the Mongolian case. In some developing countries where the western style individualism and man-to-man competition were introduced too out rightly, transferred technique was received individually and had no effect of permeating into the organization as a whole. The technique belongs to the individual staff and when the staff leaves the organization it is together with acquired techniques. On the contrary, in Japanese industries at their height of economic growth, for, instance, the advanced technologies from overseas were received by the organizations as a whole. The engineer who was nominated and mastered certain technology was eager enough to open that technology to the surroundings, from senior personnel to junior, from the advanced section to the one left behind. Owing to seniority system and life-long employment system of Japanese industries in those days, there was no reason existing to hide away acquired know-how as individual assets. It was even his merit to open the know-how and foster his successors and seek for higher position in the company. Western style individualism and man-to-man competition have a significant merit to activate organization and enhance organizational efficiency but modification with oriental groupism sometimes creates efficient circumstances for technical transfer.

3.3 Field Workers and Service Fronts

When the personnel of field workers and service front workers are in short, domestic supply sources of trained staff are generally limited in the developing countries. In Mongolia, however, the telecommunications entities look like in a provider's position rather than a receiver's of those staff. The long term personnel plan indicates that the number of personnel engaged in PSTN service in this country is on a declining trend. The Table 12-3-1 shows this trend.

Table 12-3-1 Situation of Ulaanbaatar Telephone Service

Year	1995	2000	2005	2010
Number of Staff	1351	1428	1505	1583
Staff per 1000 DEL	31	22	15	10

Table 12-3-2 Productivity of Telecommunications Services in No. of Staff / 1000 DEL (Yearbook of Common Carrier Telecommunications Statistics ITU)

Name of Country	Staff / 1000 DEL as of 1991	Name of Country	Staff / 1000 DEL as of 1991
Spain	6	Indonesia	32
Norway	7	Philippines	27
U.K.	8	Thailand	16
Sweden	7	Malaysia	16
Switzerland	5	Australia	10
		Singapore	9
Butan	167	New Zealand	9
Laos	138	Hong Kong	6
Bangladesh	77	Japan	5
China	63	Korea	4
Sri Lanka	59		
India	59	Asia Pacific	14
Pakistan	48		

It is a common knowledge that telecommunications operation is an extreme capital intensive industry. Figure 12-3-1 contains typical radar charts which is often used to examine the situation of business organization of Japan. The six axes of radar charts consist of following indexes to be calculated from Balance Sheets and Loss and Profit Accounts of business organizations.

≪Profitability Indexes≫

①Current Balance / Total Capital

②Business Margin / Sales Amount

≪Profitability Indexes≫

③Equipment Productivity(Value Added / Amount of Tangible Assets)

④Personnel Productivity(Value Added / Number of Personnel)

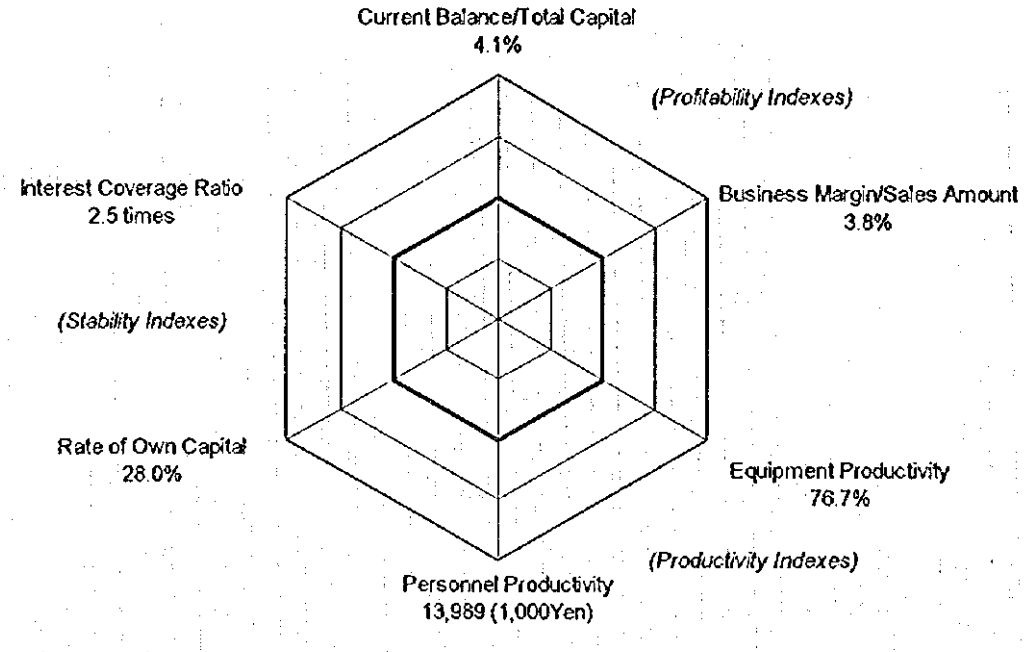
≪Stability Indexes≫

⑤Rate of Own Capital

⑥Interest Coverage Ratio

1. Whole Industry

Whole Industry (Selected 1,528 Companies in Japan)



2. Telecommunications Carrier

NTT (Leading Domestic Telecommunications Carrier)

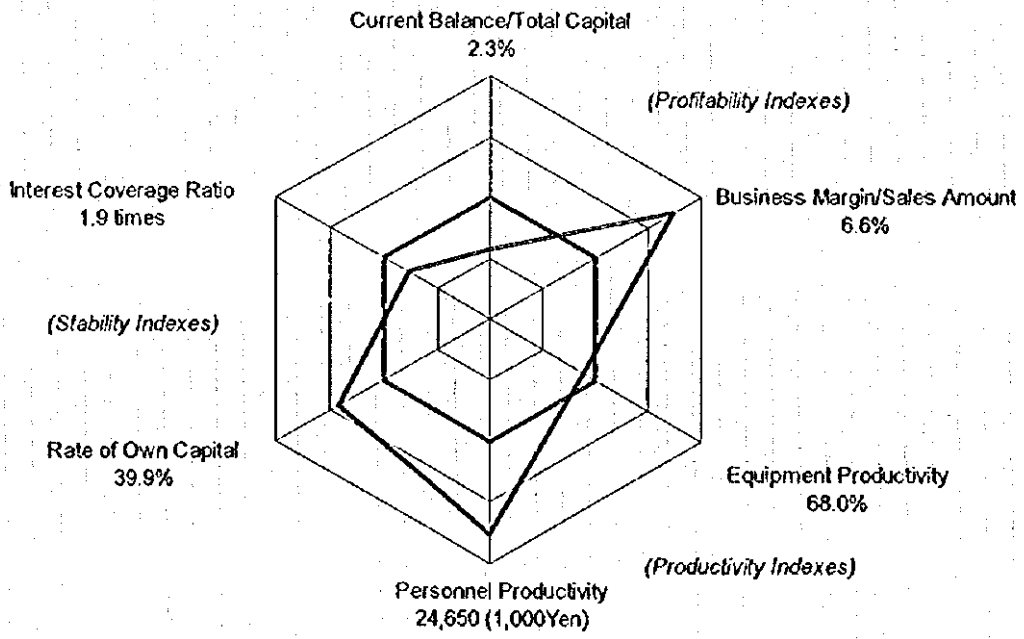
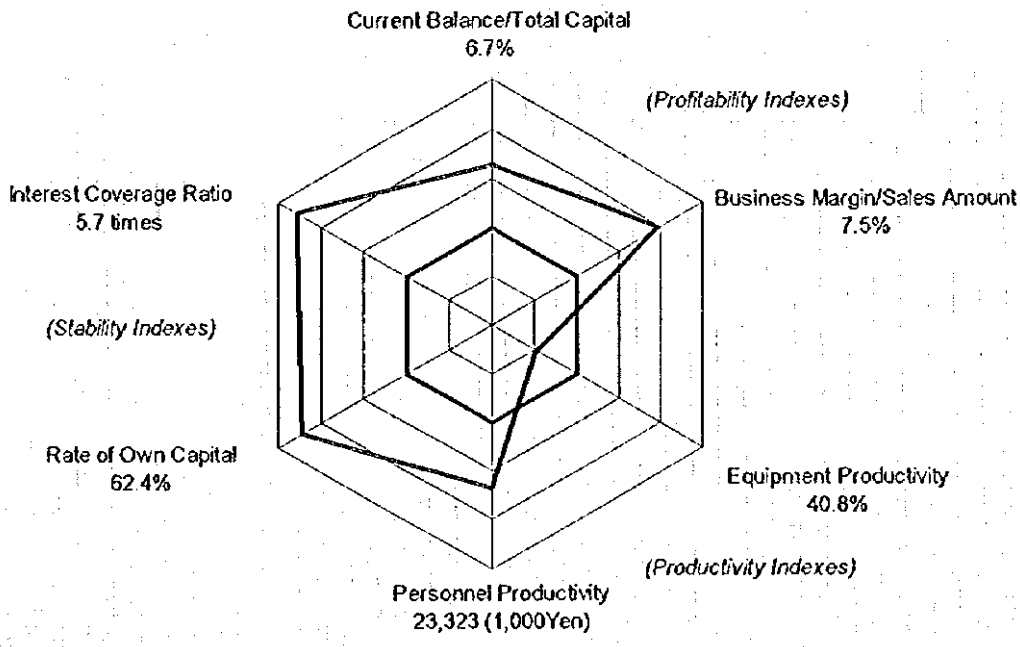


Figure 12-3-1 State of Business Organization (1/3)

3. Telecommunications Carrier

KDD (Leading International Telecommunications Carrier)



4. Telecommunications Carrier

(A Mobile Telecommunications Carrier 3rd year in Japan as an example)

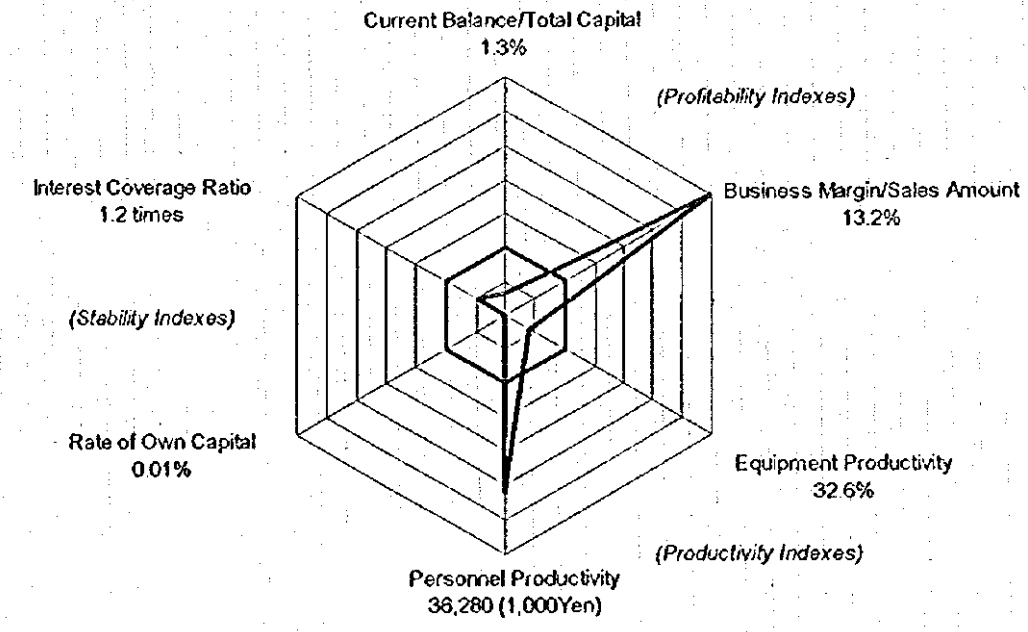
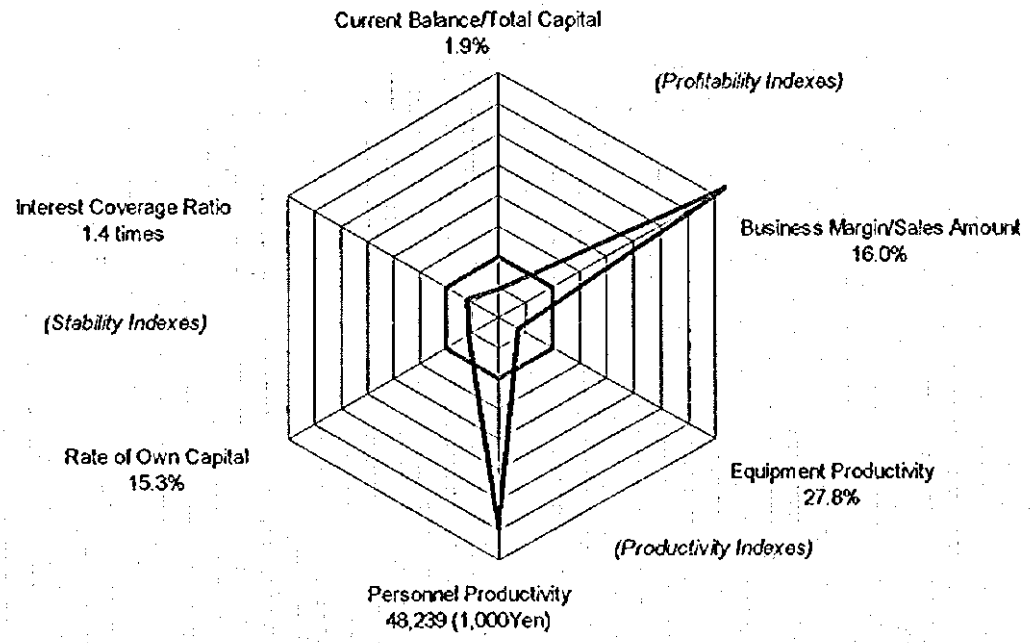


Figure 12-3-1 State of Business Organization (2/3)

5. Electric Power Industry (9 Companies)

Electric Power Industry (9 Companies)



6. Steel Industry (55 Companies in Japan)

Whole industry (55 companies)

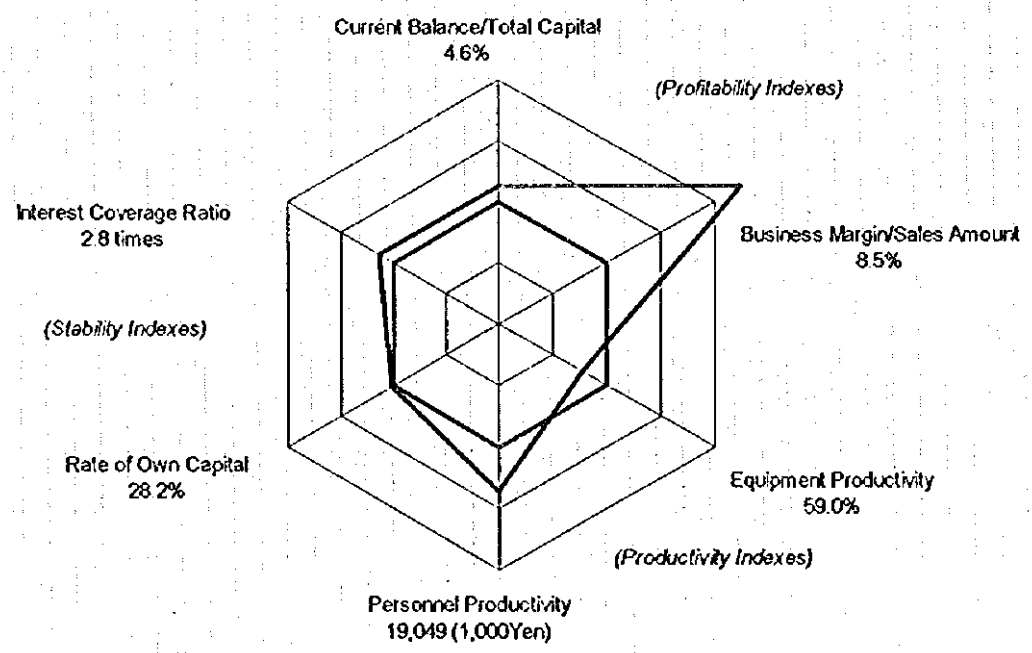


Figure 12-3-1 State of Business Organization (3/3)

The top chart of Figure 12-3-1 indicates in average of 1,528 Japanese companies registered on the stock markets covering whole range of industries. Other charts are drawn out as contrasts to the average. The graph that protrudes outward shows advantageous aspects of the company. The graph concave inside indicates inferior aspects of the company. Attention is drawn here to the productivity indexes ③ and ④. Both indexes contrast the Added Value raised through business activity of the company (Personnel Expenses + Equipment Depreciation + Interest to Borrowed Fund. + Rent + Taxes) against ③ the total amount of Fixed Assets ④ the number of personnel.

In the second and third charts of Figure 12-3-1, leading domestic and international telecommunications carrier in Japan, NTT and KDD, the equipment productivity is not excellent like electric power industry (5th chart) and steel industry (6th chart) because investment to equipment is heavy in comparison with added value. The personnel productivity is a little better than that of whole industry. The two big leading telecommunications carrier of Japan have very balanced characteristics of the chart, compared with a new mobile telecommunications carrier, fourth chart of Fig. 12-3-1. This character of the fourth chart is quite similar to those of electric power industries (5th chart). In the case of steel industries (5th chart), equipment productivity is better, while personnel productivity is lower. It must be take note that telecommunications service is capital intensive and heavy investment to equipment cannot be evaded if we intend to provide most up-to-date services of good quality to the consumers. Therefore, total efficiency or productivity of the organizational activity is unable to expect unless the number of personnel is minimized. While the labor cost is comparatively low in Mongolia and there is difficulty in raising capital, some temporal deviation towards steel industry type in Figure 12-3-1(3/3) might be permissible but the location of final goal must be remembered. For example, remote radio stations of Mongolian telecommunications services were observed to be attended by 3 to 4 shifts. In the international actuality of late, hundreds of thousands of remote radio stations are operated as unattended stations from a central control office with remote control systems.

All in all, the telecommunications service entities of Mongolia is a provider of labor forces experienced in telecommunication or trained in large scale organization. It will be a very important role in the industrialization process of Mongolia in coming years. Foreign investors, for instance, are usually interested in availability of that sort of work forces before making investment. In the initial stage of some developing countries, there were forces before making investment. In the initial stage of some developing countries, there were cases that military organization was the only place available to train people as organizational staff which could not be an ideal circumstance. In this regard, despite of future reduction of personnel in telecommunications entities, training of personnel should be encouraged. At the same time, the personal data of each staff including staff's careers, special abilities, desires, etc. should be accumulated as a data base, as a computerized data base if possible, so that it is available whenever necessity arises in future.

4. Human Resource Development on Planning Staff

A significant part of human resource development program of Mongolian telecommunications services in future will be the program to acquire planning aptitude among relative staff. Following abilities are supposed to be in need to the planning staff in the organization like MCAC as the equipment provider of telecommunications.

4.1 Demand Forecast

In the international standard, expansion of telecommunications infrastructure is planned and implemented on the prospects of demand minimum three years ahead. 5 years forecast of demand always must be in sight with reasonable accuracy. Preferably 10 years prospect should also be available in any manner.

So long as current PSTN services in Mongolia is concerned, future expansion prospect is still moderate. In many developing countries in the world, however, economic development often drastically changed the aspect especially in the metropolitan zones. On the other hand, the penetration of telephones and other telecommunications terminals are often set out as an ideal target of the country instead of leaving it only to natural trend of the market.

MCAC as the organization responsible for expansion of telecommunications infrastructure should be equipped with tools and knowledge to forecast and manage the demand for telecommunications services so that they could prepare telecommunications infrastructure at proper timing.

Tools of demand forecast is not exactly perfected even in the advanced countries of market economy either but recommendable method to master handling is such as followings:

- Logistic curve theory (Static and Dynamic)
- The market research procedure to detect potential demand
- Price elasticity analysis

4.2 Total Architecture Planning

Viewing present situation of telecommunications service provision in the advanced industrial countries in the world, there are two opposite currents are crisscrossing.

Telecommunications services are functionally or system-wise divided into parts and business approvals are given by authorities separately. It has a meaning to make new participation easier and competition further intensified. On the contrary, service provision gradually requires an integrated total service on end-to-end basis.

Both are important necessities at current stage of telecommunications services in the world. As a result, inter-connectivity and openness of the networks is regarded as more and more essential for total development of the telecommunications services. Those necessities are particularly high in the land-line networks of PSTN. In every country PSTN land-line networks are the infrastructure of the infrastructure in telecommunications services. Almost any other telecommunications services cannot be realized without inter-connection with PSTN.

The meaning of this fact is that the organization responsible for preparation of PSTN land-line network such as MCAC must be well informed of the total architecture of telecommunications services of the country and keep this part of telecommunications equipment ready for addressing access requirements arising in future from varieties of carriers and customers.

On the same line of duty, MCAC, as the entity most precise about the telecommunications equipment, will be expected to keep hold of cost information about equipment together with depreciation schedule and, what is more important, to establish the method to distribute the cost to each operator to whom the equipment are leased. The established distribution method of cost must be fair and transparent because this cost distribution provides basics of cost-matching telecommunications charges for consumers in each service.

By those reasons, the group of planners who can overview and guide the total architecture of the telecommunications infrastructure of this country is in need. As the location of those planners, MCAC could be recommended as one.

4.3 Vigilance to Technical Innovation

The entity responsible for telecommunications infrastructure must be vigilant to world-wide technical innovation of relative area. Speed of the technical innovation is particularly high in telecommunications industries in the current world.

Some system loses competitiveness in cost and service quality before depreciation of the equipment is completed and overtaken by newly developed systems. Transition from analogue system to digital system is one of the typical cases.

Some system loses its cost competitiveness through international penetration. It is a common knowledge that telecommunications services show a conspicuous nature of "economy of scale". Therefore, a certain system evaluated high in technological assessment may lose the position through cost competitiveness, if it fails in international penetration.

Apart from the problems of cost and quality, it is noteworthy that the telecommunications technologies are generally on the trend of international standardization. When a basic system of certain telecommunications service is selected, whether the systems is close or remote to the current of international standardization sometimes comes up as an important factor of judgment. For instance, in the case of cellular mobile telecommunications systems, the position of world standard is being contended and the system standing closest to this position will be advantageous to provide convenience to the users.

Needless to say, the contact with ITU and other international organizations by the planners and information gathering surrounding those will increase its importance in this regard in future.

4.4. Play Ground for Competition

The basic theory of market economy proposes realization of the largest social welfare, supplier's surplus and consumer's surplus inclusive, through spontaneous exchanges of goods and services in free competitive market. The theory assures that the optimum distribution of given social resources is achieved in this case and free competition is the best process to reach this goal.

Before introduction of competition into the market, however, we must be well aware of the fact that the real target is realization of the lowest cost and price with the best quality of goods and services and competition is a tool to materialize those objects. Competition itself cannot be the target.

Viewing the actual situation of telecommunications market in the world, the market where ideal full competitions is introduced and functioning well is rather limited. The reason is that introduction of full competition into the market requires several conditions as its prerequisite

(1) The prospected potential demand is large enough to accommodate competitors.

(2) The play ground for competition must be constructed so as to provide all participants with equal footing in competition.

(3) The players in competition must be trained in competition and hold matured idea for competition rules.

(4) The society has other frontier of economical activities to absorb the labor forces of defeated industries.

In this regard, the world-wide actuality is that the level of competition is temporarily moderated in most of the markets in accordance with the maturity of the market conditions as mentioned above. Otherwise intensity of competition does not always function to materialize the targeted objectives and may sometimes cause social losses which eventually transferred to the shoulders of general public. The ADB's proposal of multiple entities monopoly to the Mongolian telecommunications services at present stage is understood to be recommended by similar reason.

However, as the Mongolian telecommunications services have started moving on the truck of privatization and free marketing, the planners in some quarter must draft out scheme of the gradual enhancement of competitive situation. This planning work is so highly political and administrative that location of the planners might be found on the MOID level.

At the same time, preparation of fair competition ground is a very important duty and, through precedent international experiences, it is not an easy task unless the circumstances allow to start competition from scratch. Planning and preparation of the play ground for fair competition requires deep understanding of network and infrastructures and how to lease infrastructure. In any manner, MCAC will be significantly involved in this part of planning and will become in need of for that purpose.

5. Motivation for Competitive and Market Oriented Staff

Human resource development problem has a lot of subjects to be addressed especially in the most technical by intensive industrial field of telecommunication. Through the survey of this time, however, the basic capacity of Mongolian people could be ranked very high among the countries aiming at industrial development in the world. Therefore, the method of providing motivation for advancement to those people is as important subjects as acquisition of knowledge. The following enumeration is several suggestive information from actual experiences in other countries for the reference to consider Mongolian matters.

5.1 Competitive Attitude

In the free competition market, people start thinking that to stay at the present position means to be the loser of tomorrow. People are driven to assume an offensive attitude to make improvement about current situation better than any other competitors. Then the multiple entities monopoly in Mongolia could not engender competitive attitude among relative staff? Answer is that it is not always so.

For example, in an island nation of South East Asia (Singapore Telecom), notwithstanding the telecommunications services are so far under monopoly, the world lowest telecommunications tariffs are materialized and attracting the international investors. On the contrary in some other country, despite the competition of multi-participants are under way, the charges for telecommunications services are not reasonably lowered due to mutual check.

In the case of the island nation above, the country as a whole is in a competition to become an industrial hub the region and the telecommunications entity of the country, though it is a monopolist in the country, is well motivated to support the national objective by realizing the best quality of telecommunications services with the lowest charges. In these circumstances the monopolist could assume the most competitive attitudes.

In the case of other country mentioned above, the market is isolated against challenge from outside and tariff comparison will other countries are slipped off the participants' interests. Despite of multi-participants competition, incentive to realize the internationally lowest tariff is dull in this circumstance.

If the policy setting of the country as a whole is competitive one and the staff of inside organizations are well motivated to contribute to that policy, the multi-entity monopoly of Mongolia has good chance to become active and challenging same as the one in a multi-participants competition.

5.2 Market Oriented Service

Practical method to convert the state of telecommunications staff' mind from command economy to market oriented economy will be one of the major subject to be sought for in the current situation of Mongolian telecommunications services. As a result of survey of this time, the following two methods could be proposed as the initial footholds.

- Market research activity.
- TQC (Total quality Control) method.

Market research activity is originally for the purposes of holding size and quality of the market but in the market oriented economy of late, the method is actively utilized to detect and systematically classify requests from customer. Not only the telecommunication organization can clarify the location of problems but the telecommunications service staff gradually feel obliged to settle the problems for the sake of customers. It is initiation of market oriented status of mind on the part of service providers. There are elaborated research technologies available nowadays but the close contact with customers is the basics of everything. The list of research items could be discussed among Mongolian telecommunications staff depending upon what information are considered to be necessary for future improvement of services.

After the research is conducted, trial and effort for solution of even minor complaints are important. If the staff start feeling joy and pride in settling the problems of customers and competitively seeking for higher reputation in the market, it is a successful shift towards market oriented consumer-first economy.

Total Quality Control method is originally for the purpose of reducing defects of products on the manufacturing lines. "Total" in this case means total participation toward quality improvement campaign from the top to the petty workers. This total participation is a characteristic point of TQC method and is indispensable to quick solution of the problems and as motivation to the personnel.

What we can learn from the principle of TQC method in regard to market oriented operation of organizations are as follows:

① **Quality First:**

Productive activities and service provision in the market economy regard Quality, Cost and Delivery as three most significant check points. Among them, the TQC method sets the first priority on Quality of the products as it considers that high quality of goods and services is key to secure long term trust from the customers and to offer long term benefit to the customers.

② **Market-In:**

Market-in means to produce products or to provide services in consideration of customers' desire. The principle of TQC method puts the first priority to this point. It is a core of market oriented philosophy. The antonym to this term is product-out in which products and services are provided at the discretion of the provider side.

③ **Data First:**

Action is taken on the basis of data derived from fact finding survey instead of impression or feeling. Priority to address the problem is decided such data.

④ **PDCA (Plan-Do-Check-Action):**

It is the philosophy that a plan must be improved after its implementation and check of its result, namely Plan Do Check Action always must keep recycling position among each other.

⑤ **Human Centered:**

In TQC campaign, the organizations do not regard personnel merely as physical source of labor force but as human-being which has autonomy spontaneity and creativeness and as a qualified existence to participate in all aspects of organizational activities for customers.

Thus the TQC activity is one of the recommendable methods to introduce market oriented way of thinking into the telecommunications entities and at the same time motivate personnel toward active attitudes to improve status quo.

6. Undergoing Human Resource Development

In consideration of the general perspective commented above, what will be the actual human resource development programs currently under way regarding telecommunications service improvement and the remaining problems. Table 12-6-1 shows ongoing human resource development program for Mongolian Telecommunications.

Table 12-6-1 Human Resource Development Program for Mongolian Telecommunications

	Program	Terms	Funds	Implementation
①	Overseas Training for MOID staff	1995~1996	ADB US$180,000 (Loan)	
②	Consultancy Service Human Resource Development Master Plan	1995~1996	Government of Norway (Grant) US$ 500,000	Telenor
	*(Demand forecast, Macro indexes, Strategy, Marketing, Financing, Investment, Administration, Personnel training)			
③	Training for Trainers	1995~1996	Government of Norway (Grant) US$ 584,982	Korea Telecom International
	*(Operation, Maintenance, Marketing, Adaptation to new circumstances, Centralized Control)			
④	Training for Operation, Maintenance, Organization	1995~1996	Kreditanstalt fur Wiederaufbau (KfW) DM 1,500,000 (Grant)	Detecom
⑤	Assistance for Accounting	1994~1995	ADB DM 500,000 (Grant)	Arthur Ander-sen & Co.
	*(Billing system, Tariff reform, LAN system, Customer data control			
⑥	Counterpart Training	1996	JICA (Grant)	JICA

6.1 Expected Contribution of KT

In response to the precedent recommendation by overseas experts that given the need for foreign capital and skills in the medium term, the Mongolian telecommunications sector is most likely to progress quickly if MTC can enter into a partnership and twinning arrangement with a more developed telecommunications company. Korea Telecom undertook the role through the recent capital participation into MTC and the relating agreements.

The area of assistance and educational activities by the Korea Telecom is expected to be comprehensive in accordance with the schedule attached to the agreement between Mongolian government and the Korea Telecom.

(1) **Technical:**

Network design, Equipment selection and procurement, Quality target, Service quality monitoring,

Assistance to formulation of network development plans and implementation of network development plans.

(2) **Corporate Planning:**

Business strategy, Information management and data analysis,

Preparation of fiscal planning and budges.

(3) **Commercial:**

Customer service, Market analysis, Billing service.

(4) **Tariffs:**

Tariff policy, Tariff design, Tariff change.

(5) **Inter-carrier Relations:**

Inter-carrier Relations:

Interconnection agreements with local and international networks.

(6) **International Relations:**

Association with international entities.

(7) **Financial:**

Fund demand analysis, Selection of finance, Negotiation of financing agreements.

(8) **Administrative:**

Administrative methods for organization, commercial rights.

(9) **Human Resources Development and Training:**

Deployment and organization of work force, Job description,

Personnel training, Performance review, Labor relations.

(10) Public Relations:

Relations with mass media and general public.

The Agreement between Government and Korea Telecom relating Mongolia Telecommunication company signed and approved on August 31, 1995 stipulates Korea Telecom's contribution to human resource development. The point of stipulation in effect goes as follows:

> Korea Telecom acknowledged as an experienced tele-communications is expected to provide senior level management assistance to the Company particularly in marketing, human resource development and financial matters.
>
> Korea Telecom shall provide at no cost the Company human resource expertise to improve the operations and management of the Company.
>
> Korea Telecom may provide the Company with training and education program for the Company's employee.

Training for trainers program, ③ in Table 12-6-1, funded by the grant from the government of Norway has been undertaken by Korea Telecom and the training course is going to be opened shortly utilizing classrooms of the School of Information Engineering, a school of Mongolian Technical University. Human resource development program for Mongolian telecommunication shows clear sign of acceleration through those activities.

6.2 Training for Market Economy

In this area of training program, recent development of activities by Mongolian Business Development Agency draws attention. This organization was established in October 1994 as Mongolian Business Development Center and lately has been enhanced to the Agency. The agency is being managed by 6 directors from European Union and 6 from Mongolian side. The Mongolian concerns include National Development Board (NDB).

Since its incept, the agency runs two programs

①Training for operation of small and medium sized industries.

Germany and Scotland are now undertaking this program as the representatives of E.U. and the short term lecture of 2~3 days are being given to the Mongolian trainees.

②Management training on marketing financing and administration.

Bocconi University of Milan is undertaking this program and one week training courses are being given.

In addition to those domestic programs, the agency carried out overseas activities. 20 Mongolian trainees were sent to Germany and Austria for agro-processing observation and training. Another group of 20 trainers ware sent to the United Kingdom for observation and training of manufacturing.

Another remarkable trial is the pilot project of trainers' training provided to 70 participants of Mongolia for 5 weeks in July/August 1995.

Apart from the training programs Mongolian Business Development Agency is constructing data base of Mongolian industries for future industrial requirement. This work is conducted in coordination with the UNDP. Some 300 entities are now registered on the data base and 30,000 industrial entities are now being classified and assorted for registration. All those are for the purpose of providing valuable information to the investors, both foreign and domestic, when they intend to invest to Mongolian market. The idea is in common with what previously proposed in relations with human resources in this paper.

Activities of the Agency are now financially relying upon international economic assistance mainly by European Union but from 1996 is requested to be self-sufficient. Training as well as consultation must be chargeable. As an idea, the Agency is considering making use of European Senior Service Network in which volunteers among retired experts are contributing. E.U. financially is supporting this network. The Agency's idea is to continue training program by those volunteers with one man one month contribution jointly supported by Mongolian side in housing transportation interpreters etc.

The Mongolian telecommunications sector and the MBDA activity have not come across yet but the Agency is saying that if there are proper chances, why not.

(Mr. Barsbold, Director of Mongolian Business Development Agency and Mr. Nyamsuren Aliasuren, Senior Manager, were information providers.)

Through the survey in Mongolia of this time, it was found that what we call container shops were thriving in every corner of Ulaanbaatar city after market economy was introduced. Those shops are uniformly installed in the size of half-size ocean going containers. It reminds us that in devastation

of economy after the World War II, Japan started its restoration from commercial activities of similar type.

In the case of Japan, accumulation of those tiny commercial activities created the fund for the next step among general public. It appears that the shops in the current Ulaanbaatar city provides ideal sites for the people to learn how to behave in market economy as well as for fund accumulation.

6.3 Situation of Technological Education

Schooling system in Mongolia after 1991 consists of 6 years primary, 2 years junior high and 2 years senior high equivalents. The first 6+2 years are compulsory. Before 1991, it was 4+3+3 system and there is a movement to return to 4+3+3 system again.

On the top of that, technological education is undertaken almost exclusively by Mongolian Technical University. The establishment of Civil Engineering Department under the Mongolian State University in 1959 was the first step in conducting teaching and research in engineering and technology in Mongolia. In order to meet needs of engineers Polytechnic Institute was established in the Mongolian expanded into Mongolian Technical University (MTU).

MTU consisted of 4 schools and 3 institutes. Each school and institute has several departments under them. Besides, there are 2 centers and a branch in Darhan city. Telecommunications institute is now School of Information Engineering and located about 5 km east from the center of Ulaanbaatar city where the main campus of MTU exists.

School of civil engineering
School of Geology and Mining Engineering
School of Mechanical Engineering
School of Power Engineering
Computer Science & Management Institute
Telecommunication Institute School of Information Engineering
Transport Institute
Center for General Education
Center for Foreign Languages
Branch School in Darhan city

The University is carrying out restructuring and now has reached the stage that centralized managing authority has been distributed to the level of schools and institutes. It will be distributed further down to the level of department. 5 years diploma course was converted to 4 years bachelor course plus 1.5~2 years master course. The courses provide broader knowledge for initial 3 years and major in specialty in the following period whole trend is the one the trial to bring the campus closer to the western system.

School of Information Engineering has about 500 undergraduates and postgraduates and sends out about 100 engineers to the society each year. The departments inside are:

i)Telecommunication
ii)Radio communication
iii)Electrical communication
iv)Information technology engineering

Annual tuition was raised up this year from US$ 110 to US$ 200 in reflection of general price hike. In the day of socialism students were assigned to the jobs almost 100% before graduation but under the current economy some 50% are required to create their own business or to find other courses.

The school not only educates students but employees of MTC and others can join. From MTC 4~5 employees join the course every year. Until 1992, 15~20 operators ×4 courses every year were trained in this Institute but this activity is suspended at present.

The headache of the Institute at present is the tools of training are old and cannot keep up with recent innovation of telecommunications technology. As a matter of fact, the training in the Institute is limited for analogue system and it is practically impossible to train students in digital systems. Meeting with JICA team on this aspect is scheduled to be held towards the end of November 1995. As experts' School of Information Engineering are stationed.

(Dr. Badarch Denveviin, President of Mongolian Technical University,
Dr. Bayanduuren Damadinsuren, Director of school of Information Engineering.
Ms Ragchaa Bajagjavhlan, Director of Information Engineering Dept.
were information providers.)

7. Conclusion and Proposals on Human Resource Development Plan

7.1 Summary of the Current Situation of Human Resource Development

(1) When the Mongolian telecommunications sector was oriented toward market economy, consultation of ADB group pointed out the following problems:

a) Training for the manager class in general was necessary.
b) The number of managers who understand the matters in the sector comprehensively (market economy, finance, human resource development, corporate planning, customer service, organization management) was in short.
c) Skilled labor was generally in short.
d) Generally, customer focused movement must be learned and trainer's training for that purpose was necessary.
e) Training for regulatory matters was necessary.

(2) With reference to the various needs of human resource development, the international assistance begins to be offered and executed as follows:

a) Telenor-Consulting is to instruct drafting of Human Resource Development Plan utilizing the grant from Norwegian Government. (1995 ~ 1996)
b) Deutsche Telecom undertakes training for operation, maintenance and organization utilizing the grant KfW. (1995~1996)
c) Korea Telecom undertakes training for trainers utilizing the grant from Nowegian Government. (1995~1996)
d) Arthur Andersen assists billing and tariff system utilizing the grant from ADB. (1994~1995)
e) ADB is undertaking outside country training for MOID staff. JICA is carrying out same for MOID MCAC staff as the counterpart training program.

Beside the above, training opportunities recommended to take advantage is training programs of the equipment suppliers for the technology required for operation of equipment of new types.

(3) In the basic telecommunications sector as a whole, the number of staff itself is even excessive and it is planned to be cut down in the course of time.

(4) The domestically available institute for the high level technological training is only Mongolian Technical University (MTU). MTU is educating 500 students including post graduates an sends approximately 100 graduates to the society every year. MTU is partly undertaking training for the personnel from outside society such as the staff of MTC. In the period of socialism, in principle 100% of students had fixed their post graduate jobs before they graduated but after transition to the market economy the rate fell down by half. Lately the tuition was increased from $110 to $200. Though it was minimum necessary measure to keep up with recent sharp price hike, it is a burden to the students. The university is under reformation toward the style of those in the western countries by rearrangement of the grade or distribution of authority down to the faculties and the departments level and so forth. One of the heavy headache to the institute at present is that the tools for technical education are obsolete.

(5) Human resource development assistance from Korea Telecom is being highly expected . In the agreement signed on August 31st, 1995 for the participation of Korea Telecom into MTC, Korea Telecom is obliged to dispatch high class staff to MTC and assist marketing, human resource development and financial matters. In addition, Korea Telecom agreed to provide MTC, at its expenses, with expertise for improvement of corporate management and to present the training program for MTC personnel. Trainer's training course by Korea Telecom's instructor has been opened in a faculty of MTU.

7.2 Analysis on The Aspect of Human Resource Development

(1) Although the needs of training for the managers class and scarcity of skilled labor were pointed out by the advisory consultation, it must be recognized that the basic aptitude of Mongolian people are high among developing countries in the world and their attitudes to attend at their jobs are not bad. In practical skill to operate and maintain obsolete equipment, they even surpass the level of industrially advanced countries. The problems mainly on the technical side arise when new types of equipment on the new and advanced technology are introduced.

(2) As the inferior service quality and faults of service are mostly attributable to the obsolete equipment and serious shortage of maintenance parts, the field survey seldom encountered the appeals from the sites about lack of technology or shortage of hands.
If, however, the standard of service quality is reviewed in the light, for instance, of the ITU standard strictly and it is well known to the people, the needs of further training with a view to enhance the general level of personnel will be realized.

(3) It is newly arising problems that chance of employment are short for the engineers sent out of the technical course of the school. The pay is low and seniority promotion of salary is difficult to expect. Depletion of the human resources from the telecommunications sector and its influence to the morale of under-graduates are worried.

(4) According to the business plan of MTC, deletion of the personnel is carried out through natural decline. The telecommunications sector in Mongol has long provided valuable chances of employment. If we take up the basic telecommunications sector as a whole including MTC, the sector stands on the supplier side of the personnel who experienced organizational work and technical training.

(5) Recent introduction of the modern digital switch surfaced insufficiency of technological understanding of the personnel. It is not exceptional in the recent world of rapid technological innovation and by this reason the responsibility of the equipment providers for training of personnel in the recipients of the equipment became more important than before.
In the world wide trend of digitalization of telecommunications system, training activities of Mongolian Technical University are expected but lack of tools for digital training is making obstacle.

(6) Within rapid transition to the market economy and intensified technical innovation, the targets of training program are too many. Assistance from other countries cannot absorb all. Trainer's training inside the country is indispensable to enlarge the training capacity exponentially.

(7) In the organization like MCAC, the problem is not the volume of staff but quality and specification have more meaning. Required aptitude will be planning capacity, wide view on the over all management, deep understanding of international trend in technical innovation, standardization and so forth.

7.3 Summarized Enumeration of the Problems on Human Resource Development

(1) Further necessity to clarify the targeted standard of service quality.
Further clarification of necessary training needs to realize the targeted standard of service quality.

(2) Training system to facilitate a large number of trainee to acquire new technology or for total enhancement of technical level of personnel. Trainer's training, educational capacity of MTU etc. are the subject in this connection.

(3) Training system to facilitate high class staff to acquire planning aptitude and over all corporate management.

(4) Lack of educational tools for new technology.

(5) Early completion of the Human Resource Development Master Plan currently under way by assistance of Telenor International.
Early completion of the Human Resource Development Program to MTC by Korea Telecom.

(6) In transition to the market economy and consequent price hike, the income standard of the telecommunications sector including that of government official concerned has been left behind to the discouraging level and it started affecting to the morale of the current personnel as well as future work forces of under-graduates.

7.4. Proposals for the Solution Problems in The Human Resource Development

(1) Currently undergoing preparation of Human Resource Development Plans should be completed as soon as possible and further necessity of cooperation should be reviewed and listed up.

As the training plan of telecommunications sector, following area should primarily be covered.

Technical training;

- Network planning
- Optical fiber technology
- SDH
- Switching(hardware and software)
- Data transmission technologies
- ISDN technologies
- Radio transmission

Commercial training;

- Basic knowledge about industrial organizations
- Basic knowledge of finance and accounting
- Personnel management
- Marketing skills
- Customer service

(2) It is recommendable to consider following kind of training for which other countries including Japan have possibility to offer assistance.
Those skills should preferably be acquired from neutral institutes under the funds like ODA instead of support from equipment suppliers.

a) Training for the skills to inspect and supervise the construction works in order to smoothen the progress.

b) Training for the asset control skills to keep up with the ever increased volume and complication of the asset.

It is proposed to establish the position in MOID or MCAC to centrally manage those training programs.

(3) It should be recommended to be given priority to carry out innovation and reinforcement of educational tools for MTU so that the students could acquire technical training for advanced technology. At the same time, MTU should keep the door open to the training of the people from the industrial society or others outside the university. Mass training for telecommunications operators which was undertaken by the campus are suspended recently mainly due to short budget but it should be promoted as a part of cooperation activities between the campus and the industries.

MCAC as the asset holding organization developing the telecommunications infrastructure united with the government body (MOID) needs the facility to research and test telecommunications systems. This activity needs small but advanced equipment. Those equipment could be used for providing personnel with research experience and some types of technical training. In combination with those technical training, MCAC may provide managerial and administrative training to the personnel from local administration and others. For those highly practical training, MCAC may stand on better position than the university. It is worth planning to establish a training center of administrative purpose in MCAC.

(4) It is proposed to institutionalize study abroad system for the purpose of training the high class managers and engineers. The number of trainee will be limited but by sending out the trainee annually and continuously, the accumulation of the trainee will soon be substantial.
In case the training is for the younger promising staff expected to occupy higher position in future, the trainee usually is sent to the university or equivalent institutes so that he could pick up language and assimilate the way of life and make friends with promising students of the country as well as from other countries. On the second year, the trainee is to experience some telecommunications job site or training course. The first experience will be terminated in two three years in total and he may come back to the same country or the one in the same cultural area with more practical purposes in future.
In this training scheme, the trainee could have chances to understand the market economy as an integrated culture instead of partial aspects.
Acquisition of linguistic ability and cultivation of human relationship with other countries will long be their asset to execute their duties in the positions occupied after coming home.
Those chance, if possible, should be given when the trainee is as young as possible.
In the case of elder staff, the training course might inevitably be more specific.

(5) It is also suggested to search and develop the training opportunities in the facilities of world wide equipment manufacturers as their facilities are more and more sophisticated and increases capacity as their duty to train personnel of the buyers of their equipment constitutes an important part of the business activity in recent years.
In this regard, those chances are mostly available when the equipment is purchased. It is necessary to take best advantage of those opportunities.
Needless to say, this type of training opportunities are mainly for technical training.
Technical training has probability to be assisted by cooperation of other telecommunications carriers in advanced countries either.

(6) It is important to try to get in touch with the market through, for example, market research activities by organization such as MCAC in order to understand market oriented operation.

(7) As the very fundamentals to consider human resource development in the sector, the report must point out necessity to study the level and structure of salary for the telecommunications personnel and make it more stimulus to acquire further training and work long.
For example, following cases will deserve remuneration.

Acquisition of further skills or additional qualifications.
Remarkable contribution to the operation.
Seniority accompanied by enhancement of efficiency.
Remarkable proposals for better services welcomed by the market.
Remarkable proposals or actions to save cost.

As mentioned in the paragraph for the management aspect of Vol. II chapter 11, the basic level of salary in the basic telecommunications sector must be reviewed and enhanced in recent price hike and in the balance with that of other industries. Refer to Vol.II, Chap. 11,3.4,(1).
Especially those of MOID officials or MCAC staff must be maintained at the level just high enough to retain the best staff with pride and dignity. It is the very fundamentals for considering human resource development in the sector.

(8) It is recommended to construct data base and its index in the computer regarding available engineers technicians and other staff within the telecommunications sector.
It facilitates the staff to find out other jobs and at the same time facilitates the new industries advancing into Mongolian market to find out personnel in their urgent needs.