

Bangladesh

Greater Dhaka Telecommunications Network Improvement Project

Report Date: October, 2002

Field Survey: September, 2001

1. Project Profile and Japan's ODA Loan



Site Map: Greater Dhaka City



Site Photo: Telephone Exchange at Sher-e-Bangla Nagar Office, Dhaka

1.1 Background

The telephone density in Bangladesh was 0.15 telephones per 100 persons in June 1983, one of the lowest rates among Asian countries¹, and demand for fulfillment² was high, 23% in the same year. Bangladesh often suffers from low quality of telephone service; fault rates³ were about 25% in dry season and 50% in rainy season in 1983. In addition, there was a wide gap between telephone density in rural and urban areas; about 90% of the total number of telephone lines in Bangladesh were concentrated in urban areas, particularly in Greater Dhaka area, whose residents owned around 43% of all telephones in the country. However, 85 % of applicants waiting for phones were also in Greater Dhaka area. Therefore, improvement of telecommunication services in Greater Dhaka region was urgently needed.

Table 1: Telecommunication in Bangladesh (June 1983)

	Bangladesh (a)	Greater Dhaka (b)	(b)/(a) × 100 (%)
No. of Telephone Subscribers	135,945	59,133	43.5
No. of Telephones	140,049	62,239	44.4
No. of Applicants on Waiting List	31,542	26,821	85.0
Telephone Exchange Capacity	157,552	74,800	47.5
Population (1,000 people)	94,700	3,710	3.9
No. of Telephones / 100 People	0.15	1.7	-

Source: JBIC documents.

1.2 Objectives

To improve telecommunications services in the northern part of Greater Dhaka in order to meet the increasing demand for the telecommunications.

¹ For example, telephone density in 1982 was 0.5 in India, 0.5 in Pakistan, 0.7 in Sri Lanka, and 0.4 in Indonesia.

² The demand for fulfillment is the ratio of the number of applicants on the waiting list to the number of telephone subscribers.

³ The fault rate is the number of troubles/100 subscribers/month.

1.3 Project Scope

The project scope covers:

- (a) Procurement and installation of one digital tandem switch with 4,000 tandem circuit
- (b) Procurement and installation of six digital local telephone switches with total 26,000 line capacity
- (c) Installation and construction of optical fiber cables in six sections (junction cable network) with total length of 47.4 km
- (d) New and additional installation of subscriber cables
- (e) Consulting services for engineering/design, evaluation/contract assistance and installation/test supervision services

Japan's ODA loan was to cover the foreign currency portion of the total project cost; the local currency portion was to be covered by the Government of Bangladesh. Installation of subscriber cables was to be financed by local currency only.

1.4 Borrower / Executing Agency

The Government of The People's Republic of Bangladesh / Bangladesh Telegraph and Telephone Board (BTTB)

1.5 Outline of Loan Agreement

Loan Amount / Loan Disbursed Amount	6,320 million yen / 5,987 million yen
Exchange of Notes / Loan Agreement	March, 1986 / July, 1986
Terms and Conditions	
Interest Rate	1.25 % p.a.
Repayment Period (Grace Period)	30 years (10 years)
Procurement	Partially Untied
Final Disbursement Date	July, 1992

2. Results and Evaluation

2.1 Relevance

At the time of project appraisal, the telecommunications sector in Bangladesh was less developed than in other Asian countries, a situation that was deemed constraint on the general development of the country. The sector was characterized by: (i) low telephone density, (ii) a considerable number of applicants waiting for a main line, and (iii) telephone service with high fault rates. Therefore, improvement of both the quality and quantity of telecommunications service was given priority in the 2nd and 3rd Five-Year Plans of the Government. The need for improvement was urgent especially in Greater Dhaka area, a center of politics and economic activities in the country. Accordingly, the Project is considered relevant to national policy at that time.

As of June 2001, the telephone density of Bangladesh was approximately 0.87 telephones per 100 people, and in the current investment plan, the 5th Five-Year Plan (1998-2002), expansion and improvement of telephone network capacity in Bangladesh, particularly in Greater Dhaka, is still a major development priority. The 5th Five-Year Plan sets a target of achieving telephone density of 1 telephone per 100 people by June 2002, hence the project objective and scope remain relevant.

2.2 Efficiency

2.2.1 Project Scope

There were minor modifications made to each project component, but in general the project scope was maintained. The differences between the original and actual scope are: (i) installation of 5,400 tandem circuits instead of 4,000 tandem circuits at the tandem digital switch in Sher-E-Bangla Nagar (SBN) Exchange; and (ii) expansion of the network between six exchanges for a total length of 45.1 km (capacity of optical fiber cable: 140Mb/s), as against 47.4 km (capacity of optical fiber cable: mainly 34Mb/s) in the original plan.

2.2.2 Implementation Schedule

The original project implementation schedule was for the 58 months from May 1986 to February 1991, while the actual schedule spanned 56 months, from July 1986 to February 1991. The project was completed on schedule. The successful adherence to the implementation schedule can be attributed to the following factors: (i) as most of the switching facilities were installed in existing exchange sites, there was no land acquisition, which is usually a lengthy and cumbersome process; (ii) there was no major modification and revision in the project scope; and (iii) the project area was geographically concentrated in a particular area within Greater Dhaka, hence the construction and installation works could be carried out smoothly.

2.2.3 Project Cost

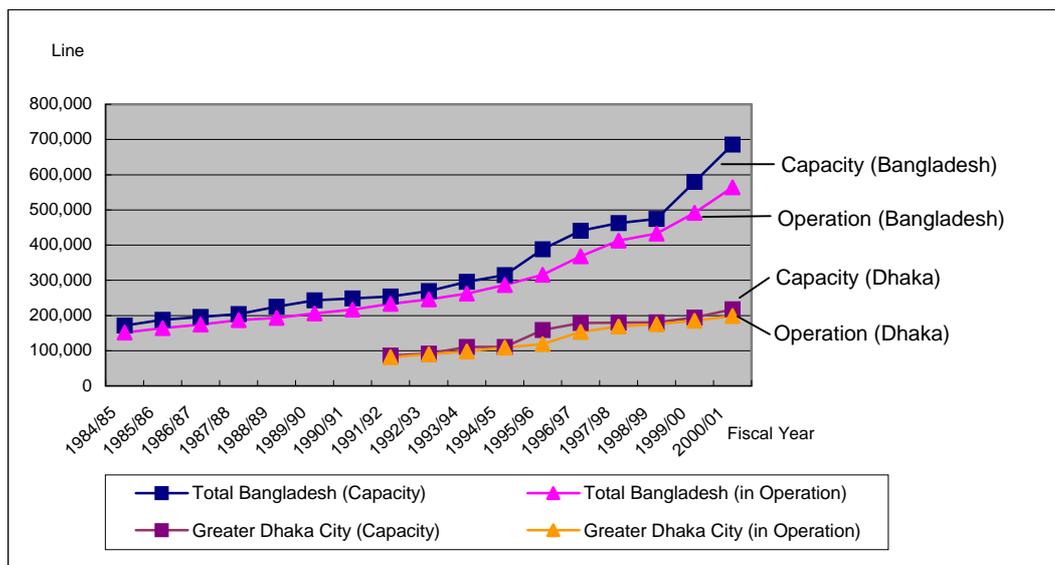
The original total project cost estimate was 11,948 million Yen, while the actual total project cost was 8,907 million Yen. Actual expenditures in local currency, which was all incurred by Bangladesh Government, were slightly reduced from 865.8 million taka to 694.3 million taka. The actual disbursement amount of Japan's ODA loan portion was also reduced to 5,987 million yen from original amount of 6,320 million yen.

2.3 Effectiveness

2.3.1 Capacity installed under the Project and its operation rate

At the time of project completion (in 1991/92), the total capacity of the main lines in Greater Dhaka was 86,500 lines (six exchanges), including 26,000 digital telephone lines installed under the Project, and 81,799 main lines were in operation. It should be noted that utilization of the facilities has been very high; it was 94.6% in the project area in 2000/01. The average utilization factor has exceeded 90% for the last ten years.

Figure 1: Capacity and Operation of Telephone Main Lines



Source: BTTB

Although the high utilization factor indicates that the project facilities have been fully utilized, the figure surpasses the standard for digital exchanges, which is between 75% and 80%. A high utilization factor brings with it the risk that quality of service may be affected. Nevertheless, the public pressure for telecommunications services is so strong that BTTB cannot lower the high utilization rate.

2.3.2 Quality of telephone service

1) Faults per 100 main lines and completion rate

Digital exchange switching lines and the optical fiber junction cables were introduced for the first time in Bangladesh under the Project. BTTB argues that the improved technology and new facilities contributed to improve the reliability of the service in the project area at the completion of the Project. However, because of the lack of available data and information, no definitive conclusion can be made here.

Yearly data for faults per 100 main lines and call completion rates in the project area, which are often used as indicators for assessing the quality of telephone service, are not available, so it is impossible to compare figures from before and after the Project.

Table 2 shows that Bangladesh still has the highest figures for the fault rate among the Asian countries. 1994 figures for other countries were 10 in the Philippines, 32 in Indonesia, 110 in Pakistan, 200 in Nepal, 218 in India, and 300 in Sri Lanka.

Similarly, the call completion rate in 1997/98 and 1999/00 were comparatively low. The local call completion rate of other Asian countries in 1994 was 93.0 in the Philippines, 60.0 in Indonesia, 95.0 in Pakistan, 40.0 in Nepal, 98.9 in Thailand, and 50.0 in Lao PDR.

Table 2: Faults per 100 mainlines a year and Call Completion Rate (Project Area)

	At the time of Appraisal 1987	Completion Year 1 1991/92	*****	Year 5 1995/96	Year 6 1996/97	Year 7 1997/98	Year 8 1998/99	Year 9 1999/00	Year 10 2000/01
Faults per 100 main lines a year	n.a.	n.a.	n.a.	585	393	410	423	515	465
Call Completion Rate (%)	n.a.	n.a.	n.a.	n.a.	n.a.	20.76	n.a.	31.17	n.a.

Source: BTTB

Note: 1) Fiscal year of Bangladesh starts from July and ends June.

2) BTTB has not yet established the database which systematically record the operational indicators such as call completion rate. Therefore, the year wise records are not available, those figures in FY1997/98 and FY2000/01 in Table 4 were collected by BTTB's ad hoc research exercised upon the request by JBIC.

2.3.3 Financial Rate of Return (FIRR)

The recalculation of FIRR (Financial Internal Rate of Return) resulted in a figure of 11.5%, higher than original calculation of 8.83%. The increase is mainly due to: (i) rise in installation fee and in annual rental fee from the original estimate, (ii) increase in international calls, and (iii) cost under-run in the project cost.

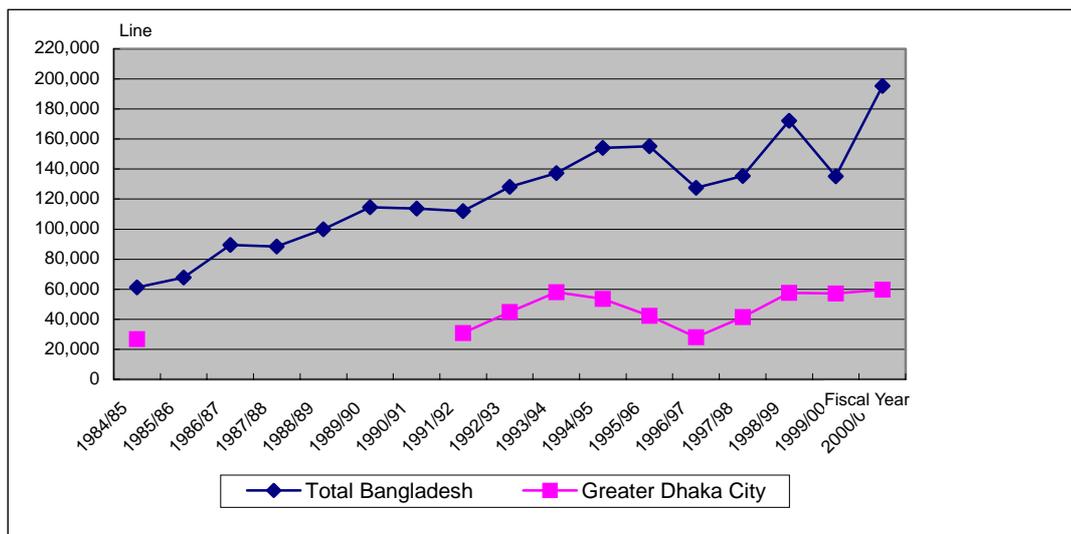
2.4 Impact

BTTB has continuously expanded its telephone capacity, and additional main lines have been installed since 1991/92 in Greater Dhaka with international donor assistance. By 2001, Greater Dhaka has installed 311,641 digital telephone lines, of which Project facilities account for 7.6%.

2.4.1 Waiting List for Main Lines

The project resulted in 26,000 new digital telephone lines in Greater Dhaka. However, hidden telephone demand was so high that newly installed capacity was exhausted shortly. In fact, the improved technology and facilities provoked an increase in telephone demand in Greater Dhaka, as seen in Figure 2. For instance, there were 30,881 applicants on the waiting list in 1992 vis-à-vis 26,821 in 1983. Therefore, while the project's contribution to moderating the supply-demand gap in telephone service can be observed, but it seems not to have been very substantial.

Figure 2: Waiting List for Main Lines (BTTB)



Source: BTTB

2.3.2 Telephone Density

The present telephone density in Bangladesh is approximately 0.87 telephones per 100 people, as of June 2001, a figure that included BTTB (0.53) and other private operators (0.34).

However, compared with the other Asian countries, Bangladesh still has one of the lowest telephone densities. The country needs to further develop its telecommunications sector.

Table 3: Telephone Density (Bangladesh)

(Unit: Main telephone lines per 100 population)

	At the time of Appraisal 1987/88	Completion Year 1 1991/92	Year 2 1992/93	Year 3 1993/94	Year 4 1994/95	Year 5 1995/96	Year 6 1996/97	Year 7 1997/98	Year 8 1998/99	Year 9 1999/00	Year 10 2000/01
Total Bangladesh	0.19	0.22	0.22	0.25	0.26	0.32	0.36	0.37	0.37	0.44	0.51

Source: BTTB

Note: 1) Population in Bangladesh in 1991 was 111.4 million.

Table 4: Telephone Density in Other Asian Countries (2000)

(Unit: Main telephone lines per 100 population)

	Laos	Nepal	Pakistan	Indonesia	Vietnam	India	Philippines	Sri Lanka	Thailand	China	Malaysia
Telephone Density	0.75	1.16	2.27	3.14	3.19	3.20	4.00	4.06	9.23	11.12	19.92

Source: ITU statistics.

2.3.3 Improvement in Economic/Social Activities and Living Standards

No survey has been made in this regard. However, according to BTTB, the Project had a positive impact on economic and social activities and on living standards in the project area. At the very least, those who gained access to telephone services on one of the 26,000 lines provided under the Project have benefited considerably and enjoyed the convenience of telecommunications.

2.3.4 Environment Impact

The Project did not involve major physical construction works, since most of the facilities were

installed in pre-existing BTTB facilities. No negative impact on the environment resulting from the Project has been reported.

2.5 Sustainability

2.5.1 Operation and Maintenance Agency

BTTB is run as a government establishment under the Ministry of Posts and Telecommunications, which provides all type of telecommunications services in urban and rural areas. Although several private telecommunication operators have emerged in line with the Government's liberalization policy for the telecommunication sector and provide mobile, paging and radio trunking services, BTTB has maintained its dominant position in the sector.

2.5.2 Operation and Maintenance

1) Human Resources and Technical Capacity

Depending on the capacity and type of system adopted, the number of operation and maintenance (O&M) staff for the 6 exchanges vary, but, in total, there is a staff of 1,541 that engages in overall O&M activities for the Project facilities (see Table 5 below).

Table 5: Human Resources for O&M in the Project Area

Exchange	Capacity (Lines)	Engineer	Office staff	Technical Personnel	Others	Total
Nilkhet	40,500	21	32	142	42	237
Moghbazar	51,686	32	50	219	63	364
SBN	49,663	35	54	204	93	386
Mirpur	25,146	17	27	121	17	182
Gulshan	39,700	26	23	149	51	249
Uttara	10,770	12	16	90	5	123
Total	217,465	143	202	925	271	1,541

Source: BTTB

Note: 1) SBN (Sher-E-BanglaNagar)

2) There are minor differences in the number of capacity at each exchange comparing to Table 3 due to different timing of data collection.

The engineers and technical staff at each exchange conduct maintenance activities according to manuals prepared by the manufactures. Their maintenance activities include: (i) daily/routine maintenance, such as traffic analysis, alarm condition checks, keeping of log files, and (ii) periodic maintenance, which includes diagnosis of the system and the replacement of subscriber cards. BTTB received O&M technical training for such project facilities as the digital exchange system and the optical fiber cables from the Project consultants and the Japanese manufacturer during the project implementation period.

BTTB provides in-service training activities aimed at updating the technical knowledge and skills of BTTB staff through Telecom Staff College (TSC) and Telecom Training Centres (TTCs). TSC in Gazipure (near Dhaka), a government technical institution established in 1987 with international donors' assistance⁴, provides long-term technical training for newly recruited BTTB engineers and refresher training for other government officers. In total, 75 participants were trained in 1999/2000 at TSC. BTTB owns TTCs in Dhaka, Khulna, Bogra, and other sub-centers, TTCs provided total 56

⁴ Telecommunication Union (ITU) and United Nation's Development Program (UNDP) assisted in the establishment of TSC.

training courses for 743 BTTB staff in the same year. In addition, 77 BTTB officers received training overseas in 38 countries in 1999/2000.

2) Spare Parts Procurement

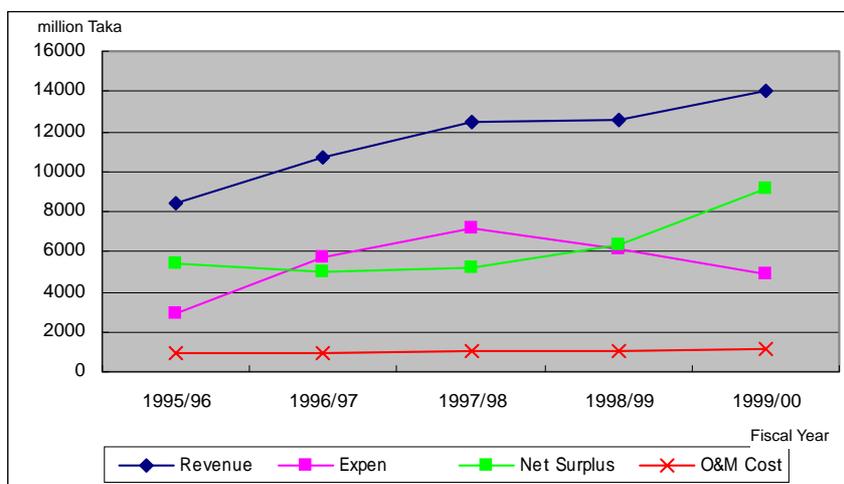
The main components of the project facilities are of Japanese manufacture, and spare parts are not available in Bangladesh. BTTB has established a quick, systematic procurement procedure for importing consumable spare parts from the Japanese manufacturers in cooperation with customs authorities. In addition, procurement of spare parts is given priority in BTTB's budget, since BTTB has been under pressure from the public to maintain the existing level of telecommunication services, even as demand greatly exceeds supply capacity.

2.5.3 Financial Status

In the last five fiscal years, the revenue of BTTB has steady increased, mainly due to the expansion of revenue from telephone and fax services, which make up nearly 98% of BTTB's total revenue. Expenditures fell after a dramatic increase from 1995/96 to 1997/98 that was affected by the repayment of bond. O&M cost, which represented about 23% of total expenditures in 1999/2000, has been stable. As a result, after 1997/98 net surplus grew by an average of 23%.

Although assessment of the long-term financial sustainability of the Project is difficult because BTTB's other financial documents, such as its balance sheet, were not available for this evaluation, based on the limited information available, it can be concluded that, in terms of its technical and financial capacities, BTTB has the ability to sustain the Project facilities.

Figure3: Comparison of Revenue, Expenditure, and Surplus in Last Five Fiscal Years



Source: BTTB

Table 6: Five Years Revenue Earning and Expenditure of BTTB

(Unit: million Taka)

Item	1995/96	1996/97	1997/98	1998/99	1999/00
Revenue					
(1) Telegraph	40.00	17.39	15.00	12.27	12.07
(2) Telephone & Fax	8,117.70	9,955.60	11,874.81	12,138.30	13,561.91
(3) Telex	202.18	290.39	198.34	200.28	157.66
(4) Other/Miscellaneous	13.30	461.47	363.69	191.64	272.11
Total Revenue Earning	8,373.18	10,724.85	12,451.84	12,542.48	14,003.76
Growth (%)	-	28.1	16.1	0.7	11.7
Expenditure					
(1) Salary of Officers	42.52	45.02	56.34	74.54	73.87
(2) Salary of Staffs	571.86	579.15	627.89	681.93	696.25
(3) Allowances	458.57	439.29	454.64	447.21	523.59
(4) Supply & Service	195.87	204.72	245.41	243.02	255.90
(5) Maintenance & Operation	915.99	892.11	1,031.51	1,046.18	1,112.31
(6) Audit Fees	19.23	23.70	26.00	27.20	29.67
(7) Pension & Gratuity	50.00	50.00	65.00	67.00	67.00
(8) Welfare Fund	5.50	5.50	5.50	5.50	5.50
(9) Renewal Reserve (RR) Fund	300.00	350.00	300.00	587.70	300.00
(10) Capital return on T&T Bond	0.00	2,750.00	3,350.00	2,228.93	1,250.00
(11) Interest on T&T Bond	0.00	0.00	460.06	314.63	110.06
(12) Interest on foreign Loan	65.00	65.00	76.60	80.00	108.36
(13) Capital repayment against foreign loan	73.60	73.60	334.77	340.00	309.92
(14) Small capital works	0.00	50.00	92.00	28.00	28.00
(15) Capital payment to TSS	180.00	130.00	0.00	0.00	0.00
(16) Return on investment	80.00	80.00	80.00	0.00	0.00
Total Expenditure	2,958.13	5,738.10	7,205.71	6,171.84	4,870.43
Growth (%)	-	94.0	25.6	-14.3	-21.1
Net Revenue Surplus	5,415.05	4,986.75	5,246.13	6,370.64	9,133.33
Growth (%)	-	-7.9	5.2	21.4	43.4

Source: BTTB

Comparison of Original and Actual Scope

Item	Plan	Actual
1. Project Scope		
(1) Location	Northern Greater Dhaka area	As planned
(2) Tandem digital switch -Sher-E-Bangla Nagar (S.B.N.)	4,000 tandem circuit	5,400 tandem circuits
(3) Digital Switching facilities		
-Uttara (UTR)	4,000 lines	4,000 lines
-Mirpur (MPR)	5,000 lines	4,000 lines
-Gulshan (GLS)	5,000 lines	4,000 lines
-S.B.N. (SBN)	5,000 lines	5,000 lines
-Nilkhet (NLK)	5,000 lines	5,000 lines
-Mogh Bazar (MGB)	2,000 lines	4,000 lines
	Total: 26,000 lines	Total: 26,000 lines
(4) Expansion of network between exchanges	6 route (optical fiber communications)	6 route (optical fiber communications)
	<u>No.of core</u> <u>Length</u>	<u>No.of core</u> <u>Length</u>
-S.B.N.-Uttara	34Mb/s × 2 6 17.3 km	140Mb/s × 2 12 17.9 km
-S.B.N.-Mirpur	34Mb/s × 2 6 8.1 km	140Mb/s × 2 8 6.3 km
-S.B.N.-Gulshan	34Mb/s × 3 8 5.4 km	140Mb/s × 2 8 5.6 km
-S.B.N.-Nilkhet	34Mb/s × 3 8 4.7 km	140Mb/s × 2 8 4.4 km
-S.B.N.-Mogh Bazar	140Mb/s × 1 6 3.9 km	140Mb/s × 2 12 3.7 km
-S.B.N.-Central	140Mb/s × 1 6 8.0 km	140Mb/s × 3 12 7.2 km
	<u>Total</u> <u>47.4 km</u>	<u>Total</u> <u>45.1 km</u>
(5) Consulting Services	Total: 129 M/M	Total: 113.5 M/M
-Review of D/D		
-Assistance of Tender Document & Evaluation		
-Construction Supervision		
2. Implementation Schedule	May 1986 - Feb. 1991 (Total: 58 months)	Jul. 1986 - Feb. 1991 (Total: 56 months)
3. Project Cost		
Foreign Currency	6,320 million Yen	6,012 million Yen
Local Currency	865.8 million Taka (=5,628 million Yen)	694.3 million Taka (=2,895 million Yen)
Total	11,948 million Yen	8,907 million Yen
ODA Loan Portion	6,320 million Yen	5,987 million Yen
Exchange Rate	1 Taka = 6.5 Yen (1985)	1 Taka = 4.17 Yen (waited average rate)

Independent Evaluator's Opinion on Greater Dhaka Telecommunications Network Improvement Project

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As in other countries Telecommunication in Bangladesh is a key infrastructure which plays a vital role in stimulating economic growth and overall development. Although Bangladesh has achieved significant progress in telecommunication over the years, the telephone density in Bangladesh is one of the lowest among the developing countries. According to the World Development Indicators (World Bank, 2000) there were 3 telephone lines per 1000 population in Bangladesh as against 37 and 146 telephone lines for the low income countries and the world respectively in 1998. In order to improve telecommunication services in Dhaka, the capital and the largest city of Bangladesh, Greater Dhaka Telecommunications Network Improvement Project had been implemented over a period of about five years from July 1986 to February 1991 with financial and technical assistance from Japan. The project resulted in 26000 digital telephone lines, through introducing an improved technology including fiber optical cables for the first time in Bangladesh. Bangladesh Telegraph and Telephone Board (BTTB), a government agency has been responsible for implementation and operation of the project. In 2002, JBIC has carried out an evaluation of the project focussing on its relevance, efficiency, effectiveness, impact and sustainability.

The low telephone density has been accompanied by poor quality of telephone service as characterized by high fault rates in Bangladesh. Moreover, the available capacity fell far short of the expanding demands for telephone services due to lack of adequate investment. The expressed needs and demands for telephone services were quite high in Dhaka city compared to the rest of the country. As a center of the country's political power and economic activities, Dhaka city has witnessed a rapid population growth of 6 to 7% per annum while the national population growth rate has been around 2% over the past two decades. The project, therefore, has a direct relevance in enhancing the quantity and quality of telecommunication services in greater Dhaka area. The Fifth Five Year Plan (1997-2000) of Bangladesh that emphasizes the availability of adequate telecommunication services for quick acquisition and dissemination of information both inside and outside the country for accelerated economic growth and poverty reduction is also a pointer to the relevance of the project. In addition to its relevance, the project has been effective in implementing its scope. The effectiveness and efficiency is demonstrated through implementation of the project on schedule and at lower than planned cost. The strong pressure for telephone services and the resulting high utilization factor, however, affects the quality of services.

The project in particular and the telecommunication services in general have a positive impact on socio-economic activities and living standards. Availability of telephone service creates enabling environment for investment and employment generation, which contribute to economic growth and poverty alleviation.

Available data for the past five years show that BTTB, the executing agency of the project, incurred a net revenue surplus as the total revenue was higher than the total expenditure. The net revenue surplus doubled during this period due to higher growth in revenue than in expenditure. In spite of sound financial position of BTTB, the sustainability of the project would require significant improvement in fault rate and quality of service. The availability of spare parts in Bangladesh and improved skill of the technical staff through training would contribute to the sustainability of the project and the telecommunications sector as well.