Zimbabwe

Communications Facilities Improvement Project

Report date: March 2001
Field survey: February 2001

1. Project Profile and Japan's ODA Loan

Site Map: The Republic of Zimbabwe

PTC Harare Central Telephone Exchange in the city of Harare

1.1. Background

The status of telecommunications in Zimbabwe at the time of appraisal was that for domestic communications service there were 97 telephone exchanges in 87 cities nationwide and that nearly all telephone switching machines had been automated. However, the majority of the switching machines were obsolete step-by-step type, making it difficult to procure parts for maintenance and causing problems in their operation. The number of subscriber cables installed was 111,000, nearly half of which are concentrated in the capital, Harare, while the number of subscribers on the waiting list amounted to approximately 36,000. On the other hand, telephone demand was growing at an average annual rate of about 7% during the seven-year period from 1980 to 1986, and it was expected to continue to grow at a similar rate in the future. International communications services allow communication with 40 countries worldwide via the INTELSAT standard A type station for Atlantic satellites (this station was established through the International Telecommunications Improvement and Expansion Project for which an ODA loan agreement with Japan was signed in April 1984).

The First 5-year National Development Plan (1986-1990) initiated in 1986 cited the development and improvement of communications systems as a priority item. It accounted for 17.6% of the total investment budget for the 5-year Plan, and was given the second highest priority after agricultural development, which accounted for 19.5%.

Given the circumstances described above, it was necessary to modernize obsolete telecommunications facilities in political and economic centers, including the Harare

capital area, and to develop, improve and expand digital communications networks, thereby making improvements in telecommunications services such as meeting growing telecommunications demand, reducing the number of subscribers on the waiting list and improving the condition of communication.

1.2. Objectives

The objective of the project was to replace obsolete step-by-step type switching machines with digital ones in Mashonaland[1] and Manicaland[2] provinces and also to install new optical-fiber transmission routes on major telephone exchanges in Harare, thereby meeting telephone demand and improving telephone services. Approximately 50% of subscribers were to be covered by digital switching machines via the improvement and expansion of systems at ten telephone exchanges in the two provinces.

1.3. Project Scope

Japan's ODA loan covered all foreign-currency costs for procuring civil engineering work, materials and equipment, and consulting and other services required for the installation of digital switching machines, laying of transmission routes, and procurement and installation of related equipment and devices.

Specifically, the project comprised replacing existing step-by-step type switching machines with digital ones at seven telephone exchanges in Harare and at one telephone exchange in Chinhoyi, both in Mashonaland province, and constructing new transmission routes (optical-fiber cable and cable PCM systems) in Harare. It also included the replacement of existing switching machines with digital ones at one telephone exchange each in Marondera and Mutare, both major cities in Manicaland province.

1.4. Borrower/Executing Agency

The government of the Republic of Zimbabwe/The Posts and Telecommunications Corporation (PTC)

1.5. Outline of Loan Agreement

Loan amount/Loan disbursed amount	¥5.246 billion/¥5.246 billion
Exchange of notes/Loan agreement	August 1989/October 1989
Terms and conditions	Interest rate: 3.5% (3.25% for consulting service portion), Repayment period (grace period): 30 years (10 years), Partially untied
Final disbursement date	December 1996

[1] Located in northern Zimbabwe and home to 40% of the population, Mashonaland is a politically and economically important region, which includes the capital area.
[2] Located in eastern Zimbabwe and bounded by Mozambique, Manicaland is economically important as an export route for Zimbabwe, which is a landlocked country without a seaport.

2. Results and Evaluation

2.1. Relevance

The project constituted part of the digital telephone network development plan, which was implemented as part of the long-term Telecommunication Development Plan[3] (1986-2005) formed in line with the First Five-year National Development Plan and was considered relevant. It was expected to increase the number of primary cables from 111,000 to 124,000 and telephone density to 2.27 units per 100 persons. Since the project was completed, however, PTC improvements to obsolete communications facilities have not been able to keep pace with the rapid growth in telephone demand in recent years. In order to deal with this situation, the improvement and expansion of the communications sector was emphasized in the Second Five-year National Development Plan (1991-1995). Under this basic policy, the communications sector investment plan (1997-2002) was developed with the goal of increasing national demand satisfaction to 90% by 2005. Following this move, the Mashonaland/Manicaland Province Development Plan[4] (period: 1996-2001; loan amount: ¥11.451 billion), the second phase of the project, is currently being carried out using Japan's ODA loan. In addition, two plans were executed using Japan's ODA loan. One was the Matabeleland Province Communications Network Improvement and Expansion Plan (period: 1993-1998; loan amount: ¥9.523 billion), which aimed at improving communications services in Matabeleland's major cities, including Bulawayo, the second largest city in Zimbabwe. The other was the Communications Network Improvement and Expansion Plan (period: 1995-2000; loan amount: ¥5.209 billion), which aimed at digitizing long-distance transmission routes nationwide. As described above, the digitization and improvement/ expansion of communications networks continue to be a priority issue in Zimbabwe. In particular, high priority is given to the Harare capital area and the project continues to be relevant.

2.2. Efficiency

(2.2.1.) Implementation Schedule

The initial implementation schedule for the project spanned 63 months from October 1989 (loan agreement date) to December 1994. However, the project took 79 months from October 1989 to April 1996 to complete. The major reason for this

[3] PTC developed the Plan in alignment with the First Five-year Plan with the cooperation of the International Telecommunication Union (ITU). The Plan consisted of modernizing obsolete facilities and introducing new equipment with the establishment of digital networks in mind. It was a communications network modernization plan whose ultimate goal was to make a switchover to an Integrated Service Digital Network (ISDN), which integrates non-telephone services, such as telex, data and image transmission, into telephone services. Based on the Plan, PTC aimed at improving and expanding its telephone network through the rehabilitation and modernization of its existing communications networks.

[4] The Plan aims to improve telecommunications service in qualitative and quantitative terms in Mashonaland province, including Harare, and Manicaland. It encompasses the whole spectrum of telecommunications facilities, including switching machines, transmission facilities and facilities outside stations, and aims at installing 125,000 additional telephone lines.

delay was that additional contracts were concluded as the result of a partial review of the plan and expansion of the project with a subsequent extension in the implementation schedule with Japan Bank for International Cooperation (JBIC) consent.

(2.2.2.) Project Cost

Actual costs totaled ¥6.753 billion (approved loan amount: ¥5.246 billion), larger than the ¥6.021 billion (approved loan amount: ¥5.246 billion) planned at the time of appraisal. As in the preceding section, this was because additional contracts were concluded due to a partial review of the plan and the expansion of the project, resulting in increased costs. The loan amount remained unchanged, and the excess was covered by PTC's own funds.

(2.2.3.) Change of the Plan

There was a wide temporal gap between the planning period and the implementation period, and during the interval, the initially forecast telephone demand had to be revised. As a result, the plan was partially altered to make the project more appropriate to the current status quo and the revised plan was implemented with JBIC's consent. For the Glenview and Kuwadzana telephone exchanges, two of the seven exchanges in Harare, the number of new telephone lines to be installed was reduced because the demand for telephone lines did not grow as much as initially predicted. Meanwhile, the number of new telephone lines to be installed was increased for three telephone exchanges: the Highlands exchange, one exchange in Marondera and one exchange in Chinhoyi. In addition, two exchanges in Harare---the Unit 3 and Southerton exchanges---and one in Bulawayo were added in order to replace existing switching machines with digital ones. As a result, the capacity of switching machines was increased from the initially planned 97,000 lines to 121,700 lines.

Furthermore, the remote line concentrator (RLC)[5] system was used for many of the switching machines at local exchanges. The major reasons for this were easy operation and management and cost-efficiency. For these reasons, both optical fiber cables were installed in the local relay transmission routes in Harare (private transmission routes), and relay lines linking RLCs and each of the local exchanges were newly included in the optical cable installation plan. As a result, the number of transmission routes covered increased from the initially planed 15 (130 km) to 40

[5] RLC is a switching machine for subscriber cables that relays between telephone sets and the telephone exchange. All subscriber cables are connected to an RLC in a given area, and telephone calls are carried from the RLC to each exchange through relay lines. For this reason, the RLC system renders operation and maintenance easier than when subscriber cables are connected directly to the exchange and is also advantageous in terms of the costs involved.

(324 km). In addition, the construction of a trunk transmission route for 10,900 lines in the Harare Central Exchange was newly included.

As a result, ODA loan allocations to the various project areas were partially altered though the loan amount remained unchanged.

2.3. Effectiveness

(2.3.1.) Effects on the Qualitative Improvement of Telephone Services

Under the project, obsolete step-by-step switching machines were replaced with digital ones and optical fiber cables were installed in the transmission routes in Harare. As a result, the reliability of telephone communication services was improved in project areas and it became easier to operate and maintain telephone communications networks. As shown in Table 1, telephone traffic has generally continued to grow in many areas since the completion of the project though there are some fluctuations.

Table 1 Telephone Traffic in Project Areas (Local and Long-distance)

(Unit: Minute-call)

Exchange	1996	1997 (Project completion year)	1998 (2nd year)	1999 (3rd year)	2000 (4th year)
Seven exchanges in Harare city					
Avondale exchange	190,770,793	199,677,164	224,027,880	183,247,392	301,562,357
Borrowdale exchange	103,024,368	112,815,372	131,322,418	99,753,264	n.a.
Highlands exchange	201,279,986	265,566,629	247,870,255	209,336,250	260,782,472
Cranborne exchange	62,334,051	75,926,304	79,069,232	74,544,504	111,307,474
Glenview exchange	12,973,465	14,753,303	24,453,010	36,256,031	104,647,597
Julius Nyrene Way exchange	1,278,083,740	156,140,412	265,467,520	487,703,359	809,106,733
Kuwadzana exchange	100,767,005	10,974,941	16,684,051	17,326,680	31,296,181
One exchange in Mutare city	102,408,541	132,605,598	134,599,253	147,451,484	165,488,206
One exchange in Chinhoyi city	32,723,789	38,055,652	42,329,521	41,050,371	61,421,900
One exchange in Marondera city	29,059,719	41,545,435	4,330,786	38,824,215	49,682,779

Source: Replies to PTC questionnaires

Notes: (1) The two exchanges---Unit 3 and Southerton---newly included in the project are excluded due to insufficient data.

(2) The development of a new communications network is under way, and the Mashonaland/Manicaland Province Development Plan, the second phase of the project, is being executed during the period from 1996 to 2001 (scheduled) using Japan's ODA loan.

(2.3.2.) Effects on the Increase in the Number of Subscribers to Telephone Services

Since the existing switching machines were replaced, the capacity of switching machines has increased by 72,300 lines, thus temporarily contributing to a reduction in the number of subscribers on the waiting list immediately after project completion. Telephone demand, however, has continued to grow at a pace that exceeds supply and the number of subscribers on the waiting list is continuing to increase on an annual basis.

(2.3.3.) Other Effects

A look at the changes in the number of subscribers to telephone services for PTC as a whole indicates that during the five-year period from 1996 to 2000, the number of subscriber cables increased by 32.4% from 187,753 to 248,598. In addition, the average goal achievement ratio as compared to the initial plan was high, at 93% for the five-year period. Furthermore, the switching machine use ratio has improved each year, reaching 94% in 2000, demonstrating that the project has made a substantial contribution to the increase in that ratio. After project completion, however, modernized and newly installed telephone lines soon reached capacity and the number of subscribers on the waiting list is continuing to grow. Thus PTC is urged to deal with growing telephone demand and is continuing to strive toward improvement and expansion of telephone communications networks.

Table 2 Other Operation Indicators (for PTC as a Whole)

		1996	1997 (Project completion year)	1998 (2nd year)	1999 (3rd year)	2000 (4th year)
Maximum number of subscribers accepted by switching machines (lines)	Plan	n.a.	n.a.	n.a.	n.a.	n.a.
	Actual	256,326	276,459	283,409	302,735	305,915
Number of subscribers (lines)	Plan	203,775	224,776	259,670	266,308	265,759
	Actual	187,753 (92%)	222,647 (99%)	231,012 (89%)	241,463 (91%)	248,598 (94%)
Use ratio [1] (%)	Plan	n.a.	n.a.	n.a.	n.a.	n.a.
	Actual	73	81	82	91	94
Number of subscribers on the waiting list (lines)	Plan	n.a.	n.a.	n.a.	n.a.	n.a.
	Actual	106,881	116,863	134,339	155,508	158,918
International telephone traffic (lines/minute)	Plan	n.a.	n.a.	n.a.	n.a.	n.a.
	Actual	318.0	328.9	436.8	373.6	406.9

Source: Replies to PTC questionnaires

Note: (1) Use ratio = Number of subscribers / maximum number of subscribers accepted by switching machines

(2.3.4.) Recalculation of the Financial Internal Rate of Return (FIRR)

The results of a recalculation of FIRR indicated that it was 20.0% (FIRR calculated at the time of appraisal:13.8%) . The reasons for such improvement were the hike in telephone charges and the expanded project scope. The preconditions for recalculation are as specified below.

(Assumptions)

Project life: 20 years (including the implementation period) with benefits starting to be generated in the second year

Benefits: Telephone charges, rental fees and installation fees generated by implementing the project

Costs: Investment costs and operation and maintenance costs

2.4. Impact

(2.4.1.) Socioeconomic Impact

The project helped improve the quality and reliability of telephone services in the project areas. Although quantitative data are not available, it is inferred that the project has increased socioeconomic convenience and that it has had a positive impact on the revitalization of corporate activities in Harare and improved the social welfare of the city's residents.

(2.4.2.) Environmental Impact

Under the project, construction was performed within PTC's existing facilities and on public roads (under public roads, along the hardshoulder thereof and on electric poles). Therefore, no private land acquisition or relocation was necessary, and there has been no particular environmental impact.

2.5. Sustainability

(2.5.1.) Operation and Maintenance

The national communications network in Zimbabwe is divided into five regions (Mashonaland, Manicaland, Victoria, Matabeleland and Midlands), and a PTC regional office has been established in each province for regular maintenance and operation. Maintenance operations are conducted according to the prescribed schedule and using operation and maintenance manuals irrespective of the capacity of switching machines, and routine maintenance is performed once every day, every week, every two weeks, every month, every three months, every six months and every year according to the designated checkpoints. With respect to the operation and maintenance of digital switching machines and facilities related to optical fiber cables, areas in which PTC does not have substantial experience, PTC is endeavoring to build up the experience of its maintenance personnel accumulate via the phased implementation of construction. It is also utilizing guidance from consultants and training from contractors to educate personnel in operation and maintenance technologies and improve their skills.

The aim of the communications equipment manufacturing division of PTC is the manufacture and repair of communications equipment. The Musasa communications equipment manufacturing plant in Harare has been designated to overhaul pay phones, circuit boards for shared telephones and various switching machines. So far, operation and maintenance has been performed under the project without any particular technical problems.

There is, however, a problem related to the procurement of telephone line subscriber cards used by exchanges, and this problem needs to be addressed. Usually, if there is a problem with a subscriber card installed in the switching machine, PTC replaces

the subscriber card with a new one for repair. Subscriber cards are produced in Zimbabwe and are easy to procure. If a component of the subscriber card fails, however, it is difficult to repair in-country and the failed component has to be shipped to the overseas supplier for repair. But according to PTC, when a component is shipped to Japan for repair, it takes a long time for it to be returned. At present, stand-by components are used as temporary substitutes, but if such components fail, no further spare parts are available, making it likely that subscriber cables at the affected location may cease to be functional. PTC cites two factors as potentially underpinning the time to procure and repair spare parts. One is that the deteriorating domestice economy and the rapid fall in foreign currency reserve in recent years has made it extremely difficult to import and procure spare parts from overseas. The other is that PTC's in-house procurement procedures are time-consuming.

(2.5.2.) Status of Revenue and Expenditure at PTC and Future Organizational Reforms

The status of income and expenditure at PTC is as shown in Table 3.

Table 3 Statement of Revnue and Expenditure
(Inflation-adjusted with 1995 CPI as 100)

(Unit: ZW$1,000)

		1995	1996	1997	1998	1999	2000
PTC total	Sales	1,402,760	1,353,212	1,357,809	2,727,671	1,783,092	1,556,796
	Expenditure	927,971	1,040,433	1,133,817	2,431,660	1,831,766	1,004,635
	Financial costs	157,762	113,459	152,392	2,141,668	328,115	1,250,379
	Profit/loss before tax	317,027	199,320	71,601	-1,845,657	-376,788	-698,219
Postal service	Sales	234,795	228,802	206,611	379,590	215,440	189,486
	Expenditure	221,773	238,749	244,448	421,809	374,607	212,755
	Financial costs	1,817	5,923	4,576	60,964	11,071	144,922
	Profit/loss before tax	11,205	-15,870	-42,413	-103,183	-170,238	-168,191
Communi-cations	Sales	1,167,965	1,124,409	1,151,198	2,348,082	1,567,653	1,367,309
	Expenditure	706,198	801,685	889,369	2,009,851	1,457,159	791,881
	Financial costs	155,945	107,535	147,816	2,080,704	317,044	1,105,457
	Profit/loss before tax	305,822	215,189	114,013	-1,742,474	-206,550	-530,028

Source: PTC materials

CPI	100.0	121.4	144.2	190.1	300.7	482.3

Source: IMF, International Financial Statistics, IMF Country Paper No. 01/03 (Janurary, 2001)

Although PTC reports operating profits almost every year, with the communications division as its core (approx. 85% of total sales), it suffers pre-tax losses due to heavy financial outlays. Following the effects of the sharp depreciation of the Zimbabwe dollar in December 1997, PTC, which depends on overseas loans for the majority of its business investment funds, sustained serious damage with substantial exchanges losses incurred. In subsequent years, the deteriorating Zimbabwean economy has

caused the Zimbabwe dollar to depreciate. In the future, PTC is urged to consider ways of increasing sales, reducing costs and taking other measures, thus striving to strengthen its financial structure.

Based on its Corporate Plan (1997/98-2001/02) developed in 1995, PTC aims to privatize and will commence operating on a self-supporting accounting system in the near future. Specifically, it plans to privatize its communications division, including mobile communications operations, by entering into a strategic partnership with another entity that will provide capital, technology and commercial skills, in order to expand the scope and improve the quality of its services. It also plans to operate its postal service division on a self-funding basis. In the past, the communications industry was monopolized by PTC, but deregulatory measures have encouraged private enterprises to launch communications businesses and the communications market has become increasingly competitive. PTC is currently working hard to establish a new system by reforming its organization targeting the commercialization of its communications division, for example.

Comparison of Original and Actual Results

Item	Plan	Results
1. Project scope	(1) Replacement of existing switching machines with digital ones at 10 exchanges (a) Seven exchanges in Harare city: 82,000 lines · Avondale exchange: 15,000 lines · Borrowdale exchange: 7,000 lines · Highlands exchange: 12,000 lines · Cranbone exchange: 6,000 lines · Glenview exchange: 15,000 lines · Julius Nyerere Way exchange: 15,000 lines (= Unit 7) · Kuwadzana exchange: 12,000 lines (= Western 2) (b) One exchange in Chinhoyi city: 3,000 lines (c) One exchange in Marondera city: 3,000 lines (d) One exchange in Mutare city: 9,000 lines * Total number of lines: 97,000 (2) Construction of optical fiber transmission routes 15 routes (130 km) 140Mbit/s and 34Mbit/s systems (3) Installation of related equipment Digital multiple-wave station system PCM system (4) Consulting service Total: 105 M/M	(1) Replacement of existing switching machines with digital ones at 13 exchanges (a) Nine exchanges in Harare city: 99,900 lines · Avondale exchange: 17,000 lines · Borrowdale exchange: 7,000 lines · Highlands exchange: 14,000 lines · Cranbone exchange: 6,000 lines · Glenview exchange: 11,400 lines · Julius Nyerere Way exchange: 29,000 lines · Kuwadzana exchange: 5,500 lines · Unit 3 exchange: 8,000 (new) · Southerton exchange: 2,000 lines (new) (b) One exchange in Chinhoyi city: 4,000 lines (c) One exchange in Marondera city: 5,000 lines (d) One exchange in Mutare city: 10,800 lines (e) One exchange in Bulawayo: 2,000 lines (new) * Total number of lines: 121,700 (f) Harare trunk switching machines: 10,900 trunk lines (new) (2) Construction of optical fiber transmission routes 40 routes (324 km) 140Mbit/s and 34Mbit/s systems (3) Installation of related equipment Same as left (4) Consulting service Total: 139 M/M
2. Implementation schedule	October 1989 to December 1994 (63 months) (The execution of the loan agreement in October 1989 was considered the start of the implementation period)	October 1989 to April 1996 (79 months)
3. Project cost Foreign currency Local currency Total ODA loan portion Exchange rate	 ¥5.246 billion ¥775 million ¥6.021 billion ¥5,246 billion ZW$1.00 = ¥85.1	 ¥5.946 billion ¥807 million ¥6.753 billion ¥5.246 billion ZW$1.00 = ¥81.25 (April 1998) (US$1.00 = ZW$1.60 = ¥139.00