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INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT PERFORMANCE AUDIT REPORT

ON

CHINA TELECOMMUNICATIONS PROJECT

(LOAN 506-CHA)

February 14, 1975

Operations Evaluation Department

TABLE OF CONTENTS

	<u>Page No.</u>
<u>Audit Memorandum</u>	
1. Introduction	1
2. The Project and the Loan	1
3. Project Implementation	3
4. Impact of the Project	5
5. Evaluation of the Borrower's Performance	7
6. On Forecasting System Growth	8
7. The Bank's Performance	9
8. Conclusions	10
 <u>Attachment</u>	
Project Completion Report	

PROJECT PERFORMANCE AUDIT MEMORANDUM

CHINA TELECOMMUNICATIONS PROJECT - Loan 506-CHA

1. Introduction

This memorandum presents the results of an audit of the project supported with Loan 506-CHA of August 1967, the only telecommunications project in the Republic of China with which the Bank has been associated. It is based on the project's Appraisal Report and the attached Completion Report, complemented with a review of Bank files, progress reports, annual reports, financial statements and audited accounts, and through discussions with relevant Bank officials.

2. The Project and the Loan

Contacts leading to the request for a Bank loan to cover the foreign exchange requirements of China's 1967-1971 telecommunication expansion program began in mid-1965. An appraisal mission visited Taiwan in September 1966 and the appraisal report is dated June 30, 1967. The loan, for US\$ 17 million equivalent, was signed on August 2, 1967. The borrower was the Republic of China's Directorate General of Telecommunications (DGT) and the guarantor was the Government of the Republic of China. The loan became effective on September 29, 1967.

The project which the loan helped finance was part of the DGT's 1967-1971 program to modernize and expand the national telephone services. Its main components were initially i) installation of approximately 118,000 lines of local automatic switching equipment in Taipei, Keelung, Taichung and Kaohsiung, including buildings and associated works; ii) installation of switching equipment for automatic subscriber trunk dialing (STD) in the three primary toll centers at Taipei, Taichung and Kaohsiung; iii) partial replacement and substantial expansion of the local cable networks; iv) expansion of the existing microwave network; v) installation of a telecommunication training center with capacity for 200 students; and vi) assistance of consultants in planning and executing the expansion program.

In September 1969, the Bank approved a change in description of the project, allowing a 75% increase in the purchase of switching equipment for local exchanges (from 118,000 to 207,000 lines) since actual bid prices had proved to be well below appraisal estimates. This substantial increase in plant above the original project was a response to demand growth well in excess of forecasts, probably brought about by the unexpected growth in the Chinese economy. The closing date, originally set for October 31, 1972

was changed to March 31, 1974. In addition, the lower actual costs resulted in a reduction of the loan to US\$ 12.5 million. The loan was completely disbursed by August 1973, and the project completed by December 1973. The total revised project reached a final cost of US\$ 60.8 million equivalent.

Several issues were discussed during appraisal and negotiations. The Bank stated that only international competitive bidding was acceptable and that direct negotiations with suppliers could not be used for Bank financed purchases. In connection with the expansion of the existing microwave system, which China wanted to negotiate directly and be financed by the loan, DGT agreed to go to international bidding in order to include this item in the project. The Bank then suggested that DGT should negotiate directly with the original supplier, in the better interest of standardization, and secure other sources of financing. Finally, DGT dropped the subject (which anyhow amounted to only 6% of the proposed loan and about 2% of the total project) and financed it from its own resources. In the particular case of the China Project, the Bank's position did not damage the project's progress. But situations can arise where strict adherence to international bidding may, in fact, distort substantially an existing telecommunications system and result in increased indirect costs in training and maintenance. The Bank's present position, when it accepts waiving the requirement of full international bidding in well-qualified cases, is welcome.

Also in the early stages of project preparation, China expected to include under Bank financing a first satellite earth station to improve international communication facilities. The Bank rejected the request arguing that China's existing international traffic was small and that it was clearly uneconomic to go to satellite circuits. China dropped the item from the loan request, but apparently pursued it elsewhere, for by 1969 it had its first station in commercial service -- which means that the feasibility studies (nonexistent at the time of the Bank's rejection) and a firm contract for the station must have been completed roughly at the time the loan agreement with the Bank was signed.

Main loan covenants required that a) DGT's fixed payment to the Government should not be increased above the current level of 25% of DGT's net income; b) tariffs should be adjusted to achieve a rate of return of at least 10% on average net fixed assets; c) the purchase contract for the expansion of the existing microwave system should be submitted to the Bank for review and comments before concluding it; d) the high US\$ 350 connection fee for new telephone subscribers should not be reduced during project execution; and e) new long-term debt (mainly for the satellite earth station and a new microwave system) should not be incurred unless net revenues for

any 12 consecutive months out of the 15-month period last preceding such incurrence were at least 2.0 times the maximum debt service requirements (including the new debt) in any succeeding year.

3. Project Implementation

The project's initial estimated total cost was US\$ 50.2 million equivalent, of which the Bank would have financed the whole foreign exchange component of US\$ 17.0 million (34%). The estimates for the revised project (1969) were US\$ 63.1 million equivalent, of which US\$ 16.01 million were in foreign exchange, with the reduced Bank loan covering US\$ 12.5 million. The final cost, as approximately assessed by DGT at the end of 1973, was US\$ 60.8 million equivalent, with a foreign exchange component of US\$ 20.16 million. The difference between the latter figure and the Bank loan was covered by DGT out of currency provided by China's Foreign Trade Board.

A breakdown of the cost figures was as follows: local switching and cable plant US\$ 51.7 m (85%), STD switching US\$ 2.6 m (4.3%), microwave US\$ 1.6 m (2.6%), training US\$ 0.8 m (1.3%) and administration and consultants US\$ 4.1 m (6.8%). The loan contributed to each of these components except the expansion of the microwave network. These figures mean that the original project was expected to cost US\$ 425 per telephone line, whereas the actual cost was only US\$ 292 per line, a 31% reduction in spite of the revaluation of the Japanese yen, which affected the cost of a large part of the imported equipment. The original estimates were based on a unit cost for the switching equipment of US\$ 92 per line, but the first tender yielded a lowest bid of US\$ 65 per line and a re-tender brought about a basic cost of US\$ 52 per line for 118,000 lines and a cost of US\$ 44 per line for the total option (177,000 lines). This is a unit cost only 48% of the initial estimate, and resulted from abnormally low prices that could not have been predicted at appraisal. It is this fact which brought about a 75% increase in project size with only a 21% increase in total cost and a simultaneous 27% reduction in Bank financing. These large differences between estimated and actual unit prices in the switching equipment are explained by the practice, of at least some suppliers, to reduce the prices in the first contract and rely on subsequent negotiated expansions to make up the difference.

If the figure of US\$ 52 per line had been used instead of the original US\$ 92, the total estimated cost of US\$ 50.2 million would have been reduced to US\$ 45.5 million (91%), and the foreign exchange requirements would have dropped from US\$ 17.0 million to only US\$ 12.3 million (72%).

The original schedule of construction was from June 1968 to December 1971, a period of 3½ years. Re-tendering, expansion of the project and building problems shifted the construction to July 1968-December 1973 (5½ years), a two-year delay. DGT did take interim measures to attend demand at the most pressing points; once deliveries finally started, DGT showed competence to proceed with installations at a very rapid pace with a high standard of engineering and labor.

Good coordination was kept between the progress of Bank and non-Bank-financed but related parts of the system. Shortage of trunk circuits, to which we will refer in section 6, brought about the advancement of a new project to construct a new microwave network in addition to the existing one.

A significant difficulty occurred when the bids for the switching equipment (the largest component of the project) were evaluated by DGT and its consultant. Two-stage bid evaluation was proposed by DGT and explicitly accepted by the Bank.^{1/} When the technical and management details of the bid were examined, DGT concluded that three of the four bids submitted were not wholly responsive to the specifications. DGT felt it had to request the bidders to "revise and improve" their presentations without altering the prices (as yet unopened); the Bank agreed to this as well, expressing that it understood it to be in the sense of a clarification and not a change in bids, as required by the Bank's guidelines for procurement.

Yet when the recommendation of award was submitted to the Bank, three qualified staff independently concluded that at least one of the bids had been substantially re-engineered, that considerable amounts of equipment had been added, and that overall the Bank's rule on clarification of bids without substantive change had been overlooked, thus invalidating the tender from the Bank's viewpoint.

During this process, considerable effort had to be devoted by Bank staff to study the situation in great detail, and substantial pressure was exerted by the most affected bidders. Although the Bank had repeatedly expressed in writing the need to limit bid modifications to "clarifications", it had not explained at any greater length the differences with the unacceptable "change" in bids. The Borrower knew the Bank's procurement rules, but it may not have been fully aware that the bid modifications underway were

^{1/} The first stage of this type of bid evaluation deals only with the technical aspects, and the second with price.

going beyond tolerable limits; the Borrower and its consultants expressed some concern about this possibility. In retrospect it appears that the Bank, being aware that problems could arise with this "revision and improvement" of bids, might usefully have gone beyond the rather formal reminders of the rule that it sent. DGT asked for new tenders; by that time the Bank had concluded that two-stage evaluation was not acceptable and the new tender was handled by DGT accordingly and with no further difficulties. Re-tendering resulted in unit prices even lower than would have been paid had the first tender been accepted by the Bank. A delay of 1½ years in initial deliveries of equipment ensued, but building difficulties were being experienced at the same time and thus the overall 2-year delay in project completion must be seen as the combined outcome of project expansion and of procurement and building problems.

4. Impact of the Project

During project implementation, China's telecommunication system grew and improved substantially. The local networks expanded from 113,000 subscribers at the end of 1966 to 487,000 at the end of 1973, a cumulative growth rate of 23% p.a., the highest in Asia; 1973 showed a growth rate of 27%, probably the highest achieved that year in the world for systems of comparable or larger size. This is a remarkable performance, considering that few countries have achieved a sustained growth of more than 15% p.a. With this expansion, the density of telephones (all stations) improved from 1.3 per hundred inhabitants in 1966 to about 4.4 in 1973; the latter level is comparable to those of Colombia, Mexico and Yugoslavia, is about double the density for Asia as a whole (2) but still well below the figures for Israel (20), Japan (32), Australia (34) or Sweden (60).

At the same time, the proportion of telephones connected to automatic local exchanges increased from 75% to 90%, and a new type of telephone set was introduced which improved substantially the quality of communication. The delay in serving new applications, which was of 4 to 6 months in 1966, was reduced to less than one month by 1973 with most areas being served within a fortnight.

The pressure for use of existing plant is still very high: 9.7 calls (local + trunk + international) per telephone (all stations) per day in 1972, well above the rate of other countries which also have more than half their telephones in businesses (Hungary 2.3, Japan 3.7, South Africa 5.4, Switzerland 1.5, Turkey 2.4). This fact presumably comes from the unusually high connection fee (US\$ 350) which depresses connections demand

but does not affect demand for traffic; in fact, the calls per inhabitant per day in China in 1972 were 0.4, well within the range of the other countries with more than 50% business telephones (Hungary 0.2, Japan 1.2, South Africa 0.4, Switzerland 0.8 and Turkey 0.1).

Subscriber trunk dialing became available on several major routes, on which now typically 75% of calls are free from operator intervention (none in 1966). Partly as a result of STD and the unexpected growth of the economy, the number of trunk calls in Taiwan is estimated to have increased by 25% p.a., as compared to the appraised estimate of 15% p.a. This has brought about substantial congestion of the trunk network; its insufficient capacity has prevented STD from becoming extended nationally as fast as expected and a number of local offices with STD possibilities built into them have delayed their cut-over into full automatic trunk operation pending the completion in 1973-1976 of a new microwave network not included in the original project.

The following table summarizes the forecasted and actual growth experienced by the system during 1966-1973.

<u>Item</u>	<u>Forecasted</u>	<u>Actual</u>
No. of telephone subscribers		
- at end of CY73	321,000	487,000
- growth rate 1966/73	16% p.a.	23% (27% in 1973)
No. of trunk telephone calls		
- FY73	67 million	102 million
- growth rate 1966/73	15% p.a.	25% p.a.
No. of national telegrams		
- growth rate in FY73	8%	5.3%
No. of international telephone calls		
- growth rate p.a. 1966/73	15%	32%
No. of international telex paid minutes		
- growth rate p.a. 1966/73	20%	23%
No. of international telegrams		
- growth rate p.a. 1966/73	8%	11%

International services were boosted by the inauguration of a satellite earth station in 1969 and a tropospheric scatter link with the Philippines, adding two important outlets to the existing tropospheric scatter link already connecting China to Hong Kong and the submarine cable network. Some national data services were also initiated in this period.

Thus the quality, quantity and variety of services have all increased, some very substantially, with several of the services growing at a rate well in excess of the original forecast. Some system imbalance, particularly expansion of the capacity of trunk circuits insufficient to match the growth achieved in local plant and associated STD possibilities, resulted from overly pessimistic initial forecasts.

This project had no specific economic justifications or expectations expressed in the appraisal report or in file material. No economic assessment is therefore attempted in this audit.

5. Evaluation of the Borrower's Performance

The performance of the Borrower, DGT, was efficient and satisfactory. Except for the one breach of procurement rules (discussed in para. 3), all loan covenants were adhered to. Annex 2 of the attached PCR shows that all principal financial indicators throughout the period 1967/73 were better than forecasted at appraisal: e.g. the rate of return on net fixed assets varied between 17% and 22%,^{1/} exceeding the forecasted 10-15% range and remaining well above the 10% minimum stated in the loan agreement. Thus, DGT's financial position has been consistently strong and shows a good prospect beyond completion date.

A substantial institutional improvement in this period was the expansion and relocation of DGT's telecommunication training center (now called "Telecommunication Training Institute") which has residential facilities for 200 students and has provided a wide range of technical and management education at levels ranging from unskilled workmen to college graduates, in some years training over 1,000 students. It has essentially freed the DGT from dependence on foreign training and seems to fulfill amply the expectations put forth in this matter at appraisal time. The performance of the trainees in the actual project implementation suggests that the training in this center is of a very good standard.

Another significant indicator is the number of DGT employees per thousand telephones, which has dropped from 39 to 30 (or 26, if only the telephone branch staff are counted). This improvement in labor productivity

^{1/} It has not been possible to establish whether assets have been soundly revalued.

can be expected to continue, since staff growth programmed for 1970/76 is of 11% p.a., and the telephone system is expected to grow at 19% p.a. A figure of 19 telephone staff per thousand telephones can be expected by 1976, well below equivalent figures in most or all other Asian countries and comparable to some European levels.

6. On Forecasting System Growth

The table in section 4 shows that there were wide disparities between some of the actual figures for system growth and those forecasted at appraisal time. The outstanding instances are the growth rates of numbers of subscribers, trunk telephone traffic and of international telephone traffic.

Regarding the figures of numbers of subscribers, there was a margin of more than 50% between actual and forecasted numbers. If only the original project (rather than the 1969 revised version) would have been carried out, there would have been by the end of 1971 a deficit in the order of 100,000 lines, or roughly one-half of the lines in service; this would have represented a dramatic deterioration of the supply situation. That it did not happen seems to have been largely due to the abnormally low prices obtained in the bids for switching equipment, which allowed a 75% increase in local switching and cable plant to be introduced with only a 21% increase in total project costs.

Trunk traffic rose well beyond expectations, leading to an important shortage of trunk circuits. A new microwave network had to be started, where only expansion of the existing one had been envisaged in the project, resulting in an unbalanced system growth and some subutilization of new equipment, as explained earlier.

Some of the factors that may have led, in this project, to underestimate the growth potential are the following.

At the outset of project implementation, China experienced a large growth in manufacturing (23.3% in 1968, against 13.9% in 1961-1964), public utilities (17.3% vs 11.8%), construction (28% vs 9.8%), number of registered motor vehicles (168% vs 18.2%), and rail and road passenger traffic (10.1% vs 5.3%) and freight (11.2% vs 4.8%); these are all sectors moderately to very strongly related to telecommunication needs. At the same time, sectors which are poor contributors to the demand for telecommunication services grew much slower or even decreased their output, e.g.

agriculture (6.1% vs 5.6%) and mining (-0.4% vs 7.1%). In fact, in the late 1960s the contribution of manufacturing to GNP surpassed that of agriculture, industrial activities became quite sophisticated, and overall the economic pattern acquired an unprecedented complexity which brought changes in structure as well as in volume. Structural change, and increased contacts among sectors and across regions, are all factors which can be expected to exert strong pressure on telecommunication services.

Bank staff familiar with the country and the project have indicated that this major change in the economy had not been foreseen and that the forecasts may not have taken them into account. This view is supported by the fact that whereas China's Fourth Four-Year Plan (1965-1968) was based on a real GNP growth target of 7% p.a., the average growth rate actually achieved was 10.5% p.a. and this was not the result of accidentally favorable factors which could not have been expected to recur in the future. In 1966, the Bank's own assessment of the economic prospects of China were based on a figure of 7.5% real growth of GNP over the 1965-1968 period, also well below actual figures, even if that assessment recognized that 1965 had shown a real growth of 10% and that the prospects for 1966 were also similarly good. Real GNP increased by 8.6% in 1966, 10.3% in 1967, 9.3% in 1968, 8.7% in 1969, 11.2% in 1970, 11.5% in 1971, 11.0% in 1972 and 12.3% in 1973.

Other factors which may have been omitted from the forecasts are the possible existence in the early 1960s of a substantial unsatisfied demand for telephone connections which emerged only once the system really got moving, and a sufficient allowance for the large impact on the number of trunk calls brought about by the generalization of direct subscriber local dialing and, more significantly, by the introduction of direct subscriber trunk dialing.

7. The Bank's Performance

As a whole, the project was extremely successful. To a considerable extent this is due to the Borrower's technical and managerial competence and to the effective support found in the small number of consultants it needed. The Bank's participation was adequately matched; excellent relationships and continuous consultation developed between DGT and the Bank, contributing significantly to the operation's success. The Bank does not appear to have given more attention to the project than necessary, yet it did provide firm orientation when required by the Borrower or by events.

However, the Bank could have been clearer on procurement matters and thus have tried harder to avert the one substantial conflict that developed during project implementation. Regarding the need for international bidding, it held a rigid position which by now fortunately has been superseded. The Bank had a vacillating position regarding retroactive financing

of consulting services used in project preparation; in the end, these services were not included in the loan. At the time the Bank rejected China's proposal to include a satellite ground station in the project, the impressive world-wide commercial expansion as is known today was only starting. Since then, ground station capital costs have dropped from some US\$ 6 million to US\$ 3.5 million. Therefore, economic analysis today might show that it would have been preferable for China to delay its satellite station project for a few years in spite of the impressive increase in international telephone calls achieved after the station became operational in 1969 (24% in 1969, 62% in 1970 and 57% in 1973, well above the appraised forecast of 15% p.a.). Yet when the Bank rejected the initial Chinese suggestion, it did this a priori without the benefit of feasibility studies to support its assumption of lack of economic justification. It also did not take into account the extent to which low existing traffic would be affected by the introduction of the new facilities, and it did not foresee imminent, deep and already publicized changes in the engineering and economic practices of international communications. And the Bank did not convey to China any argument based on expecting rapidly decreasing capital costs. Thus, although the Bank's position might in retrospect be shown as good for the Borrower, it was reached without adequate analytical basis and was evidently found unconvincing by the Chinese.

8. Conclusions

Overall the project was a remarkably successful one. This was mainly the outcome of the Borrower's technical and managerial skills.

Large underestimation of telephone connections demand and traffic was coincidental with unusually low prices obtained for some of the major items, in a way which made it possible to expand considerably the number of new connections above initial estimates with only a modest increase in overall cost and a reduction of the Bank's loan. Some system imbalance did occur, though, affecting the capacity of long distance telephone service so that STD has had to progress at a slower pace than expected, while new bearer systems were built to restore balance.

The Bank's performance was well matched to the Borrower's competence, and overall it handled the project adequately and with austerity. However, the Bank could usefully have been clearer on the subject of acceptable bid evaluation procedures, adopted a sustained position on retroactive financing, been less rigid on competitive procurement, taken a more positive and well-founded attitude on technological change and, perhaps, been more critical of the forecasting methods and underlying assumptions used by the Borrower in preparing the project.

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT COMPLETION REPORT

China - Loan 506-CHA Directorate General of Telecommunications (DGT)

1. The following completion report is based on a visit to China from November 25 to December 3, 1973.
2. Borrower Directorate General of Telecommunications (DGT)
Beneficiary Ministry of Communications
Republic of China
3. Guarantor The Government of the Republic of China
4. Loan Amount Original: US\$ 17 million
Final : US\$ 12.5 million
5. Date Loan Signed August 2, 1967
6. Effective Date September 29, 1967
7. Closing Date Original: October 31, 1972
Final : March 31, 1974
8. Period of Grace Four years
9. Term of Loan 20 years
10. Interest Rate 6% per annum
11. Commitment Charge 3/8 of 1%
12. Amortization October 15, 1971 - October 15, 1987
13. Exchange Rate Appraisal: US\$ 1. = NT\$ 40.00
December 1973 (final cost estimates):
US\$ 1. = NT\$ 40.10
Present: US\$ 1. = NT\$ 37.90

14. Appraisal Report No. & Date TO-580(a), June 30, 1967
15. Fiscal Year January 1 - December 31 to December 31, 1971
July 1 - June 30 from July 1, 1972
16. Joint Financing (where applicable) None

17. Project Description

- (a) The project which consisted of part of DGT's 1967-1971 development program for the modernization and expansion of the local and long distance telecommunications facilities provided for:
- (i) Installation of approximately 118,000 lines of automatic exchange telephone switching equipment with necessary buildings, cable networks, telephones and accessory facilities in the cities of Taipei, Keelung, Taichung and Kaohsiung.
 - (ii) Installation of a long-distance dialing system between toll centers with automatic toll switching systems located in the cities of Taipei, Taichung and Kaohsiung.
 - (iii) Establishment of a Telecommunications Training Center with a capacity for 200 trainees.
 - (iv) Assistance of consultants in the planning and execution of the expansion program.

The project was expected to be completed by December 31, 1971. The facilities were expected to be put into operation in successive stages in 1969, 1970 and 1971.

- (b) At the time of bid evaluation for the equipment included in subparas. (a) (i) and (ii) above, DGT found it necessary to request significant equipment changes which made evaluation difficult and controversial. After discussion with the Bank, DGT agreed to go through a retender operation for that equipment; this resulted in a delay of about 18 months in the initiation of the project construction period. However the retendering brought forward extremely low prices and DGT was able to take advantage of the low prices to obtain the additional equipment (89,000 lines) necessary to meet the extra demand caused by the extended construction period. To meet these circumstances on September 12, 1969, the Bank agreed that the equipment in subpara. (a) (i) of the project description above would be increased from 118,000 lines to 207,000 lines. Furthermore, the price advantages were such that on December 3, 1969, the Bank agreed to

cancel US\$ 4.5 million of the US\$ 17.0 million loan. The closing date of the loan was extended from October 31, 1972 to March 31, 1974, and it was agreed that the facilities would be put into operation in successive stages between 1969 and 1974.

18. Objective and Justification

In 1966 the telephone development in Taiwan was 1.3 per hundred of population; this was low when compared to many industrialized nations, for example, Japan with 14, Europe 45 and USA 48. The growth of the economy and improvement in living standards had rendered the facilities inadequate to satisfy the high demand for telephone service. This demand had been high and consistently maintained for over ten years despite a connection fee of about US\$ 350 charged new subscribers. The high demand was further evidenced by the abnormally high calling rate averaging 15.8 calls per day per subscriber's line throughout Taiwan. This was nearly four times the calling rate in the USA. The project was intended to expand and improve the domestic telephone and telegraph services of Taiwan in order to assist the economic development of the country.

19. Construction Schedule

The original and final construction schedules are compared below.

	Original (118,000 lines)	Final (207,000 lines)
Engineering and specifications	Feb. 1966-July 1967	Aug. 1968
Manufacture of equipment	Mar. 1968-Dec. 1970	July 1969-Mar. 1973
Installation of equipment	Jan. 1969-Dec. 1971	July 1970-Dec. 1973

The construction periods, estimated and actual, broken down into main physical components are the following:

Principal Components	Construction Period		
	Estimated initial project (Sept. 30, 1967)	Estimated revised project (Dec. 24, 1969)	Actual (Dec. 31, 1973)
Local exch. equip.	Jan. '69-Dec. '71	Aug. '70-Dec. '73	July '70-Dec. '73
STD exch. equip.	June '69-Dec. '70	Nov. '70-July '71	Nov. '70-Mar. '72
Microwave		Dec. '69-July '70	Dec. '69-Sept. '70
Line plant	June '68-Dec. '73	July '68-Dec. '73	July '68-Dec. '73
Training center	June '68-Dec. '69	June '69-Dec. '70	June '69-Dec. '71

The principal reasons for the delay in the execution of the project was the need to retender for the main equipment and the need for additional time to install the extra equipment included in the revised project (see para. 17b). There was some slippage in the original construction dates for buildings;

however because of the delays in the switching procurement DGT was able to have all the buildings erected in time for the installation of the equipment. Once the initial procurement difficulties were overcome DGT's installation performance was very good; in fact the installations were completed three months earlier than anticipated.

20. Project Cost Estimates

The estimated cost of the Bank financed project as appraised was NT\$ 2.0 billion; subsequently, when the project was changed (see para. 17b), DGT estimated the revised cost to be NT\$ 2.5 billion, of which 75% related to local costs; this revised project cost would represent probably only about 25% of the construction works to be undertaken by DGT during the period 1967 through 1973. Although the cost of the items imported directly for the Bank financed project are easily identifiable, the calculation of accurate final costs for the project is rendered practically impossible because of the need to allocate a large number of local cost items which are common to both the Bank financed project and the remaining part of DGT's program. For this reason the final costs of the project (NT\$ 2.4 billion) as prepared by DGT and shown in Annex 1 can only be considered as an estimate and may be subject to substantial error.

21. Program Achievements

Over the past seven years DGT has maintained a telephone growth which is among the highest in the world. DGT has been able to meet the exceptional demand in most areas without delay and at the same time offer a satisfactory standard of service; current waiting lists are not high. The Bank financed project, which formed part of DGT's large development program, has considerably contributed to this significant achievement. The excellent progress made in each branch of operation is indicated below.

- (a) Local Telephone Service - During the 1966 appraisal it was estimated that DGT's 113,000 telephone subscribers would increase to 321,000 by the end of 1973; annual growth would be about 16%. DGT's actual subscribers at the end of 1973 totalled 486,826, and the annual growth since 1966 had been slightly above 23%. Public telephones which totalled 2,087 in 1966 were increased to 11,000 at the end of 1973; over the same period the percentage of automatic telephones in the network increased from 75% to 90% and telephone density had increased from 1.3 to 4.4 per hundred population. Annual statistics are given below.

<u>End of CY Year</u>	<u>Percentage of Automatic Telephone Stations</u>	<u>Number of Telephone Subscribers</u>		
		<u>Yearly Increase</u>	<u>Total Number</u>	<u>Percentage of Annual Increase</u>
1966	75.0	14,894	113,414	15.1
1967	77.4	21,621	135,035	19.1
1968	79.4	30,949	165,984	22.9
1969	82.2	37,349	203,333	22.5
1970	83.7	46,087	249,420	22.7
1971	87.3	58,053	307,473	23.3
1972	89.7	75,135	382,608	24.4
1973	90.3	104,218	486,826	27.2

- (b) Long Distance Services - The number of toll calls, including those dialed directly by subscribers (STD) increased in 1966/1973 by approximately 25% p.a., far above the 15% p.a. forecasted and appraised. In the same period, the number of national telegrams increased by 10% p.a., but in the last year growth fell to 5.3%; those figures compare with 8% forecasted at the end of 1973.
- (c) International Services - The annual growth in the number of international telephone calls between 1966 and 1973 was 32%; this was more than double that estimated during the appraisal. During the same period telex paid minutes growth was 23% per year as compared with the 20% forecast during the appraisal. International telegrams increased, during the same period, at a rate of 11% per year as compared with 8% forecasted.

22. Growth Potential

Despite the high connection fee there has been no slackening of telephone connections' demand; for example, the present demand and supply in the large industrial area of Kaohsiung is running at the rate of 27% per year; DGT is presently executing another large development program covering the period to end-1976 which includes switching equipment for a further 350,000 subscribers.

23. Consultants

The consultants, Complan Associates and individual experts, who assisted in the preparation of specifications and evaluating bids, performed their duties satisfactorily.

24. Organization and Management

DGT's organization has operated effectively, management has been and continues to be extremely efficient. At the end of the project, owing

to the rapid growth, it was evident that DGT organizational capacity was burdened. DGT quickly identified the areas which required strengthening and is taking measures to ensure a continuation of efficiency.

25. Financing

The financing plan prepared at appraisal time covered the five-year construction period - January 1, 1967 through December 31, 1971. (The revised Bank-financed project was completed only by end-1973). The under-mentioned table shows (i) DGT's actual financing arrangements for the period 1967-1971 as compared with the appraisal estimates; and (ii) DGT's financing arrangements for the period January 1, 1967 through June 30, 1973, the latest date to which audited accounts are available, and the date when almost all equipment for the project had been installed.

	Appraisal Estimate	Actual	
	FY1967-71	FY1967-71	FY1967-73
	-----in millions of NT\$-----		
<u>Requirements</u>			
Construction	4,876	6,087	9,300
Working capital-increase	-	310	1,494
Total requirements	<u>4,876</u>	<u>6,397</u>	<u>10,794</u>
<u>Sources</u>			
Internal cash generation	2,988	4,259	6,838
Less: Debt service	476	366	563
Payments to Government	396	609	900
	<u>2,116</u>	<u>3,284</u>	<u>5,375</u>
Subscribers deposits and connection fees	1,347	2,492	4,198
Borrowings	903	621	1,221
Working capital-decrease	510	-	-
Total sources	<u>4,876</u>	<u>6,397</u>	<u>10,794</u>

26. Summary Financial Results

The relevant indices recording DGT's financial performance from FYs 1967 through 1973 are given below. The corresponding appraisal estimates are shown for FYs 1967 through 1971. Further details are given in Annex 2.

<u>FY</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972^{1/}</u> (six months)	<u>1973</u>
<u>Net operating income - NT\$ million</u>							
Appraisal estimate	278	327	365	405	420	-	-
Actual	329	453	493	633	776	411	1,345
<u>Rate of return - %</u>							
Appraisal estimate	14.5	14.0	13.2	12.3	10.1	-	-
Actual	17.2	22.3	20.9	20.0	18.2	15.6	20.7
<u>Operating ratio - %</u>							
Appraisal estimate	68	67	68	69	72	-	-
Actual	64	59	62	63	58	66	58
<u>Debt/Equity ratio</u>							
Appraisal estimate	12/88	15/85	17/83	17/83	15/85	-	-
Actual	9/91	8/92	10/90	8/92	8/92	7/93	9/91
<u>Current ratio - times covered</u>							
Appraisal estimate	4.5	3.7	2.8	2.6	2.6	-	-
Actual	6.3	4.1	5.1	3.2	4.0	4.2	4.6
<u>Debt service coverage - times</u>							
Appraisal estimate	11	7	6	5	5	-	-
Actual	16	14	14	9	11	14	13

Although there was an 18 to 24 months delay in the execution of the enlarged Bank-financed project, the financial results from DGT's operations throughout the construction period of the project considerably exceeded those forecast at the time of the appraisal; DGT's financial position has remained consistently strong and has exceeded expectations.

27. Insurance

DGT does not carry insurance against major losses on its fixed assets resulting from fire, typhoons, earthquakes or other catastrophes. In side letter no. 6 (dated August 2, 1967) to the Loan Agreement, the Government has agreed to indemnify DGT for losses exceeding NT\$ 1,500,000.

^{1/} FY changed from calendar year to year ending June 30.

28. Auditors

DGT's accounts, by law, are subject to audit by the Ministry of Audit. The procedure has not proved entirely satisfactory and it would have been proposed that DGT employ independent auditors if a further Bank loan had materialized.

29. Other Points and Special Features

The project has been most satisfactorily completed. No further inventory of the project is necessary.

Public Utilities Department

April 22, 1974

CHINADIRECTORATE GENERAL OF TELECOMMUNICATIONS (DGT)Loan 506-CHABank Financed ProjectPROJECT AS APPRAISED - ESTIMATED COST

	Foreign Exchange US\$	Local Cost NT\$	Total NT\$	Cost US\$
	-----expressed in millions-----			
Exchange facilities	13.25	1,192	1,722	43.05
Subscriber toll dialing	1.70	36	104	2.60
Training center	0.15	23	29	0.72
Administration & consultants	0.30	56	68	1.70
Contingencies	1.60	20	84	2.10
	<u>17.00</u>	<u>1,327</u>	<u>2,007</u>	<u>50.17</u>
	----- (US\$ 1 = NT\$ 40.0) -----			

REVISED PROJECT - ESTIMATED AND FINAL COST

	Estimated Costs			Final Costs ^{1/}		
	Foreign Exchange IBRD Loan US\$	Other NT\$	Local Cost NT\$	Foreign Exchange IBRD Loan US\$	Other NT\$	Local Cost NT\$
	-----expressed in millions-----					
Exchange facilities	10.800	2.30	1,710.5	11.07	3.56	1,485.8
Subscriber toll dialing	1.020	0.06	66.7	1.03	0.06	58.4
Training center	0.288	0.10	18.9	0.26	0.04	20.5
Microwave & carrier facilities	-	1.05	22.2	-	1.00	23.9
Administration & con- sultants	0.112	-	45.0	0.14	-	160.1
Contingencies	<u>0.280</u>	<u>-</u>	<u>20.0</u>	<u>-</u>	<u>-</u>	<u>-</u>
Total	<u>12.500</u>	<u>3.51</u>	<u>1,883.3</u>	<u>12.50</u>	<u>4.66</u>	<u>1,748.7</u>
Total Cost	(-----US\$ 63.1-----			(-----US\$ 60.8-----		
	(-----NT\$ 2,524-----			(-----NT\$ 2,437-----		
	(US\$ 1 = NT\$ 40.0)			(US\$ 1 = NT\$ 40.10)		

^{1/} Owing to the need to allocate local cost items the final costs may be subject to substantial error (see para. 20).

CHINA
 DIRECTORATE GENERAL OF TELECOMMUNICATIONS (DGT)
 Loan 506-CHA
 Financial Statistics - FYs 1967 through 1973
 (millions of new Taiwan dollars)

Year ending	<u>December 31, 1967</u>		<u>December 31, 1968</u>		<u>December 31, 1969</u>		<u>December 31, 1970</u>		<u>December 31, 1971</u>		<u>June 30, 1972*</u>	<u>June 30, 1973</u>
	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Appraisal Estimate</u>	<u>Actual</u>	<u>Actual (six months)</u>	<u>Actual</u>
COMPARISON OF ESTIMATED AND ACTUAL STATEMENTS OF INCOME												
Net operating revenues	868	916	1,006	1,116	1,153	1,304	1,323	1,688	1,518	2,131	1,207	3,193
Total operating expenses	590	586	679	663	788	811	918	1,055	1,098	1,355	795	1,847
Net operating income	278	329	327	453	365	493	405	633	420	776	412	1,347
Rate of return	14.5%	17.2%	14.0%	22.3%	13.2%	20.9%	12.3%	20.0%	10.1%	18.2%	15.6%	20.7%
Operating ratio	68%	64%	67%	59%	68%	62%	69%	63%	72%	58%	66%	58%
COMPARISON OF ESTIMATED AND ACTUAL BALANCE SHEETS												
Net plant in service	1,993	1,967	2,683	2,086	2,830	2,615	3,739	3,687	4,619	4,846	5,773	7,230
Net current assets	725	1,133	569	1,255	466	1,299	394	1,117	370	1,524	1,574	2,784
Total assets	3,789	3,874	4,431	4,830	5,160	5,737	5,836	7,019	6,405	8,570	9,288	12,394
Total equity	3,023	3,073	3,445	3,915	3,912	4,773	4,445	5,836	5,043	7,122	7,811	10,005
Total long-term debt	407	337	603	355	792	509	921	480	869	588	609	1,045
Total liabilities	3,789	3,874	4,431	4,830	5,160	5,737	5,836	7,019	6,405	8,570	9,288	12,389
Debt/equity ratio	12/88	9/91	15/85	8/92	17/83	10/90	17/83	8/92	15/85	8/92	7/93	9/91
Times current liabilities covered by current assets	4.5	6.3	3.7	4.1	2.8	5.1	2.6	3.2	2.6	4.0	4.2	4.6
COMPARISON OF ESTIMATED AND ACTUAL CASH FLOW STATEMENTS												
Internal cash generation	459	556	523	715	592	784	670	1,013	744	1,191	640	1,951
Total borrowings	183	134	240	18	240	197	200	76	40	196	60	540
Connection fees and subscribers' deposits	213	250	224	396	252	483	305	602	353	761	421	1,285
Total sources of funds	855	940	987	1,129	1,084	1,464	1,175	1,691	1,137	2,148	1,121	3,776
Construction program	902	476	996	860	1,015	1,168	1,038	1,554	925	2,029	1,018	2,195
Debt service	42	34	74	53	92	56	122	113	146	110	46	151
Payments to Government	66	76	73	96	80	129	87	136	90	172	192	99
Increase (decrease) in working capital	(155)	354	(156)	120	(103)	111	(72)	(112)	(24)	(163)	(135)	1,319
Total application of funds	855	940	987	1,129	1,084	1,464	1,175	1,691	1,137	2,148	1,121	3,764
Times debt service covered by internal cash generation	11	16	7	14	6	14	5	9	5	11	14	13

*FY changed from calendar year to year ending June 30.