**Philippines**

**Metrological Telecommunication System Development Project**

Report Date: March 2001
Field Survey: September 2000

## 1. Project Profile and Japan's ODA Loan


Site Map: The whole of the Philippines

Telecommunication Tower

### (1) Background

The Philippines is vulnerable to the effects of typhoons and the monsoon, and it suffers serious damage to lives and property every year. To reduce damage from the weather, it is important to gather meteorological observations quickly and accurately as the basis for weather forecasts, which can be effectively disseminated and used to provide warnings to the general public. At the time of the appraisal for this project (1989) the Philippines Meteorological Agency (PAGASA) gathered observation information by voice calls over short-wave radios from weather observatories around the country. Information was sent in directly and individually. The situation at that time, including the transmission method, was observed to have the following problems:

[1] Information transmission by the above method was inefficient and imprecise.
[2] Data gathering ability was poor due to dilapidation of the observation equipment.
[3] Weather forecasts and weather calamity warnings, including typhoon path forecasts, were inaccurate due to dilapidation of the data analysis equipment.
[4] Poor data gathering ability due to the use of public telephone lines in some areas.

The solution of the above problems was expected to improve the accuracy of weather forecasts in the Philippines, as well as having an indirect effect in alleviating typhoon damage in Japan.

### (2) Objectives

The objective of this project was to enhance the accuracy of weather information, including typhoon information, and enable rapid exchange of meteorological information and data, by improving and renovating the weather observation and communications system in use in 1989, ultimately to reduce disaster damage.

### (3) Project Scope

The ODA loan covered the entire foreign currency portion of obtaining equipment, materials and services for the implementation of this project. The scope of the project included civil works (buildings and antenna towers), communications systems (improvement of multiplex radio system etc.), observation equipment, backup power supplies and consulting services.

### (4) Borrower/Executing Agency

Republic of the Philippines / PAGASA

### (5) Outline of Loan Agreement

| | |
|---|---|
| Loan Amount/Loan Disbursed Amount | ¥4,986 million / ¥4,971 million |
| Exchange of Notes/Loan Agreement | October 1989 / February 1990 |
| Terms and Conditions | Interest rate: 2.7%, Repayment period: 30 years (10 years for grace period), General Untied (However, consulting services are partial untied.) |
| Final Disbursement Date | May 1998 |

## 2. Results and Evaluation

### (1) Relevance

The " infrastructure development" chapter in the Medium Term Philippines Development Plan (1999~2004) lists the establishment of communications facilities for better weather forecasts and greater safety as one activity in a high priority sub-sector. This indicates that improvement of weather communications systems remains relevant even under today's development plans.

However, problems including interference with the Cellular Mobile Telephone System (CMTS) have meant that data gathering over the system introduced under this project is inefficient and it is not a practically useful communications system.

The trunk cables for the current communications system use a frequency band close to that of the CMTS, which causes electric wave interference. In November 1988, the unified world standard for mobile communications expanded the frequency range allocated to mobile communications into the 800MHz band that was previously used for fixed communications. At the end of the 1980s, when the engineering service (E/S) for this project was conducted, it should have been possible to anticipate the future use of the 800MHz frequency for mobile communications. On the other hand, it would have been very difficult to foresee the leap in the diffusion of mobile communications and the specific impact that would have. PAGASA took the final decision to use 800MHz the frequency for this project. According to interviews with PAGASA and the consultants and contractors involved in the project, the reasons for the PAGASA decision were as follows:

(i) PAGASA had already installed a portion of 800MHz trunk cable in the 1970s, and continuing with 800MHz would enable sharing of consistent equipment and materials, which would be cost efficient.

(ii) When building a nationwide multiplex line, the long-reaching 800MHz band has an advantage, which would be economical.

(iii) The NTC (National Telecommunications Committee), which supervises radio waves, had given PAGASA official approval for the allocation of the 800MHz band for the lifespan of the equipment.

If the agreement with the NTC to allocate the 800MHz band to PAGASA was in effect, that band would have been an effective choice, and therefore there was no problem with the prospects, from the planning stage, of this project achieving its objectives.

**(2) Efficiency**

(i) Implementation Schedule

Under the initial plan the construction was to take about four years from July 1990 to December 1994, but the project was damaged by a large typhoon in December 1994, which necessitated a revision of the plan. That and other reasons extended the construction period to nearly six years, from July 1990 to May 1996. A supplementary phase was carried out for one year and nine months, from September 1996 to May 1998, to improve the quality of the communications system.

(ii) Project Cost

Project cost, including the supplementary phase, was kept within the initial planned cost.

**(3) Effectiveness**

[1] Data gathering efficiency and the operation status of the equipment

The efficiency indicator for data collection is how efficiently observation data can be gathered. As Table 1 shows, the efficiency of data collection by PAGASA was around 85% for the three years from 1998. However, the efficiency of data collection using the meteorological communications system was 21% in 1998, the year of its completion, falling to 4.3% in 1999 and zero in 2000. The main reason was the problem of interference with CMTS (Cellular Mobile Telephone System). Another reason is that some of the equipment, including the multiplex radio system, was inoperable due to a shortage of maintenance funding.

**Table 1: Data Collection Efficiency and the Usage of the Procured Equipment**

(Unit: %)

| | 1998 completion | 1999 | 2000 field survey |
|---|---|---|---|
| Data collection efficiency (Note) (monthly average value) | 87.2 | 88.6 | Approx. 86 |
| Data collection efficiency for MTDSP within the above (monthly average value) | 21.1 | 4.3 | Almost zero |
| Data collection efficiency for SSD/TEL within the above (monthly average value) | 66.1 | 84.3 | Approx. 86 |
| Usage of the procured materials and equipment | | | |
| Multiplex radio system trunk cable equipment | 80-85 | 30 | 90 |
| Branch line equipment (VHF radio system) | 90 | 90 | 90 |
| Branch line equipment (HF radio system) | 100 | 96 | 90 |
| Improvement of the existing communications system | 100 | 100 | 100 |
| Auto-report request system | 100 | 91 | 91 |
| Computer & fax system | 100 | 88 | 88 |
| Improvement of backup power supply equipment | 100 | 100 | 100 |
| Meteorological observation equipment | 100 | 95 | 95 |
| Radar system | 100 | 100 | 100 |
| Meteorological data communications system | 100 | 33 | 0 |

Source: PAGASA

Notes 1) Data collection efficiency = Volume of data collected within 30 minutes / Volume of observed data.
2) MTSDP is the data collection efficiency using the meteorological telecommunications system project implemented under the ODA loan.
SSB/TEL is the data collection efficiency using the previous voice-based system.
3) The reason why the data collection efficiency using the MTS is close to zero despite the high level of usage of the procured materials and equipment is that the problem of cellular telephone interference makes effective data collection impossible.
4) The usage of procured materials and equipment (%) shows the quantity of equipment and systems in use, relative to the quantities, which were procured.

[2] Improvement of the technical abilities of staff

On the job training (OJT) by contractors and training in the factory raised the technical level of PAGASA staff, which is regarded as one positive aspect of the project. In particular, the staff dealt with the problem of interference on the multiplex radio system, which was the trunk telecommunications system, to the best of their ability, and they attempted to find solutions to the growing interference. PAGASA also carries out its own repairs for the HF wireless equipment. That is the result of the proper transfer of knowledge and technology at the level required for dealing with the circuits and components of the equipment.

### (4) Impact

The main effects anticipated from this project, i.e. the improvement in data communications speed has not been realized at present due to the problem of interference described above, but the improvement in observation precision yielded by the renewal and standardization of equipment has enabled the provision of accurate meteorological information. This is believed to have made any extent of contribution to the reduction of disaster damage in the Philippines.

**(5) Sustainability**

(i) Operation and Maintenance

The operation and maintenance (O&M) situation after the completion of this project is managed by PAGASA, as planned. Due to budgetary constraints, no new staff have been hired for the meteorological observatories and other field stations (approximately 60 locations), which means they are operating on a little over 80% of their staff complement. This level of staffing is not necessarily adequate. In addition to the lack of budget, some of the equipment procured for this project, which is dispersed over the whole country, is not well maintained.

PAGASA has no independent sources of funding, receiving all its funds as an allocation from the central government. The maintenance of the meteorological telecommunications system is carried out by the Engineering and Maintenance Division, with maintenance budgets as shown below.

**Table 2 Maintenance Budget of PAGASA Engineering and Maintenance Division**

Unit: million peso

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|
| Approved budget | 5.67 | 6.24 | 6.86 | | | | |
| Requested budget | | | | 7.55 | 8.30 | 9.13 | 10.04 |

Source: PAGASA

Note Amounts include spare parts and travel costs for site visits, but do not include staff wages and electricity bills.

These budget amounts leave PAGASA, which must carry out maintenance works on a nationwide scale, short of funds for spare part purchases and travel expenses for regional maintenance trips.

(ii) The interference problem

By now the NTC (National Telecommunications Committee) and the mobile communications operators have nearly reached an agreement that the operators would not use those frequencies which overlap with this meteorological communications system project. Therefore there is the prospect of a solution to the interference problem. The compromise should enable the meteorological systems installed under this project to achieve the data collection efficiency expected of them. However, even if the interference problem is solved and the anticipated effects are realized, the finances and organization of PAGASA must be strengthened to make the effects sustainable.

## 3. Lessons Learned

(1) For projects in the telecommunications field, which is making rapid technological progress, equipment specifications should be selected with due care, taking into account, as far as possible, trends in world standards and the abilities of the executing agency.

(2) (Frequency allocation etc.) The realization of project effects depends on administrative frameworks and coordination. In developing countries whose necessary executive ability is insufficient, the administrative and coordination abilities must be evaluated with great care. If there is any risk over those abilities, binding measures should be taken to secure the attainment of the plan.

**Comparison of Original and Actual Scope**

| Item | Plan | Actual |
|---|---|---|
| ①Project Scope | | |
| 1.Civil works | | |
| 1-1 Access road | Improvement 1800mx3m | Cancelled |
| | Construction 1530mx3m | Cancelled |
| 1-2 Buildings and antenna towers (Maintenance center and switching office) | 8 places | Same as left |
| 2. Communications system | | |
| 2-1 Improvement of multiplex radio system | 1 Set | Changes in the quantities of the following equipment:<br>FDM Multiple Terminal Equipment,<br>FS Ringe and Compader Equipment,<br>Isolation Transformer |
| 2-2 Communication support improvement (VHF Radio System) | 1 Set | Changes in quantity. |
| 2-3 Communication support improvement (HF Radio System) | 1 Set | Changes in quantity.<br>Addition of Solar Power Supply System |
| 2-4 Improvement of existing communication systems | 5 stations | 2 stations<br>Expansion of Carrier Terminal Equipment |
| 2-5 Improvement of meteorological data switching system (Automatic Request for Repetition System) | 1 Set | Changes in quantity. |
| 2-6 Improvement of meteorological data switching system (Facsimile and Mini-Computer) | 1 Set | Changes in quantity. |
| 2-7 Installation of reserve power generating engine | 1 Set | Changes in quantity.<br>Addition of the following equipment<br>10kVA Stand-by Engine Generator Set<br>7.5kVA Engine Generator Set<br>3kVA Engine Generator Set |
| 2-8 Improvement of general observation equipment at existing weather observatories | 1 Set | Changes in quantity.<br>Addition of the following equipment<br>Transmitter and indicator set<br>Psychrometer (Fuess type) |
| 2-9 Renovation of weather radar system at existing radar observatories | 1 Set | Same as left |
| 2-10 Construction of automatic weather observatories | 1 Set | Same as left |
| 3. Consulting Service | Foreign: 155M/M<br>Local: 92M/M | (Initial phase)<br>Foreign: 163M/M<br>Local: 236M/M<br>(Extended phase)<br>Foreign: 21M/M |

| Item | Plan | Actual |
|---|---|---|
| ②Implementation Schedule | | |
| Loan agreement | Feb. 1990 | Feb. 1990 |
| Selection of consultant | Jan. 1990 ~ Sep. 1990 | Jan. 1990 ~ Jul. 1990 |
| Consulting service | Jul. 1990 ~ Dec. 1994 | Jul. 1990 ~ May 1998 |
| Detailed design | Jul. 1990 ~ Dec. 1990 | Jul. 1990 ~ Nov. 1990 |
| Construction supervision | Jul 1990 ~ Dec. 1993 | Jul. 1990 ~ Apr. 1998 |
| O&M management | Oct. 1993 ~ Dec. 1993<br>Oct. 1994 ~ Dec. 1994 | Apr. 1995 ~ Mar. 1996 |
| Procurement of contractor | Jul 1990 ~ Sep. 1991 | Nov. 1990 ~ May 1992 |
| Civil works, procurement and installation | Oct. 1991 ~ Dec. 1993 | Jul. 1992 ~ Apr. 1998 |
| O&M training | Sep. 1993 ~ Aug. 1994 | Apr. 1995 ~ May 1996 |
| ③Project Cost | | |
| Foreign currency | ¥4,986 million | ¥4,971 million |
| Local currency | 156 million peso | 87 million peso |
| Total | ¥5,954 million | ¥5,512 million |
| ODA Loan portion | ¥4,986 million | ¥4,971 million |
| Exchange rate | 1 peso＝¥6.2 | 1 peso＝¥6.2 |