Indonesia

Establishment of Geographic Information System for DKI Jakarta

Report Date: March 2001
Field Survey: August 2000

1. Project Profile and Japan's ODA Loan

Location Map of Project Area

System built by this Project

(1) Background

The DKI Jakarta, which is located in the west of Java, has a concentration of capital city functions, and it is experiencing a rapid inflow of people. The population, which was 6.7 million at the end of 1987 (before the implementation of the project), is expected to reach 12 million in 2005. Administratively it is treated as a "special city", which gives it the same status as a province. It is becoming increasingly obvious that public infrastructure is failing to keep pace with the kind of population concentration the city is experiencing. Improvements to various types of infrastructure, such as the road network, the water supply and sewerage networks, garbage disposal and the telephone network, are urgently needed.

(2) Objectives

This project aimed to build a geographic information system for Jakarta in order to take regional administrative services to a higher level and enhance their efficiency.

(3) Project Scope

Within the content of the project (listed below), the ODA loan covered the whole foreign currency portion of the project and part of the local currency portion.

Phase I: (i) Conceptual design, detailed design and preparation of bidding documents for the implementation of the project.
(ii) Consulting services in connection with (i) above.

Phase II: (i) Aerial photography of the whole of the DKI Jakarta (5 wards, approximately 70,000ha), updating of 1/1,000 scale base maps, and computer entry of those maps.

(ii) Preparation and system entry of geographic data, including land usage maps, land area maps, building permit maps, and infrastructure layout maps for water pipeline etc. for the central ward of the DKI Jakarta (approximately 16,000ha).
(iii) Installation of a computer system (hardware and software), comprising one center system and two sub-systems.
(iv) Consulting services (bid evaluation and contract assistance, project supervision, application software development, training, guidance in operation skills).

(4) Borrower/Executing Agency

Republic of Indonesia / DKI Jakarta

(5) Outline of Loan Agreement

Loan Amount/Loan Disbursed Amount	¥1,388 million / ¥1,388 million
Exchange of Notes/Loan Agreement	December 1989 / December 1989
Terms and Conditions	Interest rate: 2.5%, Repayment period: 30 years (10 years for grace period), General Untied (Partially untied for consulting services)
Final Disbursement Date	June 1997

2. Results and Evaluation

(1) Relevance

The initial plan for the project, of using a geographic information system to provide efficient and effective administrative services, remains relevant.

However, as will be described below, the completion of Phase I was to be followed by “the development of a geographic information system for land and structure development permits and the administration of land usage regulations” as a pilot element within Phase II. However, the work of matching the map data was more difficult than anticipated, and it was not possible to develop a practical system. As a result, the feasibility of one element of the project plan was not necessarily evaluated accurately at the detailed design stage.

(2) Efficiency

1) The results delivered by the project

The first phase of the project proceeded as initially planned, clarifying the scope of the system in the detailed design and establishing an implementation system. It was followed by the preparation of a base map of the whole of Jakarta, based on aerial photography (Phase II, stage 1), and the databasing of geographic information for a pilot area (the central ward of Jakarta, one part of the whole target area) within the system prepared in the detailed design (Phase II, stage 2).

Following the Phase I detailed design, and a strong commitment from the Urban Planning Department (DTK), the DTK decided to take “the development of a geographic information system for land and structure development permits and the administration of land usage regulations”, in which the DTK took a

central role, as a pilot case. However, the map information that the DTK had maintained since 1932 and the base map prepared under this project from the aerial survey were inconsistent in many places. As a result, the work of coordinating the two data sets took much longer than expected, and it has yet to be completed.

In 2000 the DTK developed, at its own expense, its own GIS (Geographic Information System) on the basis of the map data it had maintained in the past. Similarly, the National Tax Office (PBB) has developed, and is operating, its own GIS.

The base map from this project was used in Phase III for "the development of a Geographic Information System for the management of utilities, urban facilities and the environment". The system was funded by the special city of Jakarta at its own expense, and is in practical use.

The table below shows the status of the DPPT's "Map-based GIS", which was developed under this project, and the "Other GIS", which, as a result, was developed under this project and is not used.

Table 1 Geographic Information Systems in the DKI Jakarta

	GIS based on this project	Other GIS
Examples of specific uses	Management of utilities such as electricity, water supply and gas, monitoring of transport facilities and environmental management.	Land development permits, administration of land usage regulations, urban planning, fixed asset taxation.
Development plan in this project	As a result of the detailed design (Phase I), this GIS was excluded from the development of the pilot case (Phase II [2]).	As a result of the detailed design (Phase I), GIS for urban planning, land development permits and land usage regulations was made the subject of the development of a pilot case (Phase II [2]).
Attainment of project objectives, and outlook for the future	Based on the base map of all five wards (Phase II [1]), the DPPT-GIS was developed by the DPPT at its own expense, under Phase III. The achieved results of this project are as follows: - Services being provided in connection with utilities, traffic facilities management and environmental management. - Under development on the basis of the urban facilities development plan.	Coordinating the base map of all five wards (Phase II [1]) and the map information the DTK had maintained since 1932 (Phase II [2]) required more time than anticipated, and has yet to be completed. The DTK developed its own DTK-GIS system between 1995 and 2000, and it is scheduled to begin full-scale service operation within FY 2001. The National Tax Office (PBB) has developed an independent GIS for the collection of fixed asset taxes, which is now in operation.

2) Delay of implementation schedule

The implementation schedule for this project was delayed by nearly five years. The main reasons were the delay in selecting consultants at the start of Phase I (approximately 2 years), the delay in selecting consultants at the start of Phase II (approximately 1 year), and delays in tenders and revisions to computer specifications (approximately 2 years).

(3) Effectiveness

The following effects were anticipated at the time of the appraisal.

[1] Maps of all kinds would be prepared more rapidly, with less labor, and the management and updating of maps would be more efficient. These improvements were expected to make tasks such as urban planning, the planning of new public infrastructure, and the management of maintenance faster and

reduce the labor involved, as well as enhancing the quality of plans.

[2] Reduction of the cost of map preparation was expected to reduce the project costs of maintenance and rehabilitation to public infrastructure.

[3] Greater precision in geographic information, and the processing and enhancement of that information, were expected to reduce the incidence of accidental cutting of buried equipment.

[4] Higher fixed asset tax collection rates were expected.

Of these, fixed asset taxation is now covered by a GIS that was independently developed and put into operation by the National Taxation Office (PBB), while GIS systems based on this project are in use for public infrastructure and urban planning. The nature of this project makes quantitative analysis of its effects difficult, but it is reasonable to say that qualitative project effects have been achieved to some extent.

However, as described above, “the system for land development permits, building construction permits and the administration of land usage regulations” which was covered by the detailed design suffered problems due to inconsistent data, and it has not yet been put into practical operation.

(4) Impact

As is the case for quantitative effects, the nature of this project makes it difficult to analyze the degree of achievement of project impact.

(5) Sustainability

1) Operation and Maintenance

The operation and maintenance of this system is led by the Jakarta City Surveyor’s Office (DPPT). The DPPT receives a budget from the municipal government and is responsible for the preparation, management and updating of base maps, and for the management of the system as a whole. Under the plan for this project, the DPPT would exercise overall management, while three departments, the Urban Planning Office (DTK), the Urban Development Office (DPPK) and the Land Office (BPN) would each prepare and update map information that would be valuable in their own fields. However, the various departments each build, manage and update the GIS systems individually, with no cooperation between them. The DPPT is making efforts to manage and improve this project’s GIS, and the DTK is building an independent GIS, while the DPPK is scheduled to start using DTK-GIS for valuable map information. The BPN also wants to use GIS, but it has yet to do anything specific to that end.

The General Planning Agency (BAPPEDA), which manages budget allocations for Jakarta, must draw up a general plan for the building and management of geographic information systems, and use it as the basis for coordination between all the parties involved.

For system personnel, each of the branches in the five wards of Jakarta was to allocate at least two staff as system support and maintenance staff. However, most of the 60 staff who were training in how to operate this system (including 20 who were trained locally) were moved to other posts in subsequent reshuffles. As a result, only one person is responsible for this project in each branch, other than those branches belonging to the SDPPT (that was the case at the end of August 2000 in the case of Jakarta’s central ward).

According to the DPPT, the staff who received special training in the operation of this system have been replaced, and the training system has not been adequately established for its ongoing support, resulting in a

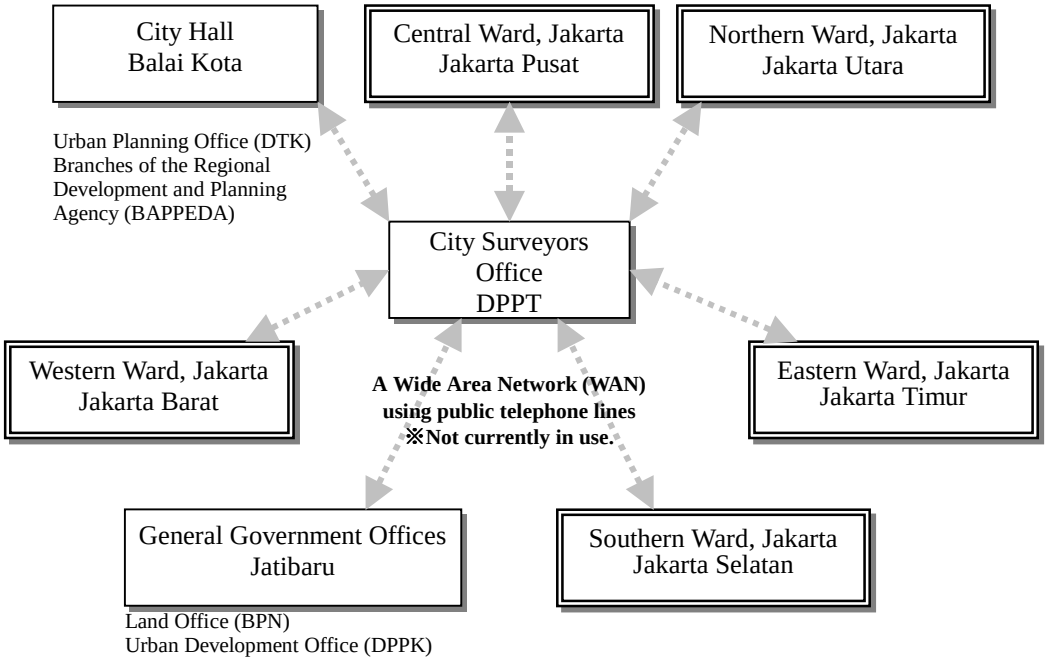
shortage of staff.

2) Operation and Maintenance Status

The base map was planned to be completely updated regularly, every five years, on the basis of an aerial photographing of whole city. However, due to the city's financial difficulties after the currency crisis, the aerial photographic survey scheduled for 1999 was cancelled. The DPPT continues its painstaking terrestrial survey work, but even that effort only covers central ward, due to budget restrictions. The area which can be updated in a year only amounts to 10~15% of the area of central ward, meaning that the full re-surveying of even that area requires nearly ten years. That rate of progress is inadequate to keep pace with the growth and renewal of the city, making it difficult to obtain adequate functionality from the system.

When the project started, WAN (wide area network) using telephone lines was intended to be used to link the GIS data held by some of the branches of the departments involved. However, the data transfer efficiency was poor because the system was audio signal based, and network operation has now been abandoned.

Figure 1 The Wide Area Network Initially Used (now abandoned)



※Each of the government buildings of the five wards contains an Urban Planning Branch Office (SDTK), Surveying Branch Office (SDPPT), Land Development Branch Office (SDPPK), Branch Land Office (KBPN) and Regional Development and Planning Branch Office (BAPPEKO).

3) Sustainability

Organizations and systems for the operation of geographic information systems must be established and provided with sufficient staff for appropriate operation and maintenance, in order to realize the effects of the project. The operation and maintenance agency has asked the Japan Bank for International Cooperation for additional assistance as described below. The requested points are all important for renewal of the

system, but as preconditions for the provision of such assistance, the DKI Jakarta must make self-help efforts to establish related organizations and systems and make appropriate staff allocations.

Table 2 Current Tasks Facing the Jakarta City Surveyor's Office and its Wishes for Additional Assistance

Tasks to be considered	Elements of assistance
1. Maintenance of the system and its data - Updating and upgrading of software. - Updating and upgrading of hardware. - Updating the database.	• Technical assistance for a review of the system in line with advances in computer technology. • Financial assistance for completion of the map database for the whole project area, and a full update of existing data. • Financial assistance for system maintenance.
2. Review of the current system	• Technical assistance for an examination of the system for the future.
3. Education and training of staff.	• Technical and financial assistance for educating personnel for system operation.
4. Examination of system applications.	• Technical assistance for examination of user-oriented and objective-oriented systems.
5. Dispersed operation system for each ward.	• Financial assistance for the establishment of operation systems in each ward.

The GIS should be positioned as project in the information technology field. It runs various applications in tandem to form the basis for numerous operations, such as streamlined determination of urban planning policy, efficient management of urban information and efficient execution of daily administrative tasks. It has the potential to serve as an effective tool for local government bodies in urban areas.

As a part of this system is not being used effectively, JBIC recognizes the need to take urgent remedial action. Special Assistance for Project Sustainability (SAPS) is now being used to enable the effective application of this project.

Comparison of Original and Actual Scope

Item	Plan	Actual
① Project Scope		
1. Consulting service		
[Phase I]	Foreign: 58M/M Local: 33M/M	Foreign: 56M/M Local: 32M/M
[Phase II]	Foreign: 194M/M Local: 108M/M	Foreign: 190M/M Local: 260M/M
2.Data preparation and system improvement	A. Overall Jakarta City (Approx.70,000ha) -Base map (1/1,000) B. Central Jakarta City (Approx. 16,000ha)	Same as left
3.Procurement of computer equipment	Main system (1 unit) Sub system (2 units)	Same as left
② Implementation Schedule		
1. Loan Agreement	Sep. 1989	Oct. 1989
[Phase I]		
2. Selection of consultant	Jul. 1989 ~ May 1990	May 1992
3. Consulting service	May 1990 ~ Apr. 1991	May 1992 ~ Apr. 1993
[Phase II]		
4. Pre-survey and software development	Jun. 1991 ~ Jan. 1992	Aug. 1995 ~ Jun. 1996
5. Data preparation and input work	Jun. 1991 ~ Apr. 1993	Dec. 1994 ~ 1998
6. Database structuring and test operation	Jun. 1992 ~ Dec. 1992	Dec. 1994 ~ Aug. 1996
7. Guidance on operation method	Apr. 1993 ~ Sep. 1993	Oct. 1993 ~ Jan. 1994
8. Training		
(1) Overseas training	May 1992, Oct. 1993	May 1993, Oct. 1995
(2) Domestic training (Jakarta)	Jul. 1991, Nov. 1992, Oct. 1993	Jan. 1996 ~ Mar. 1997
9. Procurement of computers and structure	Jun. 1991 ~ Feb. 1992	Aug. 1994 ~ May 1996
10. Installation of computers, software installation and inspection	Jun. 1992	Nov. 1996
③Project Cost		
Foreign currency	¥914 million	¥1,388 million
Local currency	¥719 million	823 million Rp.
Total	¥1,633 million	¥1,430 million
ODA loan portion	¥1,388 million	¥1,388 million
Exchange rate	1 Rp.＝ ¥0.073n (Apr. 1989)	19.6 Rp.＝¥1