Guaraní International Airport Project

Reasons for taking up this project

Guaraní International Airport in Paraguay was the third airport development project realized in Latin America under the Japanese Official Development Assistance (ODA) program.

The Paraguayan Government had recognized the importance of aviation system in the overall development of the country since the early 1970s and carried out studies on airport development through the technical assistance program of the World Bank and Japan International Cooperation Agency (JICA). As result of the said studies, construction of a new airport at Ciudad Presidente Stroessner (now Ciudad del Este) region has been decided and the project has been implemented under a financial assistance provided by Japan in response to the Paraguayan Government request.

The Japan Society of Civil Engineers takes up this Project for the following reasons:

1) The project was completed successfully in 1993, although it was 8 years behind the original schedule, because of various obstacles such as delay of land acquisition, work suspension, change of the project scope due to military coup d'etat, etc.
2) The project was challenging to Japan Airport Consultants, Inc. (JAC) engaged in this Project from its very beginning stage. For most of the consultants' engineers, it was the first experience to work in the Spanish speaking country, all meetings and communications among the contractual parties were made in Spanish, and all bidding documents including drawings and technical specifications should be prepared in both English and Spanish languages. Aside from difficulties of communication, the Consultant's engineers had worked through unexperienced environment by trial and error in order to complete the project.
3) Application of standards of International Federation of Consulting Engineers (FIDIC) to the contract documents were not so common in Paraguay at the time of this project, hence the consultant JAC faced difficulties to gain the Paraguayan authorities' understanding in the elaboration of the tender documents for international bidding.

1 Project Background

1.1 Project Country

The Republic of Paraguay, of which capital is Asuncion, is a landlocked country situated in the central part of the South American Continent, and is surrounded by Brazil, Bolivia and Argentina. Since the President Stroessner regime, Paraguay had been one of the pro-Japanese counties, and Japan and Paraguay have long emigrant histories. In 1936, the first Japanese emigrant group settled in Colonia La Colmena 130 km away southeast from Asuncion. As of today, it is supposed about 7,000 of Japanese emigrants and their descendants are living in Asuncion and several colonies.

Ciudad del Este is the capital of Alto Parana Department and the second largest city in Paraguay after Asuncion, of which the present population is approximately 300 thousand. The city is connected to Foz do Iguazu, Brazil by the "Friendship Bridge" on Rio Parana, and then connected to Puerto Iguazu, Argentine by a bridge on Rio Iguazu.

There are two attractive tourism resources like Itaipu Dam and Iguazu Falls around Ciudad del Este. Itaipu Dam is the second largest hydroelectric dam in the world on Rio Parana between Brazil and Paraguay.

Figure 1: Map of Paraguay (Source: iStock)

Iguazu Falls is located in Rio Iguazu on the border of Argentine and Brazil and is one of three biggest falls in the world.

Since early 1970s, Ciudad del Este has been known as the largest free-trade town in the region. However, after "MERCOSUR" was established in 1994 as the Southern Common Market bloc consisting of 4 countries of Argentine, Brazil, Paraguay, and Uruguay, the free-trade market business of Ciudad del Este had been stagnated gradually.

1.2 Project Overview

Since early time of 1970s, the Paraguay Government had envisaged in the National Economic and Social Development Plan that Alto Parana Department to be the potential center of the industrial, agricultural and tourism development of the country as well as trading, and Ciudad del Este area to be the center of its development.

A feasibility study on the development of eight (8) regional airports in Paraguay was conducted in 1975–1977 under a technical assistance of the World Bank. The said study revealed the top priority of a new airport in Ciudad del Este region on account of its very important role expected not only for regional development but also for future air route network of the country.

Upon the request of Paraguay, the JICA feasibility study for a new airport in Ciudad del Este area had been conducted in 1979–1980, and recommended that in order to fully realize the future development of

Alto Parana Department, a new international airport in the area was indispensable. In addition, the new airport would also be given a significant role as an alternate airport of Asuncion International Airport to stop their dependence on the neighboring countries for this function.

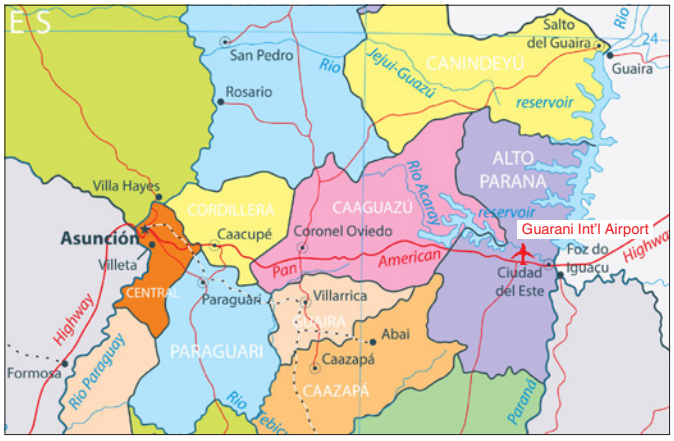


Figure 2: Location of Guarani International Airport (Source: iStock)

Based on the result of the JICA Feasibility Study, the Government of Paraguay requested a financial assistance to Japan, and Japan agreed to render a Yen loan of 11,300 million for implementation of the project in 1980 through OECF (presently JICA). Construction works of the Project started in 1988 by a Joint Venture of Spanish and Paraguayan contractors. After suspension in 1989 due to the military coup d'état, the project scope was revised by the new government. The project was resumed 1991 and completed in 1993.

2 Project Chronology

2.1 Project History

Chronological project activities are summarized as follows:

Project Formation Phase

1975–1977	World Bank study on eight regional airports
1978	Project Identification Mission comprised by experts of Civil Aviation Bureau of Japan
1979–1980	JICA Feasibility Study for the new airport project in Ciudad del Este region
1980	Commitment of Japanese ODA Loan in the amount of 11,300 million Yen

Project Implementation Phase

1982–1983	Detailed design and bid documents preparation
1983–1985	Prequalification and Bidding • Civil & Architectural Works: Awarded to the Joint Venture of Entrecanales y Tavora (Spain) and EDB Construcciones (Paraguay) • Supply and Installation of Aeronautical Radio System: Awarded to Philipps (Netherlands)
1988	Commencement of construction works
1989	Project suspension by the new government after the military coup d'état
1989–1991	Revision of project scope, withdrawal of the leading firm of the JV, Entrecanales y Tavora
1991	Resumption of the Project by EDB Construcciones
1993	Inauguration of the new airport

2.2 Site Selection & Feasibility Study Stage (1979–1980)

The Japan Airport Consultants, Inc. (JAC) performed in 1979–1980 the feasibility study for the new international airport project, entrusted by Japan International Cooperation Agency (JICA), in reply to such request from the Paraguayan Government. During the Feasibility Study stage JICA established a Supervisory Committee as an advisory body comprising four (4) members of the Ministry of Transport of Japan (Present MLIT).

The scope of the feasibility study included selection of the site for construction of the new airport. As result of the study conducted for the site selection, the area located 24 km away from Ciudad del Este along National Road No. 7 was recommended as a candidate site for construction of the new airport.

Based on the result of the feasibility study, the Government of Paraguay decided to construct a new international airport at the site and requested a financial assistance to Japan for the implementation of the project.

2.3 Design & Bidding Stage (1982–1985)

The Overseas Economic Cooperation Fund (OECF) Loan Agreement was engaged in 1980 on a basis of "LDC (Least Developed Countries) untied" that allowed the procurement of goods and services to be made only from the project country, non-OECD member countries and Japan.

All bidding documents such as drawings, technical specifications, and conditions of the contract should be prepared in both English and Spanish languages. At that time, it was neither popular to use personal computers nor internet in the consultant's business so that such works forced heavy burden to the consultant in order to complete the design works and preparation of the bidding documents within the agreed period.

Presently the standard contractual documents based on the International Federation of Consulting Engineers (FIDIC) is applied to the Japanese ODA projects. However, at that time of the project FIDIC regulation was not common in Paraguay, hence many clauses of the General Conditions in accordance with FIDIC standards were modified unilaterally by request of Paraguay's Ministry of Public Works and Communications (MOPC). *(Note: Presently JICA does not allow any modification of the Standard General Conditions of FIDIC under Yen Loan project)*.

The other challenge was concerned with application of JIS code. JIS code and norm were widely applied to the technical specifications for the Japanese ODA project. But as JIS had neither English version nor Spanish version, MOPC didn't agree to use this standard for the project. It had taken a long time and process to get a consent to apply JIS to the technical specifications. Presently, a majority of the JIS clause is translated into English to help easy use for the overseas projects.

Due to constraint on the available budget for the project, bidding package was divided into two groups, the first bid package was Civil and Architectural Works to be financed by the OECF loan, and the second bid package was Supply and Installation of Aeronautical Radio System with a condition to submit a financing proposal by the bidders.

Through bidding among the prequalified five (5) bidding groups from Japan, Brazil and Spain, the Jonit Venture of Entrecanales y Tavora (Spain) and Enrique Diaz Benza Construcciones (Paraguay) was selected as the contractor for Civil and Architectural Works, Philips of the Netherlands was

selected for the supply and installation of Aeronautical Radio System with a finance of a Japanese trading company.

2.4 Construction Stage (1988–1993)

Initially, the project was planned to be completed within 5 years after the loan agreement. Actual project implementation was delayed as shown in a comparison of Planned and Actual project schedule.

Major reasons of the delay were summarized as follows:

i) Delay of Land Acquisition

The Feasibility Study report suggested to complete the land acquisition for the new airport by the end of 1981. During the design stage, the Consultant also suggested repeatedly MOPC to accelerate land acquisition of the required area for the new airport.

However, MOPC had just explained that the land acquisition work would not be difficult, and the expropriation problem like Narita Airport would never happen in Paraguay, and then its process was very slow.

As of the contract signing with JV, the land acquisition for the new airport was not completed. Therefore, JV refused to receive the 'Notice to Proceed' of the work under the contract until the entire work site was handed over to JV.

The Consultant had to assist MOPC to prepare land acquisition documentation and survey team of MOPC. Consequently, the entire land acquisition was completed in 1987 about 6 years behind the schedule.

The following reasons would be pointed out, if looking back the land acquisition issue:

- Land acquisition division of MOPC had not enough staff;
- Budget for land acquisition was not allocated timely; and
- Prior to the land acquisition work, there was no arrangement of any stake holders meetings to land owners and residents in the site, as specified in the current Environmental Impact Assessment (EIA) regulation of JICA

ii) Withdrawal of JV Member

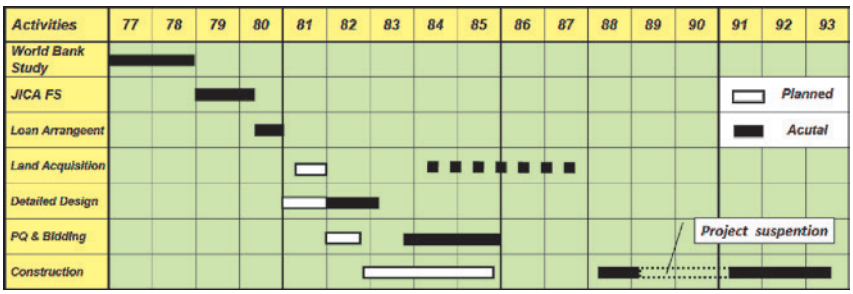
One year after from commencement of the work, the military coup d'etat took place in 1989, and the new government ordered to suspend the work and reduce the project scope.

After a substantial reduction of the project scope by the new government, the JV leader, Entrecanales y Tavora proposed to withdraw from JV member, and hand over all contractual obligations and responsibility to JV Partner, EDB Construcciones.

On the other hand, EDB Construcciones insisted to apply price escalation clause newly to the local portion as a condition to take over the remaining works.

This arrangement was argued strongly between MOPC and OECF because the Joint Venture was prequalified with the capacity and experience of the lead partner, Entrecanales y Tavora, and EDB Construcciones itself had

Table 1: Comparative Project Schedule



not passed the qualification requirements.

After long discussions among the relevant parties, OECF approved finally EDB as the successor of the contractor of the revised works of Civil and Architectural work contract.

From the viewpoint of project acceleration, OECF provided a construction specialist as the OECF's facility of "Special Assistance for Project Implementation" (SAPI) after resumption of the project.

The Consultant also advised frequently the contractor's engineers on shop drawing preparation and on quality and schedule control method.

3 Project Features

3.1 Airport Characteristic

Airport facilities of the new airport are classified into the Airside Facilities for serving aircraft operation and the Landside Facilities for serving air passengers, air cargo and visitors. A summary of Guaraní International Airport characteristic is as shown below:

Airport Reference

Name	Guaraní International Airport
Airport Code	AGT (IATA code), SGES (ICAO code)
Altitude	258 m

Airside Facilities

Runway	3,400 m x 45 m, asphalt concrete
Taxiway	1,300 m x 23 m, asphalt concrete
Apron	42,000 m^2 for B747, B767, B727, cement concrete
Nav-aids and ATC	Cat-I ILS, VOR/DME, NDB ATC Equipment, Meteorological Observation System, Airfield Lighting System

Landside Facilities

Passenger Terminal with Control Tower & ATC room	9,400 m^2, Reinforced Concrete, 2-storey with 30 m high Control Tower
Cargo Terminal	1,200 m^2, Reinforced Concrete, 1-storey
Fire Fighting Station	500 m^2, Reinforced Concrete, 1-storey, Airport Category 7 under ICAO cat.
Power Supply	Substations, Power Supply System, Generators
Utility System	Elevated Water Tank, Pump Station, Deep Wells, Sewage Treatment System

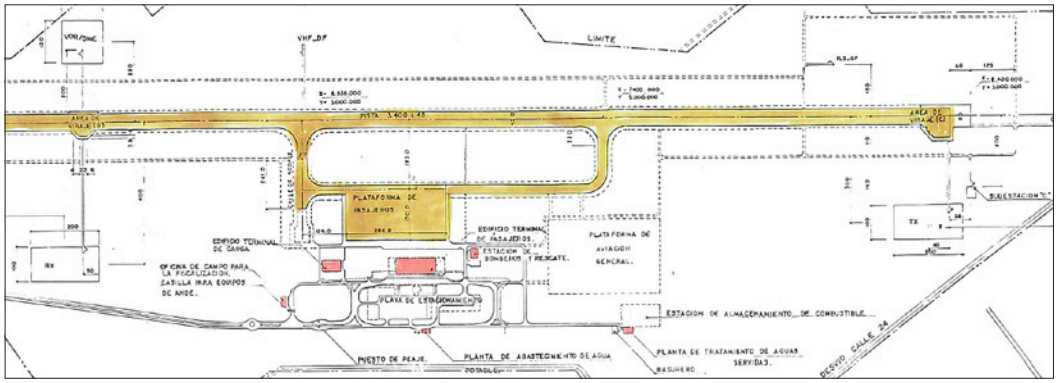


Figure 3: Terminal Area Layout

3.2 Airport Site Selection

Site selection for the new international airport was conducted as a part of the Feasibility Study. The candidate site for the new international airport was selected among the four (4) potential sites around Ciuded del Este area, considering the following criteria.

- Runway Visibility and Ceiling: Site should be as far away from the rivers and Itaipu Dam as possible, to minimize the anticipated fog problem;
- Runway Orientation: Site should be topographically able to accommodate a 3,400 m runway oriented northeast, which was the prevailing wind direction in the area;
- Availability of Airspace: Site should be free from obstructions to aircraft operation and not overlapped with the airspace of airports in Foz do Iguazu, Brazil and Puerto Iguazu, Argentine;
- Construction Cost Factors: Soil conditions and topography for less construction cost with optimum earthwork design.
- Anticipated Effects on the Regional Community: Land use conditions and possible future adverse effects should be examined. (*Note: EIA was not compulsory requirements under JICA FS at that time*)

As a result of the site selection study, the area located 24 km away from Ciudad del Este along National Road No. 7 was recommended as a candidate site for the new airport.

3.3 Runway Length

The most important key issue in planning the new airport was the selection of the largest design aircraft to determine its runway length. There was only one airport having more than 3,000 m long runway, and no alternate airport of Asuncion International Airport, in Paraguay, so that alternate airport depended on airports of neighboring countries such as Brazil and Argentina.

Considering the project purpose and discussions with the relevant organizations of Japan and Paraguay, B747-400 was selected as the design aircraft so as to allow direct flights with maximum payload to Miami International Airport which was of the main gateway airport in USA from the South American countries.

The runway length of the new airport was determined to be 3,400 m long taking into account various factors, such as distance to Miami, alternate airports, design runway longitudinal slope, airport reference temperature and altitude.

3.4 Removal of “Laguna Seca”

The topography of the new airport site was generally flat, and geological soil type was red color silty-clay called as “laterite” widely covered on the plain area in Paraguay and neighboring countries.

Total earthwork volume (cutting and embankment) was about 4.5 million cubic-meters. There was a portion of swamp area so called as “Laguna Seca” (means Dry Lagoon) at the proposed runway as shown in the figure. Depth of the Laguna was 3–5 m, of which the upper part was 1–2 m thick floating withered grass layer like sponge, and the lower part was fulfilled by muddy soil with high water content. Estimated total volume to be removed within the Laguna

was more than 600,000 cubic-meters.

In the design stage, several removal methods were compared from the viewpoints of work easiness, required period and cost, and then it was planned that a temporary canal would be provided in order to drain first the water content from the Laguna to the existing stream.

During the progress of canal excavation, some portion of the floating withered grass and muddy soil flow down together through the excavated canal, and were accumulated over the cultivated area in the downstream part. Hence, a temporary dike was constructed on the boundary of the cultivate area so as to provide temporary storage like a pond of muddy water and mass of floating withered grass.

After extraction of water content of the Laguna, temporary embanked roads were provided in the Laguna, then the muddy soil was removed using shovel and dump truck.

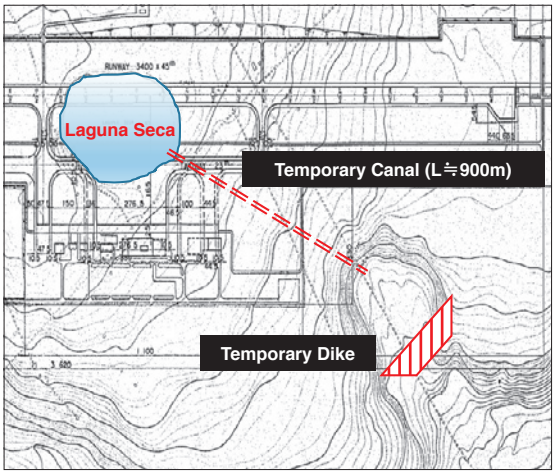


Figure 4: Location of Laguna Seca

Figure 5: Excavation of Laguna Seca after extraction of muddy soil and water

4 Lessons Leaned

The first airport development project in Latin America under the Japanese ODA scheme was the project for construction of the new international airport in El Salvador, implemented with the credit of Export-Import Bank of Japan. The construction works completed in 1979 and nowadays this airport has become a major hub airport in the Central America region. The second one was the construction of Viru-Viru International Airport in Santa Cruz, Bolivia, implemented on the turn-key basis with the OECF Yen Loan and completed in1983.

The third one, Guaraní International Airport Construction Project, financed by the OECF Loan was one of the first Japanese ODA projects undertaken in Paraguay.

The project was delayed for about 8 years behind the original schedule due to various unforeseen occurrences such as the change of the executing agency just before the commitment of the ODA loan by the Japanese Government, suspension of the Project due to a military coup d'etat, change in scope of Project, withdrawal of main contractor and resumption of construction works by Paraguayan contractor, delay in construction and so forth.

This project was truly challenging one for the Consultant and it was also invaluable experience for the consultant's engineers to have worked in an unaccustomed working environment and also learned various aspects involved in overseas projects under Japanese ODA. It is also worth mentioning that the communications on site among the

consultant and contractors engineers, in spite of the language barrier, allowed the transfer of knowledge on airport engineering to the Paraguayan engineers. Individual member of the Project had performed thereafter as the team leader of professionals of the Consultant for the various overseas airport development projects.

As presented in above, the project suffered several unexpected issues which may have possibly brought about abortion, however, the project was able to be completed with extensive helps and cooperation of the organizations and institutions concerned with the Japanese ODA.

Author

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Born in Paraguay in 1957. Joined the project team of Japan Airport Consultants, Inc. in Paraguay in 1981, Working at the Tokyo head office since 1994, after completion of the Project.
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