Bolivia

2-4 Bolivia

Table 2-4-1. Projects Evaluated in Bolivia

Project	Field	Type of study Implementation	Period	Counterpart organization in recipient country
Viru Viru International Airport Development	Transport/Aviation and Airport	F/S	Apr. 1977 to Dec. 1977	AASANA, Aviation Bureau, and Dept. of Transport and Communications
El Alto Airport Modernization Project	Transport/Aviation and Airport	M/P+F/S	Jan. 1987 to Feb. 1988	AASANA

2-4-1 Background for implementing development studies

(1) Social and economic background

Bolivia is a land-locked country surrounded by Peru, Brazil, Paraguay, Argentina, and Chile. The provisiontransport facilities in Bolivia are generally not so advanced because it is quite expensive to provide sufficient transport services in a country that has no outlet to the sea, a domestic topography consisting of high and steep mountainous areas[32] in the west and a vast undeveloped area in the north and east, and a distributed population. Though the main means for domestic transport are roads and 70% of the cargo and 80% or more of passengers rely on transportation by automobiles, air routes are usually used to transport passengers to remote places due to the restrictions mentioned above. In the private aviation sector, the Adminstracion de Aeropuretos y Servicios Auxilliaresa la Navigacion Area (AASANA) has been charged by the government to maintain the infrastructure sector of aviation. However, the Viru Viru International Airport and four domestic airports (El Alto Airport, Santa Cruz Airport, Cochabamba Airport, and Tarija Airport) were transferred to private hands in March 1997 and are now operated and managed by SABSA Inc.

[32] The topology of Bolivia consists of three layers: a high flat land 4,000 m above sea level, a canyon, and low flat land 300 m to 500 m above sea level.

(2) Background for implementing development studies of targets

a) Viru Viru International Airport Development

The yearly number of passengers who used main airports in Bolivia increased at an average rate of 11% from 1966 to 1975. The growth of demand for air transport at the Santa Cruz Airport (currently the El Trompillo Airport) located in Santa Cruz City was particularly remarkable. However, this airport will not be able to meet future demand for air transport because its facilities are too small. Furthermore, it was located adjacent to an urban district, so it involved many social problems such as noise generation and air traffic accidents resulting in injury or death.

Under these circumstances, the Bolivian Government proposed to move the Santa Cruz Airport to the Viru Viru district and to construct an international airport in connection with this move. This airport was upgraded to an international airport because Santa Cruz City is the second largest city in Bolivia and is an important area from the viewpoint of strategy for industrial development in this country.

In response to the request of the Bolivian Government, Japan implemented a review of the project size of the "Viru Viru International Airport Master Plan" established by the Bolivian Government in 1973 and a feasibility study on the Viru Viru International Airport Project to establish airport provisionexpansion plans with target years of 1985, 1990, 1995, and 2000.

b) El Alto Airport Modernization Project

The El Alto Airport is the front door of Bolivia but has not been improved to meet the rising demand since 1966 due to financial difficulties, even though its expansion and refurbishment were urgently required. Therefore, runways, taxiways, and aprons had been aging, and the passenger terminal was too small to meet the demand. Under these circumstances, the Bolivian Government requested Japan to implement a feasibility study for the El Alto Airport Modernization Project based on the notion that a long-term master plan to guide the future expansion and refurbishment of the El Alto Airport must be established urgently. In this development study, a master plan was established by dividing the necessity of provision into three priorities. A feasibility study was then implemented on the first phase work, which has the highest priority.

(3) Results of development studies

In the development studies on the two projects, plans agreeable to the government of

the recipient country were established within the planned period in accordance with the goal of the initial stage. Plans established in the development studies item and the feasibility study results are outlined below.

a) Viru Viru International Airport Development (F/S)

In this development study, the "Viru Viru International Airport Master Plan" established by the Bolivian Government in 1973 was first reviewed. Feasibility studies were then implemented in seven broad categories: "airport facilities," "radio navigation facilities and communications facilities," "aeronautical ground light facilities," "buildings," "roads and parking areas," "urban equipment," and "aircraft fueling capacity." Four-phase plans with phases ending in 1985, 1990, 1995, and 2000 were established for each category. These are summarized in Tables 2-4-2 and 2-4-3.

① Airport facilities

Runways and taxiways that complied with the length and width recommendations of the ICAO were planned. In addition, Construct a new passenger apron and cargo handling area was planned considering excess capacity after estimating the number of flights during the peak hours based on the air transport demand forecast. Furthermore, drainage facilities were planned to provide open channels around the airport facilities to prevent inflow of rainwater and outflow of drain water from the airport and to discharge water to the low wet land outside the airport.

② Radio navigation facilities and communications facilities

To ensure safe navigation and efficient operation of aircraft arriving at and departing from the new airport as well as for aircraft flying the planned Santa Cruz FIR, plans were developed to install aeronautical fixed communications facilities (three HF/ISB international communications systems, four HF/ISB domestic communications systems, and one intra-airport communications system), aeronautical mobile communications facilities (three HF/SSB ground-to-air communications systems, one VHF/UHF ground-to-air communications system, and one ATS system), aviation support facilities (VOR/DME, ILS (CAT 1), NDB, and one localizer), and meteorological facilities (one system comprising anemometers, thermometers/hygrometers, and rainfall intensity recorders).

③ Aeronautical ground light facilities

To provide visual support facilities corresponding to a CAT-1 ILS precision

approach airport, approach lights, approach angle indication lights, runway lights, runway threshold lights, runway end lights, taxiway lights, an airport lighthouse, wind direction lights, and apron illumination lights were planned to be installed.

④ Buildings

The sizes of the passenger terminal, cargo terminal, customs facilities, post office, fire-fighting/rescue facilities, hangers for common airplanes, control tower, substations, transmitting-receiving facilities, President's pavilion, AASANA office, and so on were planned.

⑤ Roads and parking areas

A two-lane, 7m-wide access road extending from the Montero road was planned. Traffic on the highway that connects Santa Cruz City and Monterois expected to increase. A two-lane, 7m-wide access road connecting this highway was planned. It was also proposed to increase the number of lanes to four by 2000. Parking areas were planned in the most convenient location for each facility.

⑥ Urban equipment

Power facilities, water supply facilities, sewage and drainage facilities, telephone facilities, trash processing facilities, and gas supply facilities were planned.

⑦ Aircraft fueling capacity

The fuel storage capacity was selected to hold a 10-day supply of fuel, and a tank facility and hydrant facility corresponding to each stop were planned.

b) El Alto Airport Modernization Project

Master plan

① Priority work (1988 to 1993)

Priority projects requiring urgent implementation in the development studies are as follows.

a. Repair of runway pavement

A 30m long, 46m wide section 1,740m from the end of runway 09R is extremely damaged. The concrete pavement will be repaired and strengthened so that it can bear large airplanes.

b. Construct new the runway shoulder and brass pad.

Paved 7m-wide runway required for safe operation of airplanes will be installed on either side of the runway, and a 60m wide by 120m long brass pad will be installed on either end of the runway.

c. Repair of the passenger terminal

To mitigate congestion in the passenger terminal, the present partitions will be changed to expand the areas of the arrival and departure zones for international lines.

② First-phase plan (1994 to 1997)

a. Engineering work

- Pavement elevation of existing runways (asphalt pavement 14 cm (thick) x 4,000 m (long) x 46 m (wide).
- Construction of new turning pad for B-747 (at the end of runway 09)
- Construction of new partially parallel taxiways and a high-speed escape taxiway (total length 4,000 m; 97,00 m^2)
- Construction of new aprons for the passenger terminal (B-747 two berths, B-757 four berths; 324.5 m (wide) x 131 m (deep))
- Construction of new road with two lanes (7m wide) and parking area (560 cars)
- Fence
- Drainage facilities in peripheral areas
- Construction of new aprons for the cargo terminal (B-707, two berths; 97.5 m x 131 m)
- Construction of a new small airplane operating apron (9,600 m^2)
- Construction of a new apron for small airplanes transporting meat (57,000 m^2)
- Construction of a new apron and connecting taxiway for high-jacked airplanes (B-747, one berth)

b. Construction work

- Construction of a new passenger terminal (Reinforced concrete; total floor area 16,500 m^2, including the arriving and departing flight information system and airport security system)
- Construction of a new management office building and control tower
- Construction of a new meteorological observation office building
- Construction of a new cargo terminal building

- Garages and warehouses for airport maintenance equipment and materials

c. Aviation security facilities, and control and communications facilities
   - Renovation of the runway lights, runway end lights, runway end auxiliary lights, and lighted wind direction indicators
   - Relocation of the secondary monitoring radar
   - Installation of new, simplified approach lights, taxiway lights, taxiway guide lights, apron illumination lights, airport lighthouse, power supply equipment, and control equipment
   - Airport security radio facilities
   - Renovation of the VHF air-to-ground radio equipment, HF air-to-ground radio equipment, VHF communications network, VHF multi-channel transceiver, control desk, magnetic tape devices, etc.
   - Installation of new VHF FM transceivers and airport information broadcasting equipment
   - Installation of new meteorological data collection system (the visible range on runway meter and cloud height measuring instrument)
   - Installation of new HF facsimile unit, radiosonde transmitter, and hydrogen generator
   - Inspection and measuring equipment, spare parts, and other consumables

d. Supply and treatment facilities
   - Expansion of power supply, water supply, and public communications facilities
   - Construction of new sewage treatment facility and incinerator

e. Fire-fighting facilities (provision of fire engines, ambulances, and rescue equipment)

f. Others (Installation of new boarding bridges, illumination lights for the road and parking area)

③ Second-phase plan (1998 to 2005)

a. Elevation of the runway pavement

b. Expansion of aprons (Construct new new aprons for domestic passengers)

c. Expansion of the road and parking area (expansion to accommodate 960 cars)

d. Expansion of the passenger terminal building (reinforced concrete, total floor area: 24,800 m^2)

e. Expansion of the cargo terminal building (expansion to 8,670 sq. meter)

f. Renovation of aviation support facilities

④ Feasibility study (for the first-phase work)

Afirst-phase plan (1994 to 1997) was drafted to outline design, project schedule, and approximate project cost (Table 2-4-3).

Table 2-4-2. Viru Viru International Airport Development (F/S)

		1985	1990	1995	2000	Remarks
Basic specifications for the new airport		Location of the airport: 17 km north of downtown Santa Cruz City Height above the sea level: 370 m Direction of the runway: 147° /327° Airport area: 2,370 ha				
Spare aeration values	Passengers of international lines	355,000/yr	677,000/yr	1,288,000/yr	2,075,000/yr	
	Passengers of domestic lines	631,000/yr	1,004,000/yr	1,579,000/yr	2,214,000/yr	
	Total	996,000/yr	1,631,000/yr	2,867,000/yr	4,289,000/yr	
	Volume of air cargo	8,000tons/yr	15,300tons/yr	21,800tons/yr	30,500tons/yr	
	Total number of departures and arrivals	44,000/yr	64,000/yr	97,000/yr	135,000/yr	
Airplane take-off/landing facilities	Landing zone	3,320m²x300m	3,620m²x300m	3,620m²x300m	3,620m²x300m	
	Runway	3,200m²x45m	3,500m²x45m	3,500m²x45m	3,500m²x45m	
	Shoulder	7.5m	7.5m	7.5m	7.5m	
	Pavement	Concrete	Concrete	Concrete	Concrete	
	Taxiway					
	Width	23.0m	23.0m	23.0m	23.0m	
	Shoulder width	10.5m	10.5m	10.5m	10.5m	
	Parallel taxiway	720m	1,600m	1,710m	3,500m	
	High-speed facility	–		1	3	
	Orthogonal taxiway	1 for cargo apron 2 for passenger apron Attached to the end of runway	1 2 1	1 3 1	1 for cargo apron 3 for passenger apron 2 attached to the end of the runway	
	Interval					
	Runway - Taxiway	210m	210m	210m	210m	Center to Center
	Aprons					
	Passenger apron	5 berths (50,050m²)	8 berths (50,050m²)	10 berths (185,900m²)	13 berths (230,900m²)	
	Cargo apron	2 berths (22,800m²)	2 berths (22,800m²)	3 berths (40,360m²)	4 berths (44,200m²)	
	Apron for common aviation	65 berths (9,300m²)	95 berths (14,000m²)	140 berths (20,000m²)	185 berths (26,500m²)	
	Pavement	Concrete	Concrete	Concrete	Concrete	
Radio communications and meteorological facilities	Aeronautical fixed communications facility	1				
	Aeronautical mobile communications facility	1				
	Radio navigation support	1 ILS facility (Cat 1), VOR facility, DME facility, etc.				
	Aeronautical meteorology	Meteorological facilities Meteorological communications facilities				
Aviation lights/road illumination	Aviation lights Road and parking area illumination lights	Lead lights, runway lights, taxiway lights, apron illumination lights, Road and parking area illumination lights, etc.				
Buildings	Passenger terminal	11000m²	16,000m²	23,000m²	2,3000m²	
	Cargo terminal	900m²	1,800m²	2,600m²	3,600m²	
	Others	Customs, quarantine station, post office (for cargo), control tower, President's pavilion, fire-fighting/rescue facilities				
Urban equipment		Ultra-high-voltage substations No. 1 to No. 11, power distribution equipment, water supply facility, sewage and drainage facility, telephone facility, waste-treatment facility, gas supply facility				Power facility 69 kW/10 kW substation, etc. will be included in the first-phase work with no expansion. Water supply and sewage facilities will be expanded.
Other facilities		Road, parking area, drainage facility, heliport, airplane fueling facilities				

Table 2-4-3. El Alto Airport Modernization Project (F/S+M/P)

Phased plans of the master plan		
Priority work (1988 to 1993)	Total amount of investment	US$679,000
	Main projects	Repair runway pavement and construct new shoulders and brass pads. Repair passenger terminal.
First-phase plan (1994 to 1997)	Total amount of investment	US$138,000,000
	Main projects	Elevate runway pavement Construct new aprons Construct new road and parking area Construct new passenger terminal building Construct new cargo terminal building Construct new management office building and control tower Improve navigation support facilities
2nd-phase plan (1988 to 2005)	Total amount of investment	US$53,000,000
	Main projects	Elevate runway pavement Expand aprons Expand road and parking area Expand passenger terminal building Expand cargo terminal building Renovate navigation support facilities
Target projects of feasibility study (for the first-phase work)		
	Main projects	Elevate runway pavement: 4,000 m x 46 m, 14-cm thick Construct new taxiway: 4,000 x 23 m Passenger terminal apron: 324.5 m x 131 m Cargo apron: 97.5 m x 131 m Construct new road and parking area Passenger terminal building: Total floor area 16,501 m² Cargo terminal building: Total floor area 5,000 m² Management office building/control tower: Total floor area 4,001 m² Improve navigation support facilities Other support facilities

2-4-2 Implementation stage of development studies

(1) Necessity of implementing development studies

a) Viru Viru International Airport Development (F/S)

When this development study was implemented, the Economic and Social Development Plan (1976 to 1980) stated, "The lack of a transportation infrastructure not only seriously hinders the national development, it also hinders the development of foreign trade and the tourist industry and is hindering the integration of economic activities in Bolivia." Based on this understanding, the development plan gave a higher priority to the aviation project by assigning 15 % of the total amount of capital formation (900 million dollars) to the transport sector, 23% of which went to the air transport sector.

The primary reason for implementing this development study is to meet the increasing demand for aviation. In that age, neither the Santa Cruz Airport nor the El Alto Airport could meet the demand for passenger and cargo transportation due to the restrictions posed by their small facilities. It was expected that the construction of the Viru Viru International Airport would mitigate the congestion in other airport facilities and that this new airport would serve as a hub (transit point) of north-south and east-west international air routes by taking advantage of the airport's location at the center of the South American Continent.

The second purpose was to ensure safety. The old Santa Cruz Airport, the only international airport in Santa Cruz City in that age, was located in an urban district and created many problems such as aircraft noise and safety of inhabitants in the event of an accident (Table 2-4-4). In October 1976, a Model B707 transport airplane crashed into the urban district due to a failure on take off[33]. This terrible disaster resulting in a total of 169 victims, including 10 killed, 78 heavily or moderately injured, and 11 missing. Local inhabitants strongly supported implementing development studies on the Viru Viru International Airport construction project that would help solve such social problems.

[33] Damage in this accident are not included in Table 2-4-4.

Table 2-4-4. Airplane Accidents in the Old Santa Cruz Airport

Year	Number of departures and arrivals per year (A)	Number of airplane accidents (B)	Number of persons killed (C)	Probability of accidents (B)/(A) x 1,000
1974	18,216	59	22	3.24
1975	20,598	69	11	3.35
1976	20,000	40	21	2.00

Source: AASANA

b) El Alto Airport Modernization Project (M/P+F/S)

Though the El Alto Airport had been partially expanded as needed since its construction in 1952, it had not been expanded, maintained, or repaired to meet the demand. Therefore, when the development studies were implemented, that airport was unable to meet the demand due to inadequate capacity, but demand for air transport was considerably larger than that expected at the time of construction. Furthermore, facilities as a whole were extremely aged, and aviation safety concerns were expressed.

It was very difficult for the Bolivian Government to implement new public works at that time since it could not procure funds due to the foreign debt accumulated during the economic dislocation that lasted until August 1985. Furthermore, economic and social conditions were being promoted mainly to improve the balance of international payments. However, it was difficult to provide a road network connecting the three main cities (La Paz, Santa Cruz, and Cochabamba) throughout the year due to the Bolivian topology. Since the road network was significantly delayed, the Bolivian Government considered it essential to provide air transport, where a transport network had already been established, to rebuild the economy. In particular, the Government considered that a development study on El Alto Airport should be implemented because it was located in the metropolitan area and played an important role as the Bolivian front door.

(2) Cooperation between the survey team and the counterpart team

a) Viru Viru International Airport Development

To implement the feasibility study on Viru Viru International Airport Development, the Japan International Cooperation Agency dispatched a survey team consisting of a total of 19 members and divided the study into four phases under the control of the Work Supervisory Committee chaired by the Manager, Planning Section, Airport Dept., Civil Aviation Bureau, Ministry of Transport. In the implementation stage of development studies, the survey team endeavored to report the status of studies by holding periodic

meetings with the AASANA, their counterpart. Furthermore, during the on-site survey for soil investigation, boring, material tests, and design (part of road design), the survey team efficiently collected information by utilizing local consultants.

In the process of implementing development studies, the survey team instructed the counterpart team on a series of procedures: what must be done when constructing the airport, what data is required, how to proceed with the plan, and so on. A member of that counterpart team who responded to our hearing highly evaluated the guiding ability of the survey team at the time of transfer of technology. The member pointed out that Japanese experts differed from experts dispatched from other donor organizations in that they worked together with their counterparts and showed them how to do it.

b) El Alto Airport Modernization Project

To implement this development study, the Japan International Cooperation Agency dispatched a survey team consisting of a total of eight members to the site under the supervision of the Work Supervisory Committee consisting of the officials of the Civil Aviation Bureau of the Japanese Ministry of Transport. The Department of Aviation (MDA) and AASANA of Bolivia also participated in this development study as counterpart organizations by forming a survey team consisting of 19 technical officials in airport-related fields under the supervision of the executing committee.

In the process of implementing the development studies, the survey team shared the know-how in the procedures for implementing the master plan and feasibility study with the counterpart organization. Furthermore, as was the case of development studies on the Viru Viru International Airport, the survey team sought to implement the development study efficiently by assigning soil investigation and surveying to local consultants.

According to an official of the former counterpart organization (currently an employee of the SABSA), the JICA survey team transferred know-how in planning and airplane noise measuring techniques required for the airport repair and the expansion project through OJT. In addition, several AASANA officials visited Japan and mastered airport planning in general through training.

Table 2-4-5. Transfer of Technology in Bolivia

Project		Technology transferred
Viru Viru International Airport Development	F/S	· Inspection of the Narita Airport, Haneda Airport, and Tokyo Air Traffic Control Center with training · Acceptance of trainees (JICA Airport Seminar) · Assignment of soil investigation, boring, material tests, and road design to local consultants
El Alto Airport Modernization Project	M/P + F/S	· Seminars in computers, economic analysis, etc. · Training and inspection in Japan for airport planning in general · Assignment of soil investigation and surveying to local consultants

(3) Provision of a system for the counterpart government to utilize the results of development studies

a) Viru Viru International Airport Development

Upon completion of this development study, the Bolivian Government formed an organization called "Comision Especial Electola de Aeropuerto Viru Viru" to promote forming plans into projects. This organization is composed of two sections: "Directorio" and "Effective/Operativa." Effective/Operativa is a working group of engineers consisting of members of AASANA and Coldecruz. Furthermore, one American and one Bolivian consultant were assigned to Effective/Operativa as supervisors. Thus, the Bolivian Government arranged its internal structure upon completion of development studies and proceeded to formulate projects systematically. Full support of the construction of this international airport by citizens of Santa Cruz was also a factor leading to promptly forming this plan into projects.

b) El Alto Airport Modernization Project

Upon completion of this development study, the JICA survey team proposed in its report that the counterpart organizations should organize a project execution committee to perform preliminary coordination for forming projects. However, the proposed organization was not formed because most of the members of the counterpart organization in this development study retired or transferred to other posts in connection with the change in regime that occurred immediately after the completion of the development study.

2-4-3 Post-implementation stage of development studies

(1) Impacts

Reflection in development policy

We confirmed that the results of development studies of the two projects evaluated were utilized effectively as the policy of each implementation organization and continue to be utilized.

The Viru Viru International Airport Development project was established in a five-year plan of the Bolivian Government for social and economic development (1976 to 1980) and was formed into a project during that plan by aid from Japan. The five-year plan for social and economic development stated, "...airport infrastructure will be improved by improving and expanding the La Paz Airport, Cochabamba Airport, Santa Cruz Airport[34], Trinidad Airport, and Santa Ana de Yakumi Airport and constructing the Tarija Airport, Cobija Airport, and Viru Viru Airport in Santa Cruz." Generating a project for Viru Viru International Airport Development can thus be seen to have been given high priority. Although the need to expand El Alto Airport had been discussed nationally before construction of the Viru Viru International Airport, El Alto Airport was given lower priority than constructing Viru Viru International Airport. However, organization of MERCOSUR (Southern South America Common Market) in 1995 increased the need for a transport network among South American countries. At the same time, it was widely recognized that the expansion of El Alto Airport, Bolivia's front door, was also necessary. The Bolivian Government tends to support prompt implementation of this project within the framework of the policy to commit it to the private sector.

Development into the next-phase development studies and forming of projects

In Bolivia, the Dept. of Finance and Vice Minister Room of the Dept. of Public Works jointly summarize aid requests. Aid is requested either from a provincial or municipal government or from a governmental department; Viru Viru International Airport Development and El Alto Airport Modernization Project fall into the latter category.

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[34] Currently the El Trompillo Airport.

Next-phase development studies

In both projects, a detailed design study (D/D) was implemented after the development study was completed as the next-phase development study. A detailed design study on Viru Viru International Airport Development was implemented in February 1978, the year after the development studies were completed; a detailed design study on the El Alto Airport Modernization Project was implemented in 1994, five years after the development studies were completed. Both were funded by gratuitous aid from Japan.

Table 2-4-6. Next-Phase Development Studies Implemented based on the Results of Development Studies

Project	Item	Description	Year of completion	Source of fund
Viru Viru International Airport Development (F/S)	Basic design study on Viru Viru International Airport Development of Bolivia	Detailed study on the provision plan to be implemented by 1985	1978	JICA
El Alto Airport Modernization Project Area (M/P+F/S)	Basic design study on El Alto Airport Modernization Project of Bolivia	Detailed study mainly on the renovating the aviation security facilities and construction of the control tower to assure safe navigation	1994	JICA

Forming into projects

All or part of the plans generated from the two projects evaluated were formed into projects. In Viru Viru International Airport Development (F/S), yen loans were granted by the OECF in 1979 (10.8 billion yen) and in 1983 (6,680 million yen), and the project was completed in 1988. The airport that was actually implemented as a project does not differ so largely from the plan proposed in the development studies. However, because the latest air transport forecast data was used in the next-phase development study (details design study) and incorporated into the project, there were some changes in scale of the construction work.

JICA granted gratuitous funds for the El Alto Airport Modernization Project (M/P + F/S) three times: in 1994 (893 million yen), in 1995 (2,374 million yen), and in 1996 (278 million yen). Subsequently, the runway was repaired, a new control tower was constructed, navigation support facilities and communications facilities were installed, and landing support-related materials were purchased. In 1997, the international airports including the El Alto Airport were committed to the private sector in accordance with the policy of the Bolivian Government. Facilities that have already been constructed using

gratuitous funds from Japan, such as communications and air traffic control facilities related to the safety of El Alto Airport, are excluded from being commissioned to the private sector and are operated directly by the Airport Public Corporation. Other major facilities, such as the runway, taxiway, apron, and passenger building, are operated and managed by SABSA, which obtained the right of trade over 25 years through an international bid. At present, SABSA has no surplus funds, and therefore there is no prospect of constructing the rest of the project.

Table 2-4-7. Projects Proposed as a Result of Development Studies and Descriptions of Items Formed Into Projects

a. Viru Viru International Airport

		Description of projects generated from development studies		Items formed into projects
Item \ Planned year		1985	1990	1988
Basic specifications for the new airport		Location: 17 km north of downtown Santa Cruz City Height above sea level: 370 m Runway Direction: 147° /327° Area: 2,370 ha		
Spare aeration values	Passengers of international lines	355,000/yr	677,000/yr	764,000/yr
	Passengers of domestic lines	631,000/yr	1,004,000/yr	1,374,000/yr
	Total	986,000/yr	1,631,000/yr	2,138,000/yr
	Volume of air cargo	8,000tons/yr	15,300tons/yr	24,411tons/yr
	Total number of departures and arrivals	44,000/yr	64,000/yr	62,00/yr
Airplane take-off/landing facilities	Landing zone	3,320m×300m	3,620m×300m	3,620m×300m
	Runway	3,200m×45m	3,500m×45m	3,500m×45m
	Shoulder	7.5m	7.5m	7.5m
	Pavement	Concrete	Concrete	Concrete
	Taxiway			
	Width	23.0m	23.0m	23.0m
	Shoulder width	10.5m	10.5m	10.5m
	Parallel taxiway	720m	1,600m	1,600m
	Orthogonal taxiway	1 for cargo apron	1	1
		2 for passenger apron	2	2
		Attached to the runway end	1	1
	Interval			
	Runway - Taxiway	210m	210m	
	Aprons			
	Passenger apron	5berths (50,050㎡)	8berths (50,050㎡)	13berths (62,550㎡)
	Cargo apron	2berths (22,800㎡)	2berths (22,800㎡)	2berths (8,700㎡)
	Apron for common aviation	65berths (9,300㎡)	95berths (14,001㎡)	164berths (27,100㎡)
	Pavement	Concrete	Concrete	Concrete
Radio, communications, and meteorological facilities	Aeronautical fixed communications facility	1		
	Aeronautical mobile communications facility	1		
	Radio navigation support	1 ILS facility (Cat 1), VOR facility, DME facility, etc.		
		Meteorological facilities		
	Aeronautical meteorology	Meteorological communications facilities		
Aviation lights and road illumination facilities	Aviation lights	Lead lights, runway lights, taxiway lights, apron illumination lights		
	Road and parking area illumination lights	Road and parking area illumination lights		
Building facilities	Passenger terminal	11000㎡	16,000㎡	15,413㎡
	Cargo terminal	900㎡	1,800㎡	2,903㎡
	Others	Customs, quarantine station, post office (for cargo), control tower, President's pavilion, fire-fighting/rescue facilities, etc.		
Urban equipment		Ultra-high-voltage substations No. 1 to No. 11, power distribution equipment, water supply facility, sewage/drainage facility, telephone facility, trash treating facility, gas supply facility		
Other facilities		Road/parking area, drainage facility, heliport, airplane fueling facilities		

b. El Alto Airport Modernization Project

Description of projects generated from development studies (for the first-term work)		Items formed into projects
Main projects	Elevation of runway pavement	Improvement of the runway
	Construct new taxiway	Committed to private sector and will be constructed by SABSA Inc.
	Passenger terminal apron	Committed to private sector and will be constructed by SABSA Inc.
	Cargo apron	Committed to private sector and will be constructed by SABSA Inc.
	Construct new road and parking area	Committed to private sector and will be constructed by SABSA Inc.
	Passenger terminal building	Committed to private sector and will be constructed by SABSA Inc.
	Cargo terminal building	Committed to private sector and will be constructed by SABSA Inc.
	Management office building/control tower	Construct new management office building/control tower
	Improvement of navigation support facilities	Improve navigation support facilities
	Other accessory facilities	Provide communications facility and purchase communications and landing support-related equipment and materials.

Economic and social effects of the projects implemented on the pertinent area

Generally speaking, the economic and social effects of an airport project can be evaluated quantitatively from the viewpoints of the change in income due to the increase in the number of arriving and departing passengers and the volume of cargo handled, whether air transport safety has been improved or not (comparing accident rates before and after the implementation of the project), whether the employment rate increased or not in the subject area (airport siting area), whether tourism has developed or not (increase or decrease in the number of passengers who used air transport), and so on.

It is possible to evaluate the economic and social effects of the Viru Viru International Airport Development project based on the above mentioned indexes because the airport was actually constructed and used. However, there is a limit to collecting data on an airport that was planned more than 20 years ago since the data items collected 20 years ago differ from

data collected now since the airport was generally controlled by AASANA in the planning stage of this development study but is now controlled by SABSA after being commissioned to the private sector. Under these circumstances, quantitative evaluation from all the viewpoints is not always possible.

In the implementation stage of the development studies on the El Alto Airport Modernization Project, planners assumed that this airport would produce the following economic and social effects.

1. Improve air transport safety.
2. Provide efficient air transport to improve the national economy.
3. Expand trade and business opportunities.
4. Increase opportunities for employment.
5. Stimulate international tourism development.

However, it is difficult quantitatively evaluate the economic and social effects of these project. Because the facilities formed into projects were limited to control facilities related to the safety of the airport, unlike the case of the Viru Viru International Airport. Furthermore, there has not been sufficient time for significant effects to become apparent because the facilities formed into projects were actually put to use in 1997. Therefore, we evaluated the effects of this airport only qualitatively based on information obtained from a survey. Indirect economic and social effects of each project are evaluated below.

a) Viru Viru International Airport Development

① Improved comfort for airport users

The passenger terminal building of the old Santa Cruz Airport was always congested because international and domestic lines used a common lobby. Furthermore, as many as three friends or family members welcomed or said farewell to each passenger transiting the airport and the outdoor baggage claim for domestic lines inconvenienced passengers, particularly on rainy days. In addition, facilities other than the terminal building (navigation support facilities, aeronautical lights, and fire-fighting and rescue facilities) were also aging and required repair.

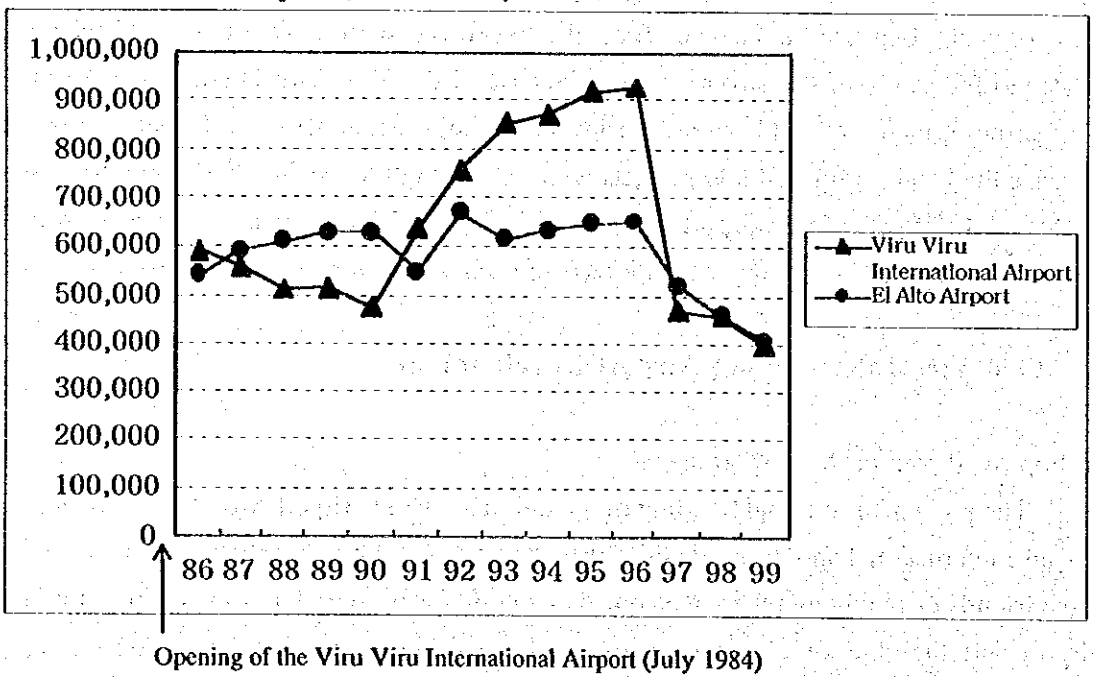
The passenger terminal of the newly constructed Viru Viru International Airport has an area of 15,413 square meters, which is 6.3 times larger than that of the old Santa Cruz Airport. Furthermore, the baggage claim is located indoors, and other airport facilities are also constructed according to international standards. This airport is thus highly evaluated

in terms of safety and security[35]. Viru Viru International Airport has contributed to improving transport service in Bolivia and to increasing the comfort of airport users.

② Increase in demand of air passengers and volume of cargo handled

In 1975, 224,000 passengers used Santa Cruz Airport, ranking it second to El Alt Airport with 326,000. However, after Viru Viru International Airport opened in 1984, the number of passengers using La Paz Airport gradually decreased, and in 1991, Viru Viru International Airport recorded more passengers than any other airport in Bolivia (Figure 2-4-1). Furthermore, the number of passengers who used international lines at Viru Viru International Airport increased remarkably compared with those who used domestic lines (Figure 2-4-2).

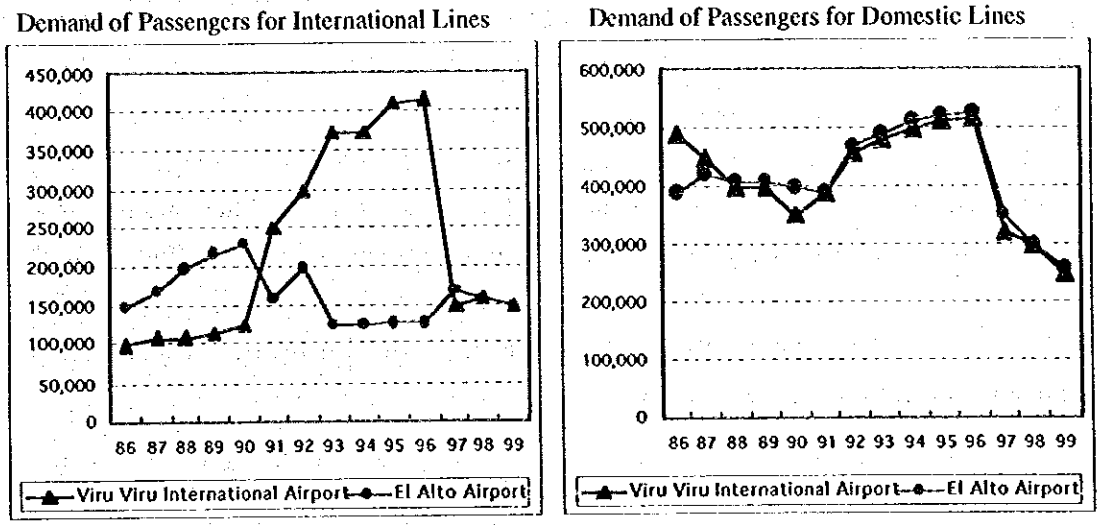
Figure 2-4-1. Comparison of Passengers Using El Alto Airport and those using Viru Viru International Airport (on all lines)



Source: SABSA "Information General Aeropuerto International"

[35] According to an official of AASANA, an official inspecting the security systems of international airports to provide for visits of important US government persons to Bolivia found El Alto Airport needed further improvement but evaluated Viru Viru International Airport highly as well able to maintain security.

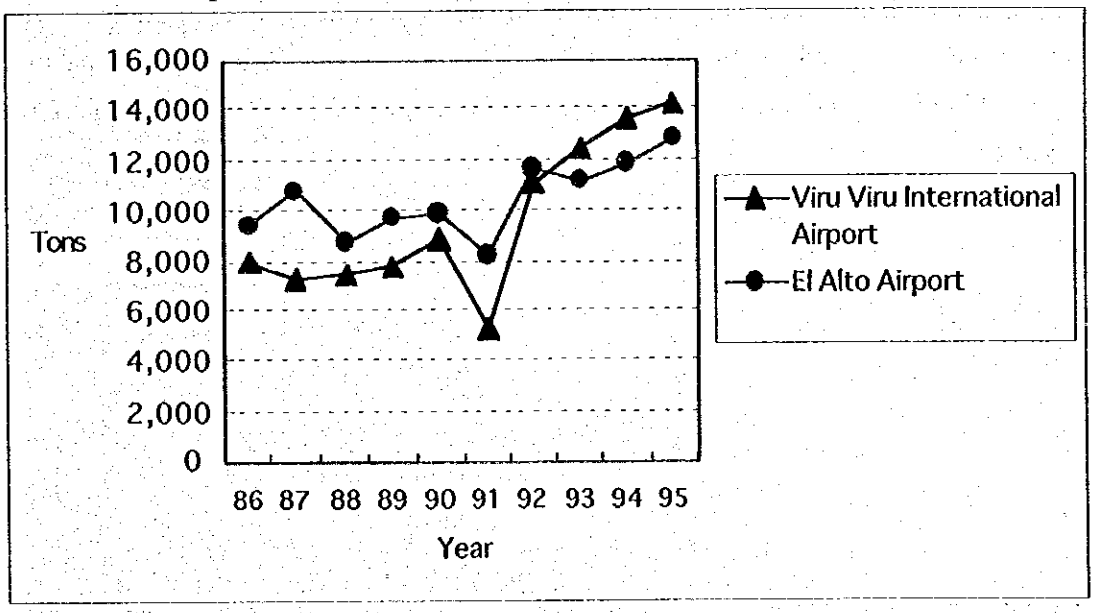
Figure 2-4-2. Transition of the Demand of Passengers for International and Domestic Lines



Source: SABSA "Information General Aeropuerto International"

The volume of cargo handled increased at both airports, but the volume of cargo handled at Viru Viru International Airport exceeded that handled at El Alto Airport in 1993 (Figure 2-4-3).

Figure 2-4-3. Comparison of Cargo Volume Handled by El Alto Airport and Viru Viru International Airport (on all lines)



Source: SABSA "Information General Aeropuerto International"

The share of El Alto Airport decreased relative to that of Viru Viru International Airport in both passengers and cargo handled, though actual numbers increased at both airports. It is also true that the total number of passengers and the cargo volume handled at Viru Viru International Airport and El Alto Airport increased to levels above those before the Viru Viru International Airport was constructed. In other words, El Alto Airport and Santa Cruz Airport would be unable to accommodate the increased passenger and cargo volumes, which would have resulted in an overflow if the Viru Viru International Airport had not been constructed. Because the increased air passenger and cargo volumes handled increases revenue through the collection of taxes for using airports, airport entrance fees, and parking fees, the economic effects of constructing Viru Viru International Airport can be judged to be very high.

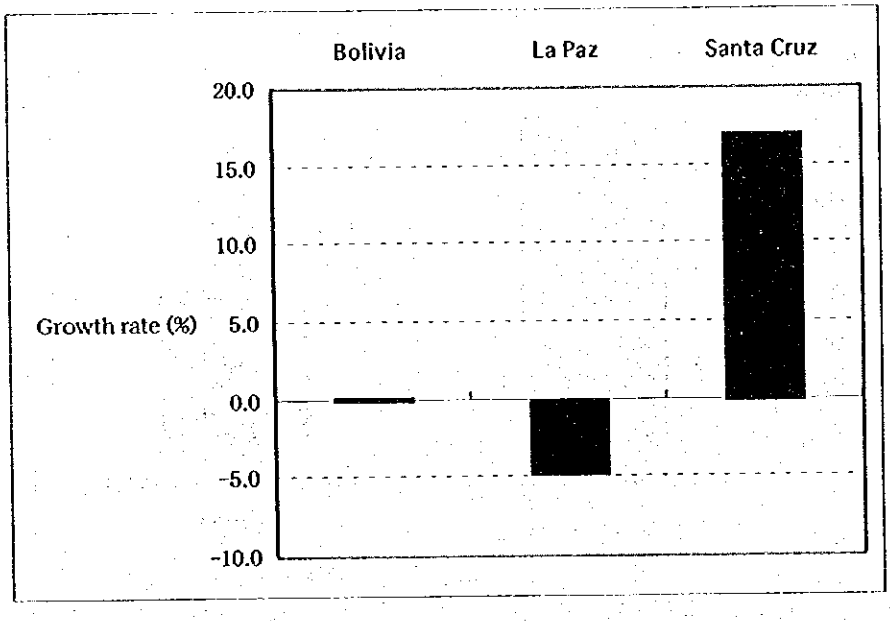
③ Increased employment opportunities in Santa Cruz Province

The growth rate of the employed population[36] as of 1976 and 1977 was plus 0.1 for Bolivia overall and minus 4.8% in La Paz Province. However, Santa Cruz Province exhibited a quite high growth rate of plus 17% (Figure 2-4-4). It may not be appropriate to conclude that the high employment growth rate in Santa Cruz Province is due to the construction of Viru Viru Airport. However, a survey found that 3,000 employment opportunities were created in the construction industry and transport service industry during the construction of the airport. Furthermore, during the airport construction[37], the road from the airport to the urban district was expanded from two lanes to four lanes, and more plants are being sited along this road. In addition, more taxis are now in service between the airport and urban district. the construction of the Viru Viru International Airport indirectly contributed to the increase in the employed population in Santa Cruz Province.

[36] The employed population as of 1976 consists of those over the age of 7; the employed population as of 1997 consists of those aged 10 to 60.

[37] Excerpted from the Project Completion Report of the OECF, which was obtained at the site.

Figure 2-4-4. Growth Rate of Employed Population (comparison between 1976 and 1997)



Source: Instituto Nacional de Estdistica, Department de Miestreo y Encuentas

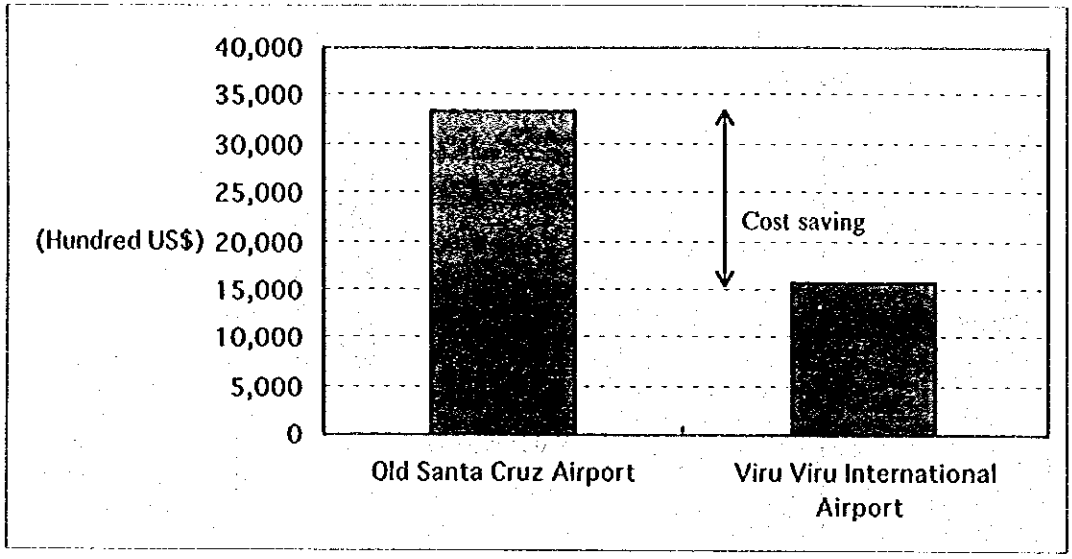
④ Various costs reduced by constructing the new airport

Costs that can be reduced by constructing Viru Viru International Airport include the maintenance cost for the old Santa Cruz Airport, road tunnel construction cost, cost for measures against noise, and cost of measures to prevent accidents. The maintenance and management cost for the old Santa Cruz Airport included reinforcing the runway and apron and renovating radio and lighting facilities. The yearly expenses totaled 3 million dollars (estimate as of 1977). The road tunnel construction cost was considered necessary in 1977 to support urban planning in Santa Cruz City where the Santa Cruz Airport is used continuously for scheduled flights. The estimated cost of this work for 10 years is 25.370 million dollars. The estimated cost of measures to prevent noise is 100 thousand dollars, and the estimated cost of accident prevention measures, 5 million dollars for 10 years[38]. In contrast, the maintenance and management cost required after the Viru Viru International Airport was constructed is 1.56 million dollars per year. Therefore, construction of the new airport enabled saving 1.78 million dollars in maintenance and management. For these reasons, the new airport construction project can be evaluated to have sufficiently benefited

[38] The cost of accident preventing measures was estimated by using the five million dollars paid as compensation for the aircraft accident that occurred in 1977 as an index and assuming that accidents will occur at a rate of one every 10 years.

the national economy.

Figure 2-4-5. Comparison of 10-Year Maintenance and Management Costs



b) El Alto Airport Modernization Project

① Improvement of aviation safety

All the plans that were formed into projects are related to aviation safety. Before being repaired, the runway did not have a runway shoulder and frequently caused engine troubles because jet engines of large planes would ingest pebbles and sand dust. Furthermore, rubber dropped from the tires of airplanes in and around the landing zone on the side of runway 09R. This rubber stuck to the surface, reducing flight safety by reducing the friction of the runway. The old control tower lacked fire alarms, hydrants, and fire extinguishers and had inadequate electrical, communications, and other devices due to several expansions of the building. There were thus problems in functions, operation, and maintenance and repair. Also, due to the aging aeronautical communications facilities, the control tower and airplanes were sometimes unable to communicate on the tower frequency.

Modernization of air transport control equipment and materials through cooperation of JICA with gratuitous funds enhanced the safety of employees engaged in aviation and airport operations by solving the problems above. In particular, the weather forecast data of the meteorological facility is highly evaluated for its accuracy and has come to be utilized also by the Meteorological Agency. Therefore, the facilities provided grants not only

improve aviation safety, they also improve the safety of other transport sectors where safety is influenced by meteorological information (such as marine and land transportation).

② Modernization of aviation technology

When Japan provided equipment, materials and facilities by grants, technology for maintaining and managing equipment and materials was implemented through OJT. The survey confirmed that the level of engineers of the AASNA was enhanced and that the engineering sector of the AASNA was more modernized than before.

(2) Sustainability in the post-implementation stage of development surveys

Sustainability of project formation

Bolivia's policy is to commission the construction, operation, and management of Viru Viru International Airport and El Alto Airport, the subjects of this evaluation study, to the private sector. These responsibilities were therefore transferred from AASANA to SABSA in 1997 in a two-year contract. Thus, as mentioned above, whether the remaining projects proposed by this development study will be implemented or not depends entirely on the judgment of SABSA.

During the F/S on Viru Viru International Airport, an airport construction plan divided into four terms ending in 1985, 1990, 1995, and 2000 was proposed so that development could be implemented step by step according to Bolivia's economic status at that time. Though the first-term work was able to be implemented using yen loans before the airport was commissioned to the private sector, subsequent work is being delayed because SABSA does not have sufficient funds to implement those projects, demand for air transport is below the forecast, and the implementation stage of development studies could not be predicted due to differences of opinion with inhabitants due to urbanization of peripheral areas of the airport. The El Alto Airport project is also being delayed due to SABSA's financial circumstances. However, SABSA understands that the results of these two development studies are appropriate and states that the projects may be implemented according to the contents proposed by the development studies if the above-mentioned problems can be solved.

The Dept. of Transport is planning to establish a "Comprehensive National Transport Master Plan" in the future. Reviewing the improvements proposed in the development studies on Viru Viru International Airport Development and El Alto Airport Modernization Project in this master plan may spur forming and implementing projects in the future.

Furthermore, in parallel, the current regime is seeking to modernize navigation support facilities at the four main airports including the Viru Viru International Airport (El Alto, Viru Viru, Cochabamba, and Tarija). For these reasons, the results of development studies on the two projects evaluated in this study are sustainable.

Sustainability of transferred technology

All members of the counterpart team who participated in the development study on Viru Viru International Airport Development have retired or left their posts due to the changes of regime and commissioning of the airport to the private sector in the last 20 years. In addition, most members of the counterpart team who participated in the development study on the El Alto Airport Modernization Project moved to the private company when the airport was committed to the private sector[39]. Therefore, though the sustainability is low in either case from the viewpoint of human resources, the results of development studies themselves can be evaluated as to be developing independently because the master plan for the Viru Viru International Airport is used as a reference for future SABSA business plans. Furthermore, the equipment and materials provided by gratuitous funds from Japan for El Alto Airport are well maintained and managed, so the portions of the plans that have been formed into projects can be evaluated as to be developing independently.

[39] According to the report on the post-implementation stage of the cooperation with gratuitous funds implemented by the JICA in 1998.

2-4-4 Conclusions

The two projects evaluated in this study can generally be judged successful based on the state of utilization, effects of projects, and sustainability in the implementation and post-implementation stages of development studies.

In the implementation stage of the development study, both projects evaluated in this study were implemented because it was judged that they reflected the social and economic needs at that time and were essential for the future economic development of Bolivia. The plan of "Viru Viru International Airport Development (F/S)" was established to complement the El Alto international airport, enhancing its significance as the hub (transit point) of the north-south and east-west international air routes, and enhancing the safety of inhabitants around the airport. In contrast, the "El Alto Airport Modernization Project (M/P+F/S)" was established primarily to avoid risks of reduced flight safety since the facilities in general were extremely aged.

In the implementation stage of both development surveys, periodic meetings were held between the JICA survey team and counterpart team. In addition, the survey team transferred technologies to the counterpart team (data collection methods, techniques of planning for airport repair and expansion projects, know-how of airplane noise measurement, etc.). It thus seems that there was sufficient cooperation between the survey team and the counterpart team.

An organized system for developing proposals into projects and utilizing the results of development studies in the implementation of stage of development studies was created upon completion of development surveys for Viru Viru International Airport Development. For the El Alto Airport Modernization Project, however, no project execution committee was organized because most members of the counterpart team for development studies retired or transferred to other positions.

In the post-implementation stage, the results of the two target development studies were utilized as policies of the state and are still being utilized now. Detailed design studies (D/D) were implemented for both target studies as the next stage development studies immediately upon completion of these development studies.

In both target studies, some plans have been developed into projects. For items related to airports, social and economic impacts of the development studies developed into projects on the local community can be generally assessed quantitatively from the viewpoint of changes in income due to the increased number of passengers using that

airport and volume of cargo handled in that airport, any improvement in the safety of air transportation (comparing accident rates before and after the project implementation), any increase in employment in the target area (airport site area), any promotion of the development of sightseeing resources (increase or decrease in the number of passengers who used that airport), and so on.

However, there is a limit on data collection since the airport had been planned more than 20 years before. Furthermore, while AASANA was in charge of general management of the airport when these development studies were planned, SABSA has been in charge of the management of the airport since it was transferred to the private sector. In addition, methods of collecting statistical data differ between 20 years ago and present. As a result, not all viewpoints can be assessed quantitatively. An assessment based on these circumstances confirmed the following points: ① improved transport services and comfort of airport users, ② increased demand for air passenger transport, ③ increased volume of cargo handled, ④ increased employment opportunities in Santa Cruz Prefecture, and ⑤ various cost savings achieved by constructing a new airport.

It was impossible to assess substantial impacts of these projects developed from development studies on the El Alto Airport Modernization Project because the project was limited to providing control facilities for airport safety and only two years has passed since the implementation of projects. However, qualitative effects, such as improving safety and modernizing aviation technology have been confirmed through surveys.

Sustainability was evaluated from the viewpoint of whether the rest of the projects generated from these two development studies will be implemented in the future or not and whether the technology transferred is sustainable or not. Though the possibility of the remaining projects being implemented promptly is low judging from SABSA's financial condition and the demand for air transport, the Dept. of Transport is planning to establish a "Comprehensive National Transport Master Plan" in the future. If the projects generated from the development studies on Viru Viru International Airport Development and El Alto Airport Modernization Project are incorporated into this master plan, formation and implementation of these projects will be spurred in the future. Sustainability of the transfer of technology is low from the viewpoint of human resources because almost all members of the counterpart team that participated in the development studies on the two projects evaluated have been replaced through the change of regime. However, the results of development studies themselves may be sustainable because the reports on the development studies on the two projects evaluated are still important references of the current SABSA.

Section 3. Proposals

Section 3. Proposals

3-1 Proposals for improving the quality of development studies

(1) Review of the purpose of development studies from the standpoint of technical cooperation

It is necessary when implementing development studies to reconfirm their purpose and to clarify that development studies are implemented by Japan as a form of technical cooperation. The recognized objectives of development studies are as follows[1]:

1) To support formulation of development plans for various public projects that will contribute to social and economic advancements in developing countries.
2) To transfer technologies such as planning methods and survey and analysis techniques to the counterpart of the recipient country.

Though the objective was achieved with regard to assisting with the formulation of plans through previous cooperation efforts with Japan, the rate of achievement was generally low for transfers of technologies. There are several possible explanations for this situation.

First, there have been many cases when both the government of the recipient country and the Japanese team implemented the development study by focusing on "forming plans" rather than on transfers of technologies. In addition to the development studies performed by Japan, M/Ss and/or F/Ss are often implemented in the recipient country by international organizations or by the government of the recipient country itself by assigning it to an external consultant. In most of those cases, the development studies are implemented only for the first objective (1) mentioned above. The recipient country occasionally perceives that the development studies implemented by Japan are executed for the purpose of "establishing plans."

Second, though the target area of a development study, the contents of the development study, and the target field of the development study are relatively clear from the beginning of implementation, the scope of the transfer of technologies remains vague. Under these circumstances, the proposals presented by bidders in response to promulgation for selecting consultants are not focused on the transfer of technologies.

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[1] JICA, Annual Report 1999.

Consultant selection also places importance on obtaining a high-quality end result rather than the pursuit of effective technical transfers.

Third, the members of the counterpart team of development studies often participate in development studies as part of their regular workday, so while the Japanese team spends an entire day on on-site surveys, the time spent by the recipient country is significantly less. It is inevitable that development studies are implemented primarily by the Japanese team, and therefore a situation occurs in which a development study to "establish plans" becomes successful through the support of the recipient country in the process of the study rather than a situation wherein transfer of technologies is implemented during the study.

If Japan plans to continue to place importance on the transfer of technologies while remaining intent on achieving the final goals of the development studies, it is necessary to improve the following points:

1) Have the government of the counterpart country of cooperation increase their perception of development studies by Japan as technical cooperation so that requests for transfers of technology are already incorporated when the development studies are requested, and present development study items that are of importance to the government of the counterpart country of cooperation during the selection and confirmation of projects (studies for forming projects).
2) Select consultants who can transfer technologies and, in the process of selection, instruct the bidders to prepare proposals that place importance on the transfer of technologies. Utilize long-term experts who are specialized in transfers of technology in the development study team on the Japanese side, depending on the individual cases.
3) Arrange a physical environment that enables the transfer of technologies from the team on the Japanese side to the team from the counterpart country of cooperation to promote participation by members of the counterpart country. To achieve this, the Japanese team may have to bear the personnel expenses for the members of the counterpart team so that the members of the counterpart team can devote themselves to development studies; this decision would be made only after fully examining the financial conditions of the country and conducting comprehensive consultations with the recipient country.

(2) Clarification of the role of development studies in the development plans of the counterpart country of cooperation

It is necessary when implementing a development study to clarify the positioning of

the study in the national development plans of the counterpart country of cooperation or in the development plans of each ministry in charge.

Development studies will be reflected in the policies of the counterpart country of cooperation and utilized more often in individual projects when the roles of the development studies and their importance are determined by the counterpart country, when expectations of the studies are clarified, and when the studies are implemented with these factors in mind.

A development study implemented in the 1980s within the framework of the Eastern Seaboard Development Project, which was an objective of this evaluation study, can be cited as an example. The Eastern Seaboard Development Project was implemented by the Thai Government as a national project of great importance, and many development studies on the development of the eastern seaboard were implemented in the 1980s under ownership of the Thai Government. Development studies to develop industrial ports and industrial areas that were implemented by Japan to position Leam Chabang as the base for export-oriented light industries and Map Ta Phut as the base for heavy industries in the Eastern Seaboard Development Project occupied a particularly important position in the Eastern Seaboard Development Project. The Thai side therefore continued its efforts to instigate related projects even after the implementation of those development studies.

This example demonstrates that clarifying the role of development studies in the development projects of the government of the recipient country and implementing development studies by keeping that role in mind enhances the ownership of the recipient country and increases the possibility that efforts will be made to secure a budget to promote the plans proposed as a result of the development studies.

(3) Clarification of the utilization targets of development studies

The purposes of implementing development studies vary depending on the type and subject of each development study item, and the manner of utilizing a development study after implementation will also vary depending on its purpose. It is necessary to verify that the utilization corresponds to the purpose of the relevant item in order to judge the state of utilization after implementation; therefore, the utilization target must be clarified in the pre-implementation and implementation stages of development studies.

Formulation into projects is one way to utilize development studies. This is considered to be the simplest and most straightforward way to utilize development studies. However, verification of utilization by formation into projects may be suitable for D/D, which was implemented for the purpose of forming development studies into projects, but

is not suitable for other cases. Formation into projects is one effective mode of utilization, but assessing the rate of utilization of development studies by the rate of formation into projects may lead to a very one-sided judgment.

For example, formation into projects will not always be proposed in the case of a policy support type of development study, and if proposals for formulation into projects are limited, other proposals that reflect on policies may also be limited. Further, some M/Ps may be implemented only to prepare the framework of development policies in the target area or target field without connection to a F/S by the recipient country or project formations as a result of examinations. However, development studies are fully utilized in such cases as the framework for development, and this aspect of utilization does not reflect on the rate of formation into projects.

Therefore, it is desirable when implementing development studies that definitive methods for utilization suitable for the purpose of the development studies be presented. The purpose of utilization should also be set in the pre-implementation or implementation stage of development studies by recognizing that the rate of utilization will be assessed in the post-implementation stage. Taking such measures ensures that the rate of utilization will not be judged only by the rate of formation into projects, and it will be possible to verify utilization in a way that is appropriate for the objectives of individual development study items.

(4) Assumption of scenarios according to changes in external conditions

It is necessary to prepare a scenario within a predictable range for each of the plans proposed out of the M/P and the plan studies in the F/S, taking into consideration the possibility that the plan may be suspended due to changes in external conditions after implementation of the development studies.

Changes in external conditions can be broadly divided into two types, unpredictable and predictable. Suspension of the plan due to a change in the needs of the recipient country after a change of regime, alteration of the plan in accordance with changes in the natural environment, and suspension of the plan due to the occurrence of a civil war can be cited as examples of unpredictable cases. Predictable case examples include those times when plans derived from several population forecasts may be examined for development studies to arrange water supply facilities, or project-forming for cases where the project size is reduced or expanded may be proposed and examined on the assumption that the demand may vary until the project is actually implemented.

Further, one of the most frequent cases wherein a plan proposed and/or examined in

the development studies is not seen through to its utilization is the case when there is no budget assigned to that plan in the recipient country. One effective method to compensate for such changes would be to consider a smaller alternative plan or a plan that can be instigated at a minimum level and then gradually expanded.

3-2 Proposals for improving the methods of evaluation for development studies

(1) Setting the utilization target according to the years of implementation, type of development study, and the purposes of the development study

It is necessary to set the utilization target according to the years passed since implementation, the type of development study (M/P, F/S, D/D, etc.), and the purpose of the development study when implementing evaluation studies on development studies. Setting a utilization target enables assessments of the results and degree of achievement of the utilization target of development studies to be implemented at any time, for any type of study, for any study purpose.

Every development study involves a time lag from the post-implementation stage until utilization. For example, the degree of utilization of an F/S implemented for the purpose of being formed into a project may differ between cases where a) it is evaluated after five years and b) it is evaluated after ten years. When those cases are compared simply in terms of "whether it has been utilized," the rate of utilization is generally higher in b). Even if a development study evaluated after five years has the potential to be utilized more effectively than one evaluated after 10 years, it may be judged to have "a lower rate of utilization" at the time of evaluation.

Methods of utilizing development studies may differ depending on the form and objective of each development study item. Therefore, development targets of each development study item must be classified by form and objective. When a development study is evaluated simply in terms of whether it has been formed into a project, as in the case of comparisons of M/Ps and F/Ss in the rate of formation into projects, wherein the M/P is implemented to prepare the framework of development of the target field/area rather than to study the feasibility of individual projects, it is a matter of course that the F/S has a higher rate of forming into projects. Further, there may be cases of F/Ss where the feasibility study on a project, which is implemented during the development study, indicates that the project should not be promoted; such a case is not suitable for verification of the target achievement rate in terms of utilization in projects.

Therefore, it is necessary to set the targets of utilization as the years passed since implementation, the form of the development study, and the objective of the development study, and the degree of utilization of individual development studies should be verified using these targets as criteria.

(2) Introduction of the assessment upon completion of development studies

It is desirable to introduce an assessment upon completion of development studies to judge their efficiency in the implementation stage.

It is difficult to collect the information necessary to assess the implementation stages of development studies that were implemented 15 or 20 years ago, and even if the information can be collected, it would be difficult to derive clear assessment results in most cases due to the low credibility of such information.

Concrete matters such as the transfer of technologies performed in the implementation stage of a development study and whether cooperation with the counterpart country was sufficient can be clarified by introducing the assessment upon completion of a development study. The credibility of information regarding whether the development studies were implemented efficiently in the implementation stage can thus be enhanced.

The group responsible for implementing the assessment upon completion of a development study must be carefully considered. Members of the Japanese team, members of the team from the recipient country, and third parties who are not participating in the development study can be considered as candidates to implement the assessment; however, each of these candidates could conceivably reach a one-sided conclusion.

Since the Japanese team is usually composed of consultants, even if the development study was implemented inefficiently, they will not reach a negative conclusion for the assessment that may impair the interests of their organization or the consultants who participated in the development study.

Since the counterpart team of the recipient country can declare that the cooperation system of their country and the structure for implementing development studies are well arranged if the development studies succeed, they may draw a one-sided assessment conclusion, i.e. a conclusion better than the actual status. However, a recipient country that is accustomed to receiving aid may draw a conclusion poorer than the actual status in expectation that such a conclusion will lead to additional support from Japan.

More objective assessments than in the two cases mentioned above are implemented when a third party who is not participating in the development study implements the assessment, but it is also highly probable that such a faction would be less familiar than the parties concerned with the contents of the study, the implementation background of the study, and the progress of the study.

Therefore, careful examinations are required when selecting the assessor. The most practical way to implement an assessment in the post-implementation stage appears to be to employ a third party as the assessor with the right to give final judgment after carefully

examining the opinions of both the recipient country and Japan. The assessor should maintain the position of a third party but be familiar with the contents and background of the target of assessment.

One suitable method for this purpose is to appoint a person specialized in assessment who has little interest invested in any of the participants of the development studies to monitor the development study as preparation for implementing assessment in the post-implementation stage. Measures must be taken when securing the assessor to avoid any connection with the Japanese team that is participating in the development study, perhaps by preparing the assessor separately from preparation of the team for development studies.

(3) Necessity of examining the method of evaluation - Positioning of development studies using the logical configuration of PDM

Five evaluation items (efficiency, degree of achieving the target, impacts, adequacy, and potential for independent development), from which the contents of evaluations are decided based on the logical configuration of PDM, are used as evaluation elements in evaluation studies on ODA items of Japan, particularly for evaluation studies on projects. The PDM, which forms the relationships between the PDM configuration of "inputs and activities" → "results" → "project targets " → "upper-level targets" and external factors into a matrix is set along the flow of the project, and therefore is very clear from a logistics standpoint. However, it is necessary to fully examine the positioning of the flow from the implementation stage to the post-implementation stage of development studies when implementing an evaluation study that employs the logical configuration of PDM in a similar method, such as for projects like technical cooperation.

The basic principle of positioning in a logical PDM configuration begins with setting the target of the relevant project as the "project target," followed by setting "outputs" and "goals." According to this basic principle, the objective of the relevant project is actually set as the "project target" in the PDM to assess the technical cooperation of project type, for example. However, the setting of objectives in the PDM is impossible for development studies because there are various judgments about where the "target" level of development studies should be set.

First, the target of the development studies may be set as the target of each plan proposed in the final report for the development studies. This could be a target for a short-term plan or long-term plan, such as "to construct [an objective] by the year xxxx," as planned in the development studies. Since a single report on development studies may

contain multiple plans, it is very difficult to determine the positioning of each plan in the PDM. When a development study is implemented to establish a development framework for an entire area or when a policy support type of development study is focused on enhancing the organization and arrangement of the implementation structure, the study plans make it difficult to set a concrete target, and so evaluations of these types of development studies are considered impractical.

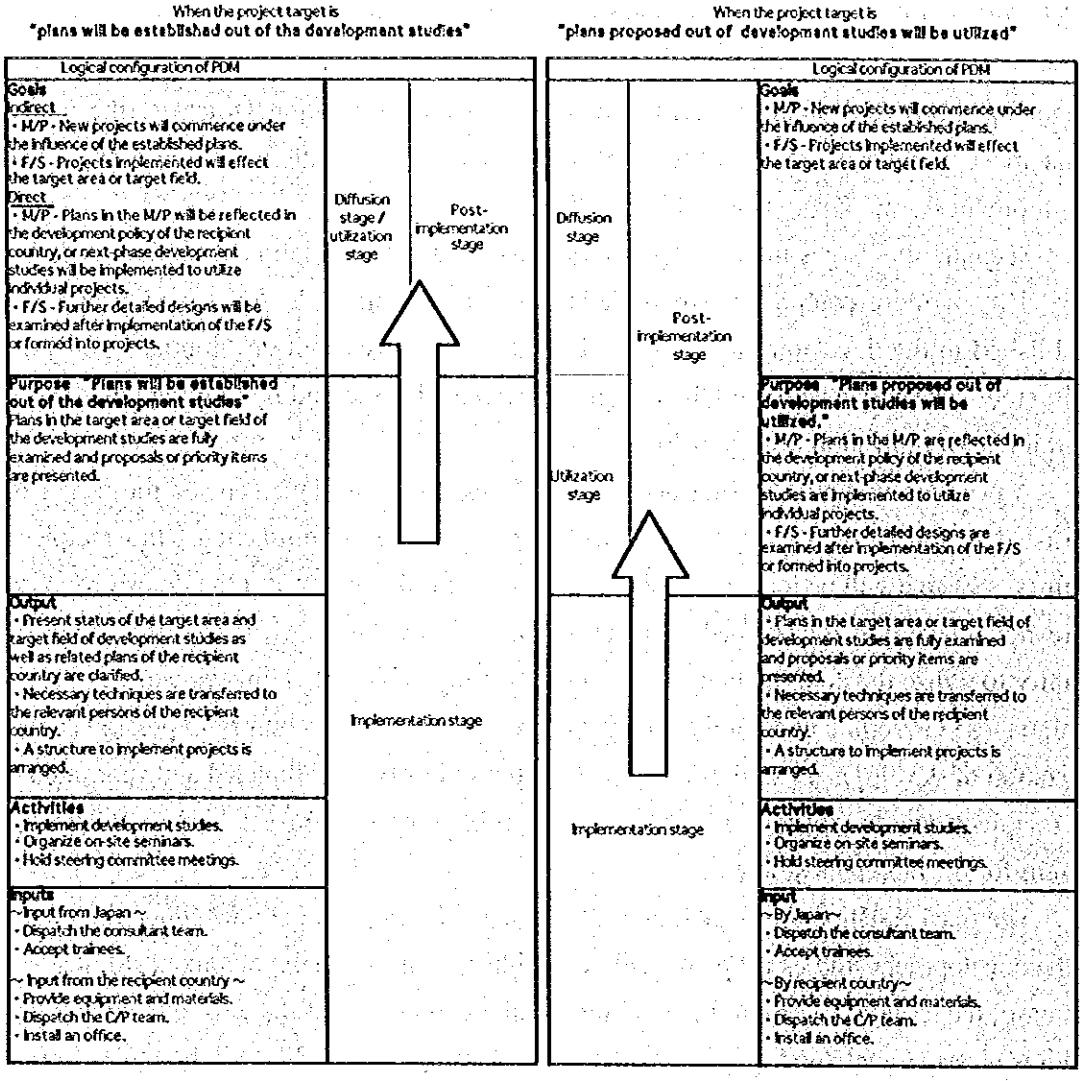
Second, the target may be "plans proposed out of development studies will be utilized by a more comprehensive understanding of the multiple plans and proposals established in the development studies." In this case, the relevant development study is understood as a single item, and the rate of achievement is assessed by judging whether the overall rate of utilization is high or low.

A problem in both the first and second cases is that achievement of the target is entrusted to utilization of the development studies by the government of the recipient country. Since it will be judged that the target was not fully achieved if the items proposed were not utilized, it is assumed that the Japanese Government will urge the recipient country to utilize the items so that the target can be fully achieved. However, to what extent the Japanese Government should actually work with the recipient country to precipitate the utilization of development studies after the final report has been completed and submitted to the recipient country relates to a fundamental problem of how to establish a follow-up system for development studies.

The third situation arises in setting the target of development studies when the target of the development studies is "plans will be established out of the development studies." In this case, the target is to submit the final report after completion of the development studies, and it is clearly understood that the results of the development studies will be utilized after completion of the development studies under the control of the recipient country and that secondary effects of utilization will then be pursued.

The figure below compares the third situation described above with the second situation with regard to the implementation of development studies.

Figure 3-1. Positioning of Development Studies in the Logical Configuration of PDM



The left side of the table shows the case targeting "plans are established out of the development studies," and the right side describes the case targeting "plans proposed out of the development studies are utilized." These two positions are not judgments as to which is correct but are used to examine the positioning by PDM to set the five evaluation items. However, the positioning targeting "plans are established out of the development studies," shown on the left, is more practical. The table below shows the range of evaluation for each of the five evaluation items according to this positioning, as well as a few examples of evaluation standpoints within each range of evaluation.

Figure 3-2. Example of the range of the five evaluation items targeting "plans are established out of the development studies"

	Logical configuration of PDM	Efficiency	Target achievement rate	Impacts	Adequacy	Potential for independent development
Post-implementation stage	Goals Projects implemented after development from proposals or priority items presented in development studies will have effects on the target area or target field.			Diffusion stage - M/P - Were new projects commenced under the influence of the established plans? - F/S - Did the implemented projects have effects on the target area or target field? Utilization stage - M/P - Were plans in the M/P reflected in the development policy of the recipient country or were next-phase development studies utilized for implementing individual projects? - F/S - Were additional detailed designs examined after implementation of the F/S or formed into projects?	- Was the timing of the implementation of the development studies adequate? - Is the direction of the development studies still adequate at the time of evaluation?	- Was the structure enhanced in the post-implementation stage in relation to the utilization of the results of the development studies? - Were independent efforts made to utilize the development studies in the implementation stage of the development studies?
	Purposes Plans in the target area or target field of development studies will be fully examined, and proposals or priority items will be presented.		- M/P - Were plans for the target area/field established? - F/S - Was the feasibility of the priority items in the target area/field fully examined?			
	Outputs - Present status of the target area and target field of development studies as well as the related plans of the recipient country are clarified. - Necessary techniques are transferred to the relevant persons of the recipient country. - A structure to implement projects is arranged.					
Implementation stage	Inputs Activities - Implement development studies. - Organize on-site seminars. - Hold steering committee meetings. Inputs ~Inputs from Japan~ - Dispatch the consultant team. - Accept trainees. ~Input from the recipient country ~ - Provide equipment and materials. - Dispatch the C/P team. - Install an office.	- How was the cooperation between the counterpart side and Japanese side? - Was technology transfer sufficient?				

We determined that the more practical positioning for evaluation at the present stage is the case targeting "plans are established out of the development studies" because if "plans proposed out of the development studies are utilized" is targeted, the range of utilization will be unlimited and the criteria for "being utilized" will become vague. While the term "utilization of development studies" connotes the forming of projects, development studies are not always implemented for the purpose of forming projects. Among development studies, D/D (detailed design) alone is considered to be implemented for the purpose of forming projects. A policy support type M/P may contain proposals to enhance organization rather than for project planning; an F/S may not always propose plans for individual projects, but rather the results of a feasibility study may conclude that some projects should not be implemented as drawn. We consider that targeting "plans are established out of the development studies" is the more practical positioning for evaluation at the present because the definition of utilization is not yet clarified.

However, if a target of utilization such as "the [proposed] project will be commenced within xx years after the development study" is clearly set under agreement with the recipient country when development studies have been implemented, it becomes possible to assess the target achievement rate by using it as the "project target." In parallel, if the target of utilization is clearly set for each year that passes after implementation as well as the type of development study (M/P, F/S, D/D, etc.) and the purpose of the development study, as proposed in section 3-2 (1) above, the possibility of implementing an assessment with "plans proposed out of development studies are utilized" set as the project target will be further enhanced.

(4) Examination of methods other than the assessment method using five evaluation items

Though the argument in section (3) was developed on the proposition that assessment is implemented by setting five evaluation items according to the logical configuration of PDM, the evaluation method need not always use these five items as clues; if there is another method that is more suitable to evaluate development studies, such method may be used.

The primary advantages and disadvantages of the evaluation method using the five evaluation items are described here as factors to consider when reviewing this method. The primary advantages and disadvantages are listed below.

Advantage 1: The logical configuration based on PDM enables us to clarify the standpoint

of evaluations of development studies and also enables us to share this perspective among relevant persons when implementing assessments.

Advantage 2: The range of the five evaluation items is set automatically by determining the logical configuration of PDM, and this simplifies selection of the assessment contents.

Disadvantage 1: Contents of evaluations may vary greatly depending on the positioning of the "project target" by the PDM.

Disadvantage 2: Though the range of the five evaluation items is set automatically by determining the logical configuration of PDM, contents of evaluation may be duplicated among different items.

Though there are numerous advantages and disadvantages other than the above if minor points are included, the two main advantages and disadvantages are cited here. Further descriptions of the disadvantages are given below.

Disadvantage 1 is that contents of evaluations may vary greatly depending on the positioning of the "project target" by the PDM. For example, the contents of assessment will vary significantly and even the assessment results may vary between a case targeting "plans will be established out of the development studies" and one targeting "plans proposed out of the development studies will be utilized." One disadvantage lies in the fact that even though the assessment result appears to be reliable because it follows a logical configuration, it can be altered by the initial positioning on the PDM; the lower the "target" is set, the higher the target achievement rate becomes with a better assessment result.

Disadvantage 2 is that although the range of the five evaluation items is set automatically by determining the logical configuration of PDM, contents of an evaluation may be duplicated among different items. For example, though the "impact" as assessed according to the position in Fig. 3-2 indicates that secondary effects were obtained from the utilization of an item proposed out of the development studies, when this proposal is a tangible means for arranging a structure and the organization is enhanced by the recipient country according to this proposal, it will be understood both as an "impact" and also as "potential for independent development" of the organization, and therefore duplication occurs. Further, though enhancement of the implementation structure of the recipient county in the implementation stage of development can be considered part of the "potential for independent development," the implementation structure of the recipient country can also be understood as a factor in effective implementation of development studies from the standpoint of "efficiency," and duplication again occurs.

It is therefore necessary to implement more appropriate examinations of the evaluation method in addition to comprehensive examinations of these advantages and disadvantages. There are two alternatives for establishing a method for evaluation studies on development studies: 1) to improve the current evaluation method using the five evaluation items as a reference for evaluation, or 2) to investigate new evaluation methods while still utilizing the five evaluation items.