

Thailand

Ex-Post Evaluation of Japanese ODA Loan

“Second Bangkok International Airport Development Project (I)(II)(III)(IV)(V)(VI)(VII)”

External Evaluator: Keishi Miyazaki, OPMAC Corporation

0. Summary

The objective of this project was to accommodate increasing passenger and cargo demands by constructing the Second Bangkok International Airport, including a passenger terminal with a capacity of 45 million passengers/year, a cargo terminal with a capacity of 2.12 million tons/year and two runways, at Nong Ngu Hao, Samut Prakan Province which was located 30 km east of Bangkok, thereby contributing to the economic development of Thailand.

The project was highly relevant to Thailand’s development plan and development needs, as well as to Japan’s ODA policy, and therefore its relevance is high. The operation of the Second Bangkok International Airport (Survarnabhumi Airport) is generally good. The key performance indicators such as the number of passengers, cargo volume and the number of takeoffs and landings have mostly achieved their targets, and they have been increasing constantly. The expected project effects such as improvements in airport convenience and efficiency, improvements in airport safety and in the capacity and function of the airport as an international hub-airport have been achieved. Also, the project positively contributed to commercial development near the airport, the development of transport networks between the airport and the city center of Bangkok, and the promotion of tourism sector development in Thailand. Noise issues near the airport have been a pending issue, but mitigation measures have been carried out by the Airport of Thailand Public Company Limited (AOT) and the Thai government. Thus, the effectiveness of the project is high.

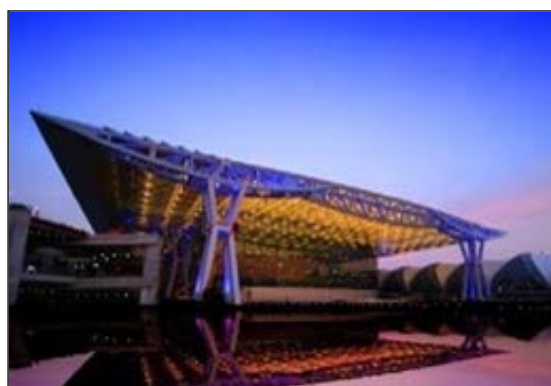
The project cost exceeded the plan, and the project period exceeded it significantly, therefore the efficiency of the project is low. Project sustainability is deemed high in the structural, technical and financial aspects, the O&M condition of project facilities and equipment is good.

In light of the above, the project is evaluated to be satisfactory.

1. Project Description



Project Location



Passenger Terminal Building of Survarnabhumi Airport

1.1 Background

In 1996, there were five international airports (Bangkok, Chiang Mai, Hat Yai, Phuket, and Chiang Rai) and 21 airports in Thailand. The airport sector of the country had been developed first through expanding flight networks within the main five international airports with the

central focus on Bangkok, then between the five international airports and other domestic airports. As there was economic development as well as tourism sector development in Thailand, the demand for airport passengers through Bangkok was expected to increase from over 35 million in 2000 to 55 million in 2010. However, the existing passenger handling capacity of the Bangkok International Airport (Don Muang International Airport) was 30 million and expansion of Don Muang International Airport was difficult because the airport was located in a populated residential area. Therefore, the development of a new international airport in Bangkok was necessary in order to meet the future air passenger demand and to secure smooth air transportation.

1.2 Project Outline

The objective of this project was to accommodate increasing passenger and cargo demands by constructing the Second Bangkok International Airport including a passenger terminal with a capacity of 45 million passengers/year, a cargo terminal with a capacity of 2.12 million tons/year and two runways, at Nong Ngu Hao, Samut Prakan Province which was located at 30km east of Bangkok, thereby contributing to the economic development of Thailand.

Loan Approved Amount / Disbursed Amount	199,243 million yen / 194,410 million yen (Total amount from Phase I to Phase VII)
Exchange of Notes Date / Loan Agreement Signing Date	(Phase I) Sep. 1996 / Sep. 1996 (Phase II) Sep. 1997 / Sep. 1997 (Phase III) Sep. 1999 / Sep. 1999 (Phase IV) Sep. 2000 / Sep. 2000 (Phase V) Sep. 2002 / Sep. 2002 (Phase VI) Apr. 2004 / Apr. 2004 (Phase VII) May 2005 / May 2005
Terms and Conditions Interest rate Repayment period (Grace period) Condition of procurement	(Phase I) IR: 2.70%, RP: 25 years (GP: 7 years), General Untied (for consulting services: IR: 2.30%, RP: 25 years (GP: 7 years), General Untied) (Phase II) IR: 0.75%, RP: 40 years, (GP: 10 years), General Untied (Phase III) IR: 2.20%, RP: 25 years, (GP: 7 years), General Untied (for consulting services: IR: 0.75%, RP: 40 years (GP: 10 years), General Untied) (Phase IV) IR: 2.20%, RP: 25 years, (GP: 7 years), General Untied (for consulting services: IR: 0.75%, RP: 40 years, (GP: 10 years), General Untied) (Phase V) IR: 2.02%, RP: 25 years, (GP: 7 years), General Untied (for consulting services: IR: 0.75%, RP: 40 years (GP: 10 years), General Untied) (Phase VI) IR: 1.05%, RP: 20 years (GP: 6 years), General Untied (for consulting services: same as above) (Phase VII) IR: 0.90%, RP: 15 years (GP: 5 years), General Untied (for consulting services: same as above) Note: IR: Interest Rate, RP: Repayment Period, GP: Grace Period
Borrower / Executing Agency	Airport of Thailand Public Company Limited (AOT) / Airport of Thailand Public Company Limited (AOT)
Final Disbursement Date	(Phase I) January 2004, (Phase II) January 2005, (Phase III) January 2008 (Phase IV) January 2008, (Phase V) January 2010, (Phase VI) August 2010 (Phase VII) August 2010
Main Contractors (Over 1 billion yen)	<ul style="list-style-type: none"> • Trad Construction Ltd., Part. (Thailand) • Krung Thon Engineers Co., Ltd.(Thailand) / Vichitbhan Construction Co., Ltd. (Thailand) • Italian-Thai Development Public Company Limited (Thailand) • Obayashi Corporation (Japan) / Takenaka Corporation (Japan) / Italian-Thai Development Public Company Limited (Thailand) • Krung Thon Engineers Co., Ltd.(Thailand) / Vichitbhan Construction Co., Ltd. (Thailand) / Prayoonvisava Engineering Co., Ltd. (Thailand) • Bina Puri Holdings Berhad (Malaysia) / Kampangphetviwat Construction Co., Ltd. (Thailand)

	<ul style="list-style-type: none"> • Kamangphetviwat Construction Co., Ltd. (Thailand) / P.P.D. Construction Co. Ltd. (Thailand) • Shimizu Corporation (Japan) / Vichitbhan Construction Co., Ltd. (Thailand) • Nishimatsu Construction Co., Ltd. (Japan) / The Nippon Road Co. Ltd. (Japan) / Krung Thon Engineers Co., Ltd.(Thailand)
Main Consultants (Over 100 million yen)	<ul style="list-style-type: none"> • Pacific Consultants International (Japan) / C&C International Venture Co., Ltd. (Thailand) • Oriental Consultants Co., Ltd. (Japan) / Asian Engineering Consultants Co., Ltd. (Thailand) / Epsilon Co., Ltd. (Thailand) / Roge and Associates Co., Ltd. (Thailand) • Nippon Koei Co., Ltd. (Japan) / Thai Engineering Consultants Co., Ltd. (Thailand) / MAA Consultants Co., Ltd. (Thailand) • Norconsult International AS (Norway) / Southeast Asia Technology Co., Ltd. (Thailand) / MAA Consultants Co., Ltd. (Thailand) / Scott Wilson Kirkpatrick (Thailand) Ltd. (Thailand) / Span Co., Ltd. (Thailand) • Dorsch Consult Ingenieurgesellschaft Mbh (Germany) / Japan Transportation Consultants (Japan) / JAL Aviation Consultant (Japan) / Southeast Asia Technology Co., Ltd. (Thailand) / TEAM Consulting Engineering and Management Co., Ltd. (Thailand) / Project Planning Services Co., Ltd. (Thailand) / Santhaya & Associates Co., Ltd. (Thailand) • Nippon Koei Co., Ltd. (Japan) / Tesco Ltd. (Thailand) / MAA Consultants Co., Ltd. (Thailand) • Quatrotec Inc. (USA)
Feasibility Studies, etc.	Master Plan was prepared in 1993 by a consortium: name of General Engineering Consultant consists of NACO (Netherlands), Louis Berger International (USA) and other Thai consulting firms.
Related Projects	<ul style="list-style-type: none"> • Dispatch of JICA experts (Airport construction) (1997) • JICA technical cooperation “The Project on Capacity Building for Environmental Management and Airside paved Area Maintenance of Suvarnabhumi Airport” (2004- 2006) • Special Assistance for Project Implementation on the Second Bangkok International Airport Development Project (I)(II) (1998) by JICA

2. Outline of Evaluation Study

2.1 External Evaluator

Keishi Miyazaki, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: August 2011 – August 2012

Duration of the Field Study: January 8 – 21, 2012 and April 1 – 7, 2012

2.3 Constraints during the Evaluation Study

None

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Thailand

At the time of the Phase I appraisal, the Thai Government's Seventh National Economic and Social Development Plan (NESDP) (1992-1996) set out its main development objectives as: (i) to maintain economic growth rates at appropriate levels to ensure sustainability, (ii) to redistribute income and decentralize development to the regions and rural areas more widely, and (iii) to accelerate the development of human resources, the upgrading quality of life, the environment and natural resource management. In order to achieve the above main development objectives, the promotion of the development of the Bangkok Metropolitan Region in order to ensure better connections and integration between the Bangkok Metropolis and the Eastern Seaboard area was highlighted as one of the principal development guidelines in the plan. This addressed the strengthening of the metropolitan region as a regional center for finance, tourism, air transport and telecommunication in the Southeast Asian region.



Figure 1: Project Site Map

The airport sector of the country had been developed through the establishment of flight networks between the main five international airports and other airports with the central focus on Bangkok. In the Thai airport sector development strategy at the time of the Phase I appraisal, the Second Bangkok International Development Project was given the highest priority as the largest national project. In the Master Plan of the Second Bangkok International Development Project (1993)³, this project was seen as the first phase of the entire project.

At the time of the ex-post evaluation, one of the missions of the Tenth NESDP (2007-2011) was to make the economy more efficient, stable, and equitable by reforming the structure of the economy to be a competitive foundation for the development of infrastructure and so on. Also to support competitiveness and a fair distribution of benefits. At present, the Second Phase of the Master Plan is in progress for the expansion of the passenger terminal building etc. It is expected that passenger handling capacity will be expanded from the existing 45 million passengers/year to 60 million passengers/year by the Second Phase Project⁴. Furthermore, passenger handling capacity will be expanded to 80 million passengers/year by the implementation of the Third Phase Project through the construction of the third runway and the domestic passenger terminal building.

3.1.2 Relevance with the Development Needs of Thailand

At the time of the Phase I appraisal, air passenger demand in Bangkok was growing, together with economic development as well as development of the tourism sector in Thailand. For example, the number of international and domestic air passengers recorded 9-15% annual

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory.

² ③:High, ②:Fair, ①:Low.

³ The master plan divided the entire development plan into five phases, and its ultimate goal was to expand the airport capacity with four runways, passenger handling capacity with 100-120 million passengers/year and cargo handling capacity with 6.4 million tons/year.

⁴ The Second Phase Project obtained Cabinet approval in August 2010, and the contract for management consulting service was signed between AOT and the consultants in May 2012.

growth rates, and it was estimated that the total number of international and domestic passengers would increase to 35 million in 2000 and 55 million in 2010. Meanwhile, the passenger handling capacity of the existing Don Muang Airport (Bangkok International Airport) had been expanded to 30 million passengers/year in 1995. However, since Don Muang Airport was surrounded by main roads and a populated residential area as well as a part of the airport being utilized for a military base, it was difficult to further expand the airport in order to cope with future demands. Therefore, the construction of the Second Bangkok International Airport was urgent in order to meet future demands and secure smooth air transportation.

At the time of the ex-post evaluation, the number of passengers at Survarnabhumi Airport (in 2011) was 47.9 million, which already exceeded the existing passenger handling capacity of 45 million. It is estimated that the number of passengers at the airport will increase to 58.9 million in 2015, 72 million in 2020, and that cargo volume will increase to 1.58 million tons in 2015 and 1.97 million tons in 2020⁵ (Table 1).

Table 1: Demand Forecast of Survarnabhumi Airport

	2011*	2012	2013	2014	2015	2020
1. No. of passengers (unit: 1,000/year)	47,911	51,015	53,766	56,444	58,901	72,049
- International	35,009	37,394	39,996	42,401	44,384	54,374
- Domestic	11,305	11,982	12,106	12,354	12,803	15,828
- Transit	1,597	1,639	1,664	1,689	1,714	1,847
2. Cargo volume (unit: tons/year)	1,347,514	1,380,000	1,445,450	1,514,000	1,586,700	1,973,500
- International	1,265,016	1,318,000	1,381,000	1,447,000	1,517,000	1,889,000
- Domestic	55,080	62,000	64,450	67,000	69,700	84,500
- Transit	27,418	N/A	N/A	N/A	N/A	N/A
3. No. of takeoffs and landings (unit: time/year)	299,566	317,456	331,960	346,244	359,700	431,701
- International	216,636	229,894	243,720	256,425	266,848	318,344
- Domestic	82,930	87,562	88,240	89,819	92,852	113,357

Source: AOT.

Note: The figures in 2011 are actual figures.

The total number of passengers at the six major international airports⁶ in Thailand in 2010 was 58.2 million, of which 42.8 million (73.5%) were passengers at Survarnabhumi Airport⁷. At present, 105 airlines, including 101 international and 4 domestic airlines, operate in Survarnabhumi Airport with a flight network to 146 overseas cities in 61 countries and 22 cities in Thailand. Survarnabhumi Airport is ranked 17th in passenger volume in the world and is a major regional hub-airport in Asia⁸. Thailand has the biggest manufacturing base for electronics and automobile industries in the ASEAN region with a well-developed infrastructure and supporting industries. Thailand is also one of the important economic focal points for exports into the ASEAN region. In addition, since Thailand is rich in tourist resources and is located at a strategic point for transport in the region, the country attracts a great number of tourists, not only from the neighboring states, but from all over the world including Europe, U.S.A. and Australia. According to a forecast of the International Civil Aviation Organization

⁵ The current cargo handling capacity of Survarnabhumi Airport is 3 million tons/year.

⁶ Survarnabhumi Airport, Don Mang Airport, Chiang Mai Airport, Hat Yai Airport, Phuket Airport, and Chiang Rai Airport.

⁷ Source: 2010 AOT Air Traffic Statistical Report, AOT, 2011.

⁸ The survey of the Airport Council International (ACI). In the same survey, Changi Airport in Singapore is ranked in 18th place and Jakarta Airport in Indonesia is ranked in 16th place.

(ICAO), air passenger demand in the world will increase by about 6% during the period between 2012 and 2013, and in particular air passenger demand in the Asia Pacific region will increase by about 8% during the same period⁹. Under these circumstances, the necessity to expand the capacity of Survarnabhumi Airport and strengthen its function as a major international hub-airport in Asia was still valid from the view point of promoting the economic development and competitiveness of the country as well as attracting the growing air passengers in the Asia Pacific regions to visit Bangkok as their destination or transit point at the time of ex-post evaluation.

Initially it was planned that the operation of all commercial flights in Bangkok would be consolidated at Survarnabhumi Airport after its opening, but Don Muang Airport has continued to operate as a domestic airport limited to non-connecting domestic flights through a decision of the Thai government. As previously explained, the number of passengers at Survarnabhumi Airport has exceeded the designed capacity since 2011, and it is planned that Don Muang Airport will be continuously utilized in parallel with Survarnabhumi Airport at least until the realization of the Second and Third Phase Projects.

3.1.3 Relevance with Japan's ODA Policy

Japan's Official Development Assistance Charter, approved in 1992, focused on assistance for infrastructure improvement as a priority area with a special emphasis on the Asian region. At the time of the Phase I appraisal in 1996, Japan's ODA policy for Thailand had five priority areas, which were: (i) social sector development, (ii) environmental protection, (iii) rural and agricultural development, (iv) economic infrastructure development, and (v) support for regional cooperation. Regarding (iv) economic infrastructure development, special attention was paid to the inadequacy of the economic infrastructure caused by rapid industrial and economic growth in Thailand, together with problem of overconcentration in Bangkok.

From the above, it can be seen that this project has been highly relevant to Thailand's development plan and development needs, as well as to Japan's ODA policy, therefore its relevance is high.

3.2 Effectiveness¹⁰ (Rating: ③)

3.2.1 Quantitative Effects

(1) Operation and Effect Indicators

The number of passenger at Survarnabhumi Airport was 38.6 million in 2008, 82.1% against the target figure, and thus almost achieving the target. After 2008, the number of passengers constantly increased to 40.5 million in 2009 and 42.7 million in 2010, reaching 47.9 million in 2011. As the designed capacity of Survarnabhumi Airport was 45 million per year, passenger volume had already exceeded capacity. The number of takeoffs and landings was 245,719 in 2008 with a 102.3% achievement of the target. After 2008, this also steadily increased to 253,967 in 2009, 265,896 in 2010 and 299,566 in 2011. Cargo volume was 1,199,897 tons in 2008, an 80.7% achievement of target. Although this declined to 1,070,623 tons in 2009, the figure recovered to 1,343,533 tons in 2010 and 1,347,514 tons in 2011 (Table 2).

Possible factors behind the actual passenger and cargo volume in 2008 being about 80% against the target and the cargo volume temporarily dropping in 2009 were a slump in the number of tourists and business persons going to Thailand, as well as a slump in exports and imports, caused by the world economic recession and financial crisis of September 2008 (the so called "Lehman Shock"), as well as an outbreak of Influenza A (H1N1) infection in 2009, and

⁹ ICAO Medium-term Forecast, ICAO News Release, 19 July 2011.

¹⁰ Sub-rating of Effectiveness is to be included in consideration of Impact.

political instability in Thailand. It was expected that passenger and cargo volume would continuously increase after 2011, and AOT, the executing agency of this project, plans to expand the passenger handling capacity to 80 million per year by implementing the Second and Third Development Projects.

Table 2: Operation and Effect Indicators of the Project

	Target (2008)	Actual				
		2008	Achievement	2009	2010	2011
1. No. of passengers (unit: 1,000/year)	47,007	38,604	82.1%	40,500	42,785	47,911
- International	32,126	30,104	93.7%	28,835	31,418	35,009
- Domestic	12,607	6,993	55.5%	10,210	9,836	11,305
- Transit	2,274	1,507	66.3%	1,455	1,531	1,597
2. Cargo volume (unit: tons/year)	1,487,655	1,199,897	80.7%	1,070,623	1,343,533	1,347,514
- International	1,295,921	1,140,300	88.0%	1,003,187	1,259,181	1,265,016
- Domestic	86,934	23,068	26.5%	38,989	49,708	55,080
- Transit	104,800	36,529	34.9%	28,447	34,644	27,418
3. No. of takeoffs and landings (unit: time/year)	240,095	245,719	102.3%	253,967	265,896	299,566
- International	154,729	188,706	122.0%	181,522	192,463	216,636
- Domestic	85,366	57,013	66.8%	72,445	73,433	82,930

Source: AOT.

As previously stated, the flight network of Suvarnabhumi Airport expanded to 146 overseas cities in 61 countries. The number of regular commercial flights per month increased from 21,436 flights (14,479 international flights and 6,957 domestic flights) to 23,364 flights (17,446 international flights and 6,248 domestic flights) in a comparison of before and after the project, which indicates about 9% of growth (Table 3).

Table 3: Comparison of Flight Network before and after the Project

	Before Project Completion (2006) Don Muang Airport		At Present (2011) Suvarnabhumi Airport	
	International	Domestic	International	Domestic
No. of airlines operating	91	7	101	4
No. of cities connected	132	26	146	22
No. of regular commercial flights per month	14,479	6,957	17,446	6,248
No. of chartered flights per month	240	0	519	0

Source: AOT

3.2.2 Qualitative Effects

(1) Improvements in the Convenience and Efficiency of the Airport

The capacity of the airport facilities was substantially expanded by shifting the main airport in Bangkok from Don Muang Airport to Suvarnabhumi Airport after project implementation (Table 4). The new airport is able to accommodate more passengers through an expansion of airport facilities such as the passenger terminal area, check-in counters, boarding bridges, the baggage area, the passport control area, airline lounges, commercial and service facilities. Also the flow of transit passengers had become smoother through the consolidation of the international and domestic terminals into one at the new airport. The

maximum number of takeoffs and landings increased from 60 per hour to 76 per hour. According to AOT, flight delays caused by delays in takeoffs and landings were dramatically lessened after project implementation.

Table 4: Comparison of Airport Capacity before and after the Project

	Before Project Completion (2006) Don Muang Airport	At Present (2011) Suvarnabhumi Airport
1. Passenger handling capacity (persons/year)	33,500,000	45,000,000
2. Cargo handling capacity (tons/year)	1,000,000	3,000,000
3. No. of takeoffs and landings (times/hour)	60	76
4. No. of boarding bridges (no.)	35	51
5. No of remote parking stands (no.)	66	69

Source: AOT

In sum, the number of airlines, the number of connecting cities, and the number of regular commercial flights were all expanded, and thus the convenience of air passenger transport and cargo transport was improved at Suvarnabhumi Airport, in comparison with the situation at Don Muang Airport before project implementation. Also, transport accessibility was improved by improved accessibility between the airport and the existing road and highway network and the opening of a railway between the airport and Bangkok city center.

Meanwhile however, congestion at the airport became severe after passenger volume exceeded the designed handling capacity in 2011. As shown in the results of the beneficiary survey with airlines below, this issue may affect the positive effects of improvements in the convenience and efficiency of the airport, and thus preparation for further expansion of the capacity of the airport facilities has been in progress at present.

(2) Improvements in the Airport Safety

The airport safety and security status of Suvarnabhumi Airport has been improved by a strengthening of security facilities of the passenger terminal such as security checks, security gates and security camera systems as well as an improvement of AOT institutional aspects of airport safety, by establishing Aviation Security Standard and Quality Control Department which is responsible for conducting aviation security training and quality control activities in accordance with ICAO standards. This may be compared to the situation at Don Muang Airport. Both Suvarnabhumi Airport and Don Muang Airport fully meet the airport safety standards of ICAO.

(3) Improvements in the Capacity and Function of the Airport as an International Hub-Airport

As previously explained, Suvarnabhumi Airport expanded its flight network in and out of the country and was ranked 17th in passenger volume after project implementation. Suvarnabhumi Airport has been highly evaluated for the quality of its airport facilities and services in the major world airport ranking surveys (Table 5). Therefore, it can be judged that the project has improved the capacity and function of the airport in Bangkok as a major international hub-airport in Asia.

Table 5: World Airport Rankings of Suvarnabhumi Airport

	2008	2009	2010	2011
Airports Council International (ACI), Airport Service Quality Award	5	-	-	5
SKYTRAX, World Airport Award	37	16	10	13
Smart Travel Asia, World Best Airport (by airport category)	-	3	3	5

Source: ACI, SKYTRAX, Smart Travel Asia.

Note 1: ACI is a non-profit global trade organization of the world's airports, consisting of 576 members operating 1,656 airports in 179 countries and territories (as of March 2011).

Note 2: Skytrax is an United Kingdom-based research service firm, which conducts airline and airport reviews and rankings across the world.

Note 3: Smart Travel Asia is an online travel magazine.

(4) Results of Beneficiary Surveys with Airlines (Beneficiary's Assessment on the Quantitative Effects of the Project)

This ex-post evaluation conducted a beneficiary survey with the airlines operating in Suvarnabhumi Airport as a part of the assessment of the project effects (the detailed survey results are provided in the Box: Summary Results of the Beneficiary Survey with Airlines below). On the one hand, about 50 to 70 percent of respondents positively evaluated the current status of the takeoff and landing functions of the runways, taxiways, and aprons, the aircraft assistance services including maintenance facilities and services, airport operation and management, and Suvarnabhumi Airport as a regional hub-airport in Asia as a whole. On the other hand, only about 30 to 40 percent of respondents gave a positive evaluation of passenger handling services, the efficiency and convenience of the airport, and airport safety and security. A common reason for this relatively low satisfaction rate was the recent severe congestion of passengers and aircrafts in the airport. The following recommendations were proposed by respondents and are expected to be taken into consideration in the on-going Second Phase Project.

Regarding efficiency and convenience of the airport, the following are recommended: (i) mitigation of the congestion of passengers in airport facilities such as the departure and arrival lobbies, the connection lobby, passport control areas, and the baggage claim area as well as the congestion of aircraft on the runways, taxiways and apron areas, (ii) expansion of toilet facilities, information signs, and car park space as well as the introduction of a free wireless internet service in the passenger terminal, and (iii) expansion of space for airline offices and airline lounges as well as a canteen for airport employees.

Regarding airport safety and security, the following recommendations are made: (i) strengthening of the security monitoring system at airside¹¹ by an increase in the number of monitoring cameras in risky areas, (ii) enforcement of strict staff access controls to aircraft, (iii) improvement of the capacity of staff engaged in security checks, and (iv) a modernization of the baggage matching system. Moreover, it was recommended that service fees such as airport facility service charges be revised to a reasonable price.

¹¹ Airside is a restricted area in the airport where only passengers who have completed the embarkation procedures at immigration and airline and airport staff are allowed to enter.

Box: Summary Results of the Beneficiary Surveys with Airlines

The ex-post evaluation conducted beneficiary surveys with airport users. Firstly, a questionnaire was sent to 84 airport users including 82 airline companies and two airport ground handling companies operating in Suvarnabhumi Airport. Out of 84 companies, 15 airline companies responded to the questionnaire including one airline from USA, four airlines from Europe, seven airlines from Asia, one airline from the Middle East, and two airlines from Australia. The collection rate for the questionnaire was 17.9%. The summary results of the beneficiary survey is as follows:

(1) Takeoff and Landing

- 67% of respondents (or 10 respondents) were either “satisfied” or “satisfied to some extent” with the capacity of the runways and touchdown areas. Regarding the capacity of the taxiways and aprons, 60% of respondents (or 9 respondents) answered that they were either “satisfied” or “satisfied to some extent”.
- Respondents who answered either “unsatisfied” or “not satisfied at all” explained the reasons as recent airport congestion at peak hours caused by the number of flight delays and bad surface conditions on a part of the taxiways and apron areas.
- 80% of respondents (or 12 respondents) answered either “satisfied” or “satisfied to some extent” with the aviation safety and systems during takeoff and landing.

(2) Aircraft Assistance Service

- On the one hand, 53% of respondents (or 8 respondents) recognized that the maintenance facilities and services of Suvarnabhumi Airport had improved in comparison with those of Don Muang Airport in the past. On the other hand, 20% of respondents (or 3 respondents) answered that they had deteriorated, and the necessity for improving the the management of facility maintenance was suggested.
- Regarding fueling, catering, cabin cleaning, and ground support equipment (GSE) services, 60% of respondents (or 9 respondents) replied that they had improved.

(3) Passenger and Cargo Handling Services

- On the one hand, 40% of respondents (or 6 respondents) were either “satisfied” or “satisfied to some extent” with the capacity of the passenger handling services and passenger terminal facilities. On the other hand, 60% of respondents (or 9 respondents) were either “unsatisfied” or “not satisfied at all”. The reasons for this were the congestion of airport facilities, such as the departure and arrival lobbies, the connection lobby and immigration areas, at peak hours and a lack of information signs, toilets, lighting and parking lots.
- Regarding the capacity of the cargo handling services and cargo terminal facilities, 73% of respondents (or 11 respondents) answered that they were either “satisfied” or “satisfied to some extent”.

(4) Airport Operation and Management

- 67% of respondents (or 10 respondents) agreed that the services provided by AOT met the requirements and expectations of airlines. However, 53% of respondents (or 8 respondents) replied that the service charge of Suvarnabhumi Airport, such as the airport facility charge, is higher than at other major international airports.

(5) Efficiency and Convenience of the Airport

- Regarding the efficiency and convenience of Suvarnabhumi Airport, 33% of respondents (or 5 respondents) said that they were either “very good” or “good”, 33% of respondents (or 5 respondents) were “neutral”, and 33% of respondents (or 5 respondents) said that they were either “bad” or “very bad”.
- In their opinion, Suvarnabhumi Airport is efficient and convenient in terms of the airport security system, transport accessibility, Custom Immigration Quarantine (CIQ), baggage handling, cleanliness and hygiene, and the variety of shops and restaurants. However, AOT’s disadvantages are a shortage of car parking space and toilets, information signs, long walking distances in the terminal, congestion at check-in, the CIQ, the baggage claim area, and the drop-off area in front of terminal for buses and taxis, bad allocation of shops and restaurants, bad service on the part of officers, and so on.

(6) Airport Safety and Security

- Regarding airport safety and security, 33% of respondents (or 5 respondents) said they were either “very good” or “good”, 27% of respondents (or 4 respondents) were “neutral”, and 40% of respondents (or 6 respondents) said they were either “bad” or “very bad”. Basically those who answered “neutral” recognized that there was no problem in the airport safety and security status of Suvarnabhumi Airport.
- Those who answered either “bad” or “very bad” pointed out problems in the capacity of security staff, their technical skills, professional knowledge, communication skills in foreign languages, and behavior at work.

(7) Suvarnabhumi Airport as a Regional Hub-Airport in Asia

- Regarding the status of Suvarnabhumi Airport as a regional hub-airport, 47% of respondents (or 7 respondents) answered that it was either “very good” or “good”, 40% of respondents (or 6 respondents) replied “neutral”, and 13% of respondents (or 2 respondents) answered “bad”.
- On the one hand, those who answered either “very good” or “good” considered that Suvarnabhumi Airport satisfied the conditions for a regional hub-airport as Bangkok is in the best location with good airport facilities and public transportation infrastructure. On the other hand, those who replied “bad” pointed out several disadvantages to the airport such as congestion of airport facilities, lack of information signs, poor slots management, and complicated flight connections.

Photograph: Passenger Terminal Facilities of Suvarnabhumi Airport



Departure Lobby



Duty Free and Shopping Area



Transit Counter



Arrival Area



Immigration Area



Baggage Claim Area

3.3 Impacts

3.3.1 Intended Impacts

(1) Commercial Development near the Airport

Housing estate development projects have been in progress near Suvarnabhumi Airport. At present, there is a master plan for the development of a commercial zone in the Northeast plot near the airport with a total area of 182.4 ha. The plan has been initiated with the target year of completion as 2030¹². The plan includes the development of a commercial complex containing three four star hotels, a convention center, an exhibition hall, an office park, premium factory outlets, luxury serviced apartments, a hospital, and Thai food markets. This commercial complex is expected to become a new commercial lodgment area in the Bangkok Metropolitan area.



Makkasan Station
(Airline check-in counters)

(2) Development of the Transport Network between the Airport and the City Center of Bangkok

In parallel with the implementation of this project, airport access roads were connected to the motorways and expressways, and existing local trunk roads and community roads near the airport were expanded or improved. In August 2010, an airport railway (the so called “Airport Rail Link”) with a total length of 28.5km was opened between Suvarnabhumi Airport and Makkasan Station of the State Railway of Thailand (the so called “Makkasan City Air Terminal”). Makkasan Station is not only used as a conventional railway station, but also it also provides the check-in and baggage handling services of airlines as the City Air Terminal¹³. The Airport Rail Link is used as public transport for both airport passengers and airport staff as well as local residents along the line. The number of passengers using the non-stop express

¹² The project name is the Public-Private Partnership for Commercial Real Estate Development of the Land Plot No.37 in Suvarnabhumi Airport.

¹³ As of 2011, only Thai Airways International provides a check-in service at Makkasan City Air Terminal.

service of the Airport Rail Link connecting the airport and Makkasan Station in 17 minutes was about 3,500 persons/day in 2011. The number of passenger using the commuter service (City Line) was 48,000 persons/day in the same year¹⁴.

(3) Promotion of Tourism Sector Development in Thailand

The total number of passengers at the major six international airports in Thailand was 58 million in 2010, out of which 42.8 million (73.5% of the total) were accommodated at Suvarnabhumi Airport. The number of tourists visiting Thailand has shown a stable upward trend since 2006 except in the period between 2008 and 2009 when Thailand was hit by the financial crisis in September 2008, an outbreak of Influenza A (H1N1) in 2009, and political instability. A considerable number of tourists visiting Thailand use Suvarnabhumi Airport (Table 6). The tourism industry is one of the main industries in Thailand, and the tourism sector has a share of 6% in the Gross Domestic Product (GDP) of the country.

According to the Tourism Authority of Thailand (TAT), the increase in air travelers as a result of capacity improvement of the airport facilities in Bangkok has had a direct contribution to the growth in the number of tourists visiting Thailand. TAT recognized that this project also contributed to the promotion of the Thai tourism industry and the attraction of tourists. Furthermore, TAT considers that Suvarnabhumi Airport had played an important role as a gateway to the Asian market, and that this project has had a positive impact not only on the tourism industry but also on trade and investment. Therefore, it can be concluded that this project has made a contribution to the promotion of tourism sector development in Thailand to some extent.

Table 6: Number of Tourists visiting Thailand

	2006	2007	2008	2009	2010	2011
No. of Tourists visiting Thailand (Million persons)	13.82	14.46	14.20	14.15	15.90	19.10

Source: Tourism Authority of Thailand (TAT).

Note: No. of tourists visiting Thailand are those who entered Thailand via all means of transportation including air, land and ship.

3.3.2 Other Impacts

(1) Impact on the Natural Environment

The environmental impact assessment (EIA) for the original project scope acquired the approval of the National Environmental Board (NEB) of Thailand in May 2002, and the additional EIA accompanying the modification in project scope obtained the approval of NEB in March 2005.

a) Noise Pollution Compensation with Local Residents

AOT has implemented the following compensation scheme for noise pollution near the airport according to the level of noise. According to Thai government policy, the target for compensation is defined as those people who live in an area of more than NEF¹⁵ 30 and who have been living in the location before 2001¹⁶. Principally, AOT purchases the land and

¹⁴ Initially the estimated daily average number of passenger in 2007 was 8,200 persons/day for the express and 87,700 persons/day for the city line. However, the actual passenger volume in 2011 did not reach the targets. The reason for this may be the bad connection with public transport such as the subway system (MRT) and the monorail system (BTS Skytrain) at Makkasan Station, which reduces the convenience of passengers.

¹⁵ NEF (Noise Exposure Forecast) is a measurement of the actual and forecasted aircraft noise recommended by ICAO. If NEF is converted to decibels, NEF 40-50 is equivalent to less than 75 decibels, NEF 35-40 is equivalent to less than 70 decibels, and NEF 30-35 is equivalent to less than 65 decibels.

¹⁶ Since the Thai government officially announced the implementation of this project to the public in 2001, those who moved into the area near Suvarnabhumi Airport after 2001 are not entitled to receive compensation for noise pollution even if their houses and buildings are located in an area of more than NEF 30.

buildings of residents in areas of more than NEF 40, and AOT subsidizes the cost for improving the soundproofing of buildings. If residents in areas of more than NEF 40 are not willing to sell their property, alternatively they can receive money for building improvements.

The number of target households for compensation identified by AOT as of end of 2011 was: 644 households in areas of more than NEF 40, and 15,040 households in areas of NEF 30-40. So far, 472 households (73%) out of 644 households in areas of more than NEF 40, and 6,135 households (41%) out of 15,040 households in areas of NEF 30-40 have already completed the compensation procedures (Table 7).

Table 7: Summary of Noise Pollution Compensation (As of December 2011)

Noise level	Description	Amount
More than NEF 40	Total no. of households	644 households
	a) Prefer to sell land and buildings	208 households (110 households completed)
	b) Prefer to improve building soundproofing	436 households (362 households already paid)
NEF 30-40	Total no. of households	15,040 households
	a) Improvement of building for soundproofing	15,040 households (6,135 households already paid)
	Compensation to King Mongkut's Institute of Technology Ladkrabang (KMITL)	214 million Baht
	Compensation to sensitive public buildings such as hospitals, schools and religious places (building improvement)	21 locations (19 locations already paid for soundproofing) 293 million Baht
	Waiting for acceptance of offers from Bangkok Metropolitan Administration (BMA)	2 locations

Source: AOT

Note: Incomplete compensation cases are: (i) where the compensation process is in progress or under preparation; (ii) where corrections are being made in the estimation and appraisal of land and building value; (iii) where acceptance is being awaited by the land owners, (iv) where the year that houses were built is under investigation, (v) where the owner of land and building is unknown, and (vi) where compensation is not accepted.

The reason why compensation is an on-going process at present, five years after the opening of the airport in September 2006, is that the noise affected areas and target households for noise pollution compensation were ultimately determined and identified based upon the result of an additional noise impact study in 2006-2007¹⁷. The kick-off of the full-scale of compensation process was thus delayed. In addition, AOT conducted a noise pollution compensation scheme for the first time during this project and their unfamiliarity with the scheme may be another reason for the prolonged compensation process. According to the Ministry of Natural Resources and Environment (MNRE), the Bangkok Metropolitan Administration (BMA), and the two local governments where Suvarnabhumi Airport is located: Lat Krabang District of Bangkok City and Bang Phli District of Samut Prakan Province, they also recognized that a lack of information disclosure to the public and consultation with local authorities and people by AOT as well as a lack of communication and coordination between AOT, local authorities and related government organizations were another factors influencing on the delay of the compensation process. They expected AOT and concerned organizations to jointly solve the above two issues. According to AOT, it is planned that all compensation cases will be completed by the end of 2012. However, there are some households who do not

¹⁷ The noise impact study was conducted in the EIA approved in 2002 and the additional EIA approved in 2005. Later noise simulation criteria were revised by a Cabinet Decision of Thai government, an additional noise impact study was conducted in 2006-2007 by AOT.

agree with the proposed amount of compensation by AOT and there are disputed court cases against AOT and the Thai government taken by some local residents near the airport¹⁸. These pending issues must be carefully taken into consideration when carrying forward the on-going compensation scheme.

Photograph: Compensation for Noise Pollution by AOT



Procedures for noise pollution compensation by AOT



House with Soundproofing



Interview with local residents in a noise affected area (NEF 30-40)

b) Noise

In this ex-post evaluation, an interview survey with 50 households near the airport regarding the environmental impact of the project was conducted¹⁹. Regarding noise pollution²⁰, “very severe” was returned by 100% of respondents with over NEF 40 (or 20 respondents), 80% of respondents with NEF 30-40 (or 14 respondents), and 40% of respondents below NEF 30 (or 4 respondents), and “severe to some extent” was given as an answer by 15% of respondents with NEF 30-40 (or 5 respondents) and 50% of respondents below NEF 30 (or 5 respondents). Since Suvarnabhumi Airport is operated in 24 hours a day and the number of takeoffs and landings achieves a peak at night time, local residents are sensitive to the noise from aircraft. According to the Ministry of Natural Resources and Environment (MNRE), the Bangkok Metropolitan Administration (BMA), Lat Krabang District, and Bang Phli District, they had received many complaints about noise pollution from residents near the airport, and they concerned about possible negative effects on the health and living conditions of people in the noise affected areas.

Meanwhile, concerning the acceptability of noise pollution, 64% of total respondents (or 32 respondents) replied that they could accept noise pollution.

¹⁸ 359 local people near the airport appealed to a civil court in 2007 and requested that AOT, the Department of Civil Aviation, the Ministry of Transport and the Department of Pollution Control, Ministry of Natural Resource and Environment: (i) suspend takeoffs and landings during the night in Suvarnabhumi Airport, and (ii) purchase residents’ houses where noise exceeded 70 decibels (i.e. NEF 30-40) while paying for the sound proofing of houses for those who were experiencing lower noise levels (i.e. lower than NEF 30). The court rejected the demand of the people in February 29, 2012.

¹⁹ The 50 households interviewed included 20 households in an area with more than NEF 40, 20 households in an area with NEF 30-40, and 10 households in an area with less than NEF 30, and the 50 households have been living in their area before 2001. The target areas of the interview survey were eight local communities in Lat Krabang District of Bangkok City and Bang Phli District of Samut Prakan Province including Roongkij Garden Home Village, Romruedee Village, Pracharuamjai Community, Ruamjaiapatana Community, Bangchalong Sub-district, Bang Pla Sub-district, Rajathayva Sub-district, and Nongprue Sub-district. In each community, approximately 5-8 households were randomly selected and interviewed. In order to make a comparison with the situation of the households who were eligible to the noise pollution compensation and who were not eligible to the compensation under the current compensation scheme, 10 households in an area with less than NEF 30 were included in the target households of this interview survey.

²⁰ Regarding noise pollution, 82% of total respondents (or 41 respondents) said “very severe”, 16% of total respondents (or 8 respondents) said “severe to some extent”, and 2% of total respondents (or one respondent) said “No problem at all”.

c) Air Pollution

The results of the interview survey with 50 households near the airport indicates that regarding air pollution²¹, 80% of respondents with over NEF 40 (or 15 respondents), 70% of respondents with NEF 30-40 (or 14 respondents) and 40% of respondents below NEF 30 (or 4 respondents) answered either “very severe” or “severe to some extent” when asked about forms of dust, smoke and oil slough, etc. associated with the takeoffs and landings of aircrafts.

Meanwhile, concerning the acceptability of air pollution, 80% of total respondents (or 40 respondents) replied that they could accept air pollution.

d) Vibration

Similarly, regarding vibration²², 100% of respondents with over NEF 40 (or 20 respondents), 100% of respondents with NEF 30-40 (or 20 respondents) and 90% of respondents below NEF 30 (or 9 respondents) said it was either “very severe” or “severe to some extent”. It was observed that areas with a high noise level tended to be subject to the influence of air pollution and vibration.

Meanwhile, concerning the acceptability of vibration, 72% of total respondents (or 36 respondents) replied that they could accept vibration.

e) Discharge Water and Waste Treatment

Waste water from the airport is treated at a waste water treatment plant (WWTP) with a maximum treatment capacity of 18,000m³/day in the airport. The water quality parameters of discharged water from WWTP meet Thai environmental standards (Table 8).

In addition, 40 tons of garbage per day produced in the airport (90% general waste, 9% hazardous waste, and 1% infected waste) is sorted at the waste management building with the final disposal treatment being outsourced to contractors. The above waste management is undertaken according to ISO14001 which is the environmental management system standard.

The results of the interview survey with 50 households near the airport indicate that no problems of discharge water and waste treatment in the area near Suvarnabhumi Airport were identified.

Table 8: Monitoring Indicators for Discharged Water

		Unit	2006	2007	2008	2009	2010	2011	Thai Standards
1	pH	-	-	-	-	-	-	-	-
2	Dissolved Oxygen (DO)	mg/L	4-5	4-5	4-5	4-5	4-5	4-5	N.A.
3	Chemical Oxygen Demand (COD)	mg/L	30-40	30-40	30-40	30-40	30-40	30-40	50
4	Biochemical Oxygen Demand 5 (BOD5)	mg/L	2-4	2-4	2-4	2-4	2-4	2-4	20
5	Total Suspended Solids (TSS)	mg/L	3-5	3-5	3-5	3-5	3-5	3-5	50
6	Oil & Grease	mg/L	0.5	0.5	0.5	0.5	0.5	0.5	5
7	Coliform	MPN/100ml	<1	<1	<1	<1	<1	<1	N.A.
8	Total Kjeldahl Nitrogen (TKN)	mg/L	4-5	4-5	4-5	4-5	4-5	4-5	120
9	Total Nitrogen (TN)	mg/L	8-9	8-9	8-9	8-9	8-9	8-9	N.A.
10	Total Phosphorus (TP)	mg/L	1-1.5	1-1.5	1-1.5	1-1.5	1-1.5	1-1.5	N.A.

²¹ Regarding air pollution, 32% of total respondents (or 16 respondents) said “very severe”, 36% of total respondents (or 18 respondents) said “severe to some extent”, 30% of total respondents (or 15 respondents), and 2% of total respondents (or one respondent) said “do not know”.

²² Regarding vibration, 46% of the total respondents (or 23 respondents) said it was “very severe”, 36% of the total respondents (or 18 respondents) said it was “severe to some extent”, 16% of the total respondents (or 8 respondents), and 2% of the total respondents (or one respondent) said that they “do not know”.

		Unit	2006	2007	2008	2009	2010	2011	Thai Standards
11	Cadmium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
12	Chromium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.75
13	Lead	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.20
14	Arsenic	mg/L	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.25

Source: AOT

Photograph: Site Utilities at Suvarnabhumi Airport



Water Supply Pumping Station



Waste Water Treatment Plant



Waste Management Building

f) Others

According to the results of interviews with noise affected residents of Romruedee Village located in an area with over NEF 40, the residents have often suffered from objects falling from aircrafts as the village is located directly underneath of takeoff and landing routes. Residents complained about the response of AOT, the Civil Aviation Authority, and the police such as handling of the falling objects and compensation of damages when accidents happened and the lack of feedback of investigation results to the people affected.

In addition, based upon the experience of environmental impacts near the airport, the Ministry of Natural Resources and Environment (MNRE), the Bangkok Metropolitan Administration (BMA), Lat Krabang District and Bang Phli District commonly recognized that the establishment of a coordination mechanism for land use near Suvarnabhumi Airport among the stakeholders must be seriously taken into consideration in order to bring forward the future expansion of Suvarnabhumi Airport.

g) AOT Environmental Mitigation Measures

The Environmental Department of AOT is in charge of environmental monitoring and they produce an environmental monitoring report every quarter. AOT established a Tri-Party Committee²³ with representatives from local people, AOT and the Thai government agencies concerned such as the Ministry of Interior. Various issues are discussed, including the compensation scheme and complaints raised by local people. Local people have been proposing to modify the current compensation scheme so that: (i) those who migrated to near the airport by 2007 should be included as targets for compensation if their houses are located in areas with NEF 30-40 or over NEF 40, and (ii) those who live in areas with NEF 30-40 can be entitled to the same compensation as those who live in areas with over NEF 40, that is, so that land and buildings in areas with NEF 30-40 can be purchased by AOT. Currently AOT, together with local people, have been requesting that the Thai government modifies the compensation schedule and the arrangement of a necessary additional budget in order to expand the target and scope of noise pollution compensation.

²³ The Tri-Party Committee consists of one representative from the Ministry of Transport (Chairperson), one representative from AOT, seven representatives of noise affected local communities, and seven representatives from the Ministry of Finance and the Ministry of Interior. Principally the Tri-Party Committee is to meet one a month.

Regarding the damage by objects falling from aircrafts, the Civil Aviation Authority together with AOT is primarily responsible for handling this issue. AOT will closely work with the Civil Aviation Authority and strengthen the regulations and enforcement measures for aircraft with problems as well as working on accident investigations in order to minimize the risk of the damage. AOT has set up a Community Relationship Unit in the Special Affairs Department under the Administration Line of Suvarnabhumi Airport and has been making efforts to promote the local people's understanding of the project and establish a good relationship between AOT and the local people and communities through discussions, dialogue, listening complaints, provision of information, and participation in community events and activities.

Since opening of the airport, AOT has been implementing a noise abatement measure which is an introduction of noise abatement flight procedures and operating restrictions during takeoff and landing. In addition, AOT plans to implement the following technical and economic environmental mitigation measures: (i) a strengthening of the noise monitoring capacity and the enforcement of aircraft noise control by introducing an aircraft noise monitoring system²⁴, (ii) incentives for airlines which introduce low noise aircrafts, and (iii) a preferential airport tariff system according to the time zone. Furthermore, AOT set up an Airport Environmental Master Plan in 2006, and has been aiming for a more environmentally-friendly airport by introducing the "Green Airport" concept since 2010²⁵. AOT signed a sister airport agreement with the Narita International Airport Corporation (NAA), Japan in 2010 and is establishing a cooperative relationship which will include information exchange and mutual learning about airport environmental management.

(2) Land Acquisition and Resettlement

The Thai government decided on the project site at Nong Ngu Hao, Samut Prakan Province in 1961, and the land acquisition of 3,100 ha was completed in 1973. About 2,300 households on the project site moved out with cash compensation. Only 27 households preferred to move to the resettlement area prepared by AOT, and of these 20 households had been continuously living in the area as of the end of 2011. In the resettlement area, basic infrastructure such as roads, water supply and electricity were provided. The above land acquisition and resettlement was implemented in accordance with the related domestic laws and regulations, and no problems were identified regarding the rules and regulations of the procedures.

In the ex-post evaluation, an interview survey was conducted with 10 resettled households out of the existing 20 households. Previously, most of the households interviewed possessed their own houses and land for fish farming and vegetable gardens, and earned their living from fish farming



Resettlement Area



Interview with Resettled Residents

²⁴ Noise monitoring stations have been set up at 19 locations inside and outside the airport.

²⁵ AOT has implemented the following programs for the Green Airport:

- (1) Energy efficiency improvement (improvement of energy utilization, reduction of electricity use, improvement of the electricity system, reduction of fuel use, improvement in ground transport, electricity generation from renewable sources);
- (2) Green operation (reduction of CO₂ emissions, green building and green areas, the utilization of natural resources such as recycle of water, environmental quality monitoring, green community: the enhancement of the quality of life in the surrounding communities); and
- (3) Noise management (forecasting the aircraft noise impact areas, noise abatement procedures, aircraft noise compensation, aircraft noise monitoring).

and subsistence agriculture. However, after resettlement, they lost their livelihoods. Some are now working as employees of companies and farmers, some are migrant workers and some are unemployed. In general, their employment status is unstable, and there was a strong demand for employment. Also, many households interviewed perceived that the level of their household economy had declined in comparison to the situation before resettlement. Their satisfaction level with the maintenance condition of roads and the water supply as well as with transport accessibility and accessibility to services was not high as 50% of the households interviewed replied there were some problems. In fact, 70% of the households interviewed said that they were “not much satisfied” with living in the resettlement area. The resettlement area is located out of the noise affected area.

In order to meet the demands for employment opportunities on the part of the resettled households, as one of its CSR (Corporate Social Responsibility) activities, AOT has provided an area in one of the airport office building as an open market two days a week in order to encourage the community around the airport, including people in the resettlement area, to sell goods to support their income generation activities.

(3) Socio-Economic Impact on the Local Residents near the Airport

The results of the interview survey with 50 households near the airport indicates that regarding the socio-economic impacts²⁶, 85% of respondents with over NEF 40 (or 17 respondents), 70% of respondents with NEF 30-40 (or 14 respondents) and 90% of respondents below NEF 30 (or 9 respondents) answered either “Yes, very much” or “Yes, to some extent” about positive impacts. Positive socioeconomic impacts such as the establishment of new commercial and business activities, the development of land and housing zones, improvement in the accessibility of services, employment and business opportunities, increases in land price, and population growth were perceived by the majority of respondents.

The key performance indicators such as the number of passengers, the cargo volume and the number of takeoffs and landings mostly achieved their targets in 2008, and they have been increasing constantly since then. Expected project effects such as improvements in airport convenience and efficiency, improvements in airport safety and in the capacity and function of the airport as an international hub-airport have been achieved. Also, the project has positively contributed to commercial development near the airport, the development of the transport network between the airport and the city center of Bangkok, and the promotion of tourism sector development in Thailand. Meanwhile, noise issues near the airport remain pending, but it is expected that this will be improved in the near future by the on-going mitigation measures implemented by AOT and the Thai government agencies concerned. These measures will include periodic environmental monitoring, noise abatement flight procedures and operating restrictions as well as an on-going noise pollution compensation scheme. In addition, the land acquisition and resettlement was implemented in accordance with the related domestic laws and regulations and no problems have been identified.

Thus, this project has largely achieved its objectives, and therefore its effectiveness with the impacts is high.

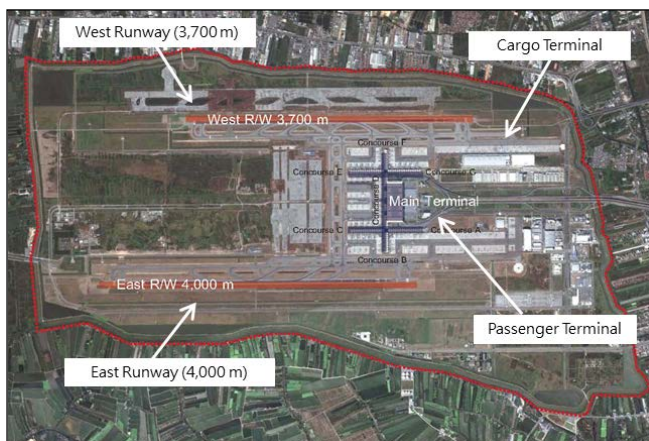
²⁶ Regarding the positive impact of the socio-economic aspects, 56% of the total respondents (or 28 respondents) said “Yes, very much”, 24% of the total respondents (or 12 respondents) said “Yes, to some extent”, 14% of total respondents (or 7 responses) said “No, not so much”, and 6% of total respondents (or 3 respondents) said “No, not at all”.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The planned scope of the main project outputs covered by the Japanese ODA loan portion²⁷ was: (i) Site improvements, including main polder and pump stations, (ii) Main airfield pavements including two runways (3,700m x 45m), a taxiway, and an airside terminal, (iii) A passenger terminal complex (total area: 500,000m², passenger handling capacity: 30 million passengers/year), (iv) Site utilities (water supply plant: capacity of 40,000m³/day, wastewater treatment plant: capacity of 12,200 m³), (v) Transformer stations, (vi) Ground access roads, (vii) Ground improvement of the east runway, and (viii) Consulting services.

Photograph: Panoramic View of Survarnabhmi Airport



Source: AOT

Several modifications were made to the actual project outputs such as modifications to the runway design (3,700m x 60m x 1 no. and 4,000m x 60m x 1 no.), modification to the passenger terminal design (total area: 54,000m², passenger handling capacity 45 million passengers/year), modification to the waste water treatment plant design (capacity: 18,000m³/day). Also, some additions were made to the ground access roads and to ground improvement of the east runway. However, the key project outputs necessary for achieving the expected project objectives were mostly achieved as planned.

The above modifications in the project outputs were made by the Thai government in order to meet the increasing air transport demand, to accommodate large aircraft such as the Airbus 380, and to improve airport security and safety²⁸. Since this project was a large-scale infrastructure project consisting of seven Japanese ODA loan agreements and the above modifications were made in response to the changing situation, the reasons for the modification of the project scope were reasonable.

Those project outputs which were not covered by the Japanese ODA loan portion, such as a cargo terminal with a handling capacity of 3 million tons/year, supporting facilities such as firefighting facilities and airport maintenance facilities, air navigation facilities, airline office buildings, etc. were constructed using AOT finance and private funds.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual total project cost was 382,185 million yen against the 343,641 million yen planned cost, which exceeded the planned cost²⁹, at 111% of planned (Table 9). As for the project cost for the Japanese ODA loan portion, the actual project cost was 217,956 million yen against the 251,930 million yen planned cost, which was within the planned cost (86% of planned).

The main reason for the extra cost was the additional scope of the passenger terminal

²⁷ This project was composed of seven Japanese ODA loan agreements, and after the Phase I appraisal in 1996, the project scope was modified several times. Most of the project scope covered by the Japanese ODA loan portion was identified in the Phase III appraisal in 1999. Therefore, in this ex-post evaluation, the project outputs determined in the Phase III appraisal (1999) are deemed to be the planned outputs to be compared with the actual outputs.

²⁸ The above modification in the project scopes was approved in the Phase VI appraisal in 2004 based upon an agreement between JICA and the Thai government.

²⁹ Since the project outputs approved in the Phase III appraisal in 1999 are deemed to be the planned outputs in this ex-post evaluation, the project cost approved in the Phase III appraisal was also adopted as the planned project cost for comparison.

building and site utilities caused by the modification of the project plan and design. These were mostly in the Thai financed portion.

Table 9: Comparison of Planned and Actual Total Project Cost

Item	Plan		Actual	
	Foreign Currency (mil. JPY)	Local Currency (mil. THB)	Total (mil. JPY)	Total (mil. JPY)
A Japanese ODA Loan financed items				
1. Site improvements (main polder & pump station)	589	275	1,472	1,402
2. Ground improvement for the east runway and taxiway	1,893	2,344	9,417	0
3. Main airfield pavement	6,954	5,842	25,707	43,294
4. Passenger terminal complex	59,143	22,034	129,872	142,720
5. Site utility	2,436	478	3,970	2,817
6. Ground access facilities	1,329	5,587	19,263	19,862
7. Price escalation and physical contingency	9,712	11,752	47,437	0
8. Consulting services*	7,619	2,234	14,792	7,861
Total	89,675	50,546	251,930	217,956
B Thai financed items				
1. Site improvements	353	5,442	17,822	21,525
2. Main airfield improvements	3,789	6,688	25,258	59,425
3. Passenger terminal complex	0	0	0	11,374
4. Site utility	0	0	0	22,885
5. Ground access facilities	0	0	0	931
6. Support facilities	10,009	2,037	16,549	22,080
7. Price escalation and physical contingency	1,588	1,176	5,361	0
8. Consulting services*	8,106	5,799	26,721	26,009
Total	23,845	21,142	91,711	164,229
Ground Total (A+B)	113,520	71,688	343,641	382,185

Source: JICA appraisal document and AOT.

Note 1: The planned project cost is based on the planned project cost at the time of the Phase III appraisal (1999).

Note 2: The Cost for consulting services includes price escalation and physical contingency.

Note 3: Exchange rate used: 1 Baht=3.12 Yen in 1999 (Plan) and 1 Baht=3.114 Yen as an annual average from 1996 to 2007 (Actual).

3.4.2.2 Project Period

The actual project period was 133 months from September 1996 (signing of the loan agreement) to September 2007 (end of the consulting services) against 64 months from September 1996 to December 2001. This was significantly longer than the planned period³⁰, at 208% of the planned project period (Table 10).

The reasons for the delay were: (i) delay in land reclamation due to delay in pumping out of water and prolonged site improvement works, (ii) further delays in the procurements and civil works, etc. associated with the terminal building as the original design of the passenger terminal building (selected as the result of a design competition) had a large roof structure using a massive amount of glass and steel beams which caused technical and financial problems, the unique architectural design requiring major modification, and (iii) delays in the above terminal building package also affecting the schedule of other packages including the selection of contractors.

Survarnabhum Airport formally started operations in September 2006.

³⁰ Since the definition of the start of a project is usually the date of loan agreement signing, the start of this project should be the date of the loan agreement signing for Phase I (1996) of this project. Therefore, the planned project period at the time of the Phase I appraisal (1996) was adopted as the planned project period of this project for comparison.

Table 10: Comparison of Planned and Actual Project Period

Item	Plan	Actual
1. Signing of loan agreement	September 1996	September 1996
2. Site improvement	January 1996 – January 2001 (61 months)	July 1998 – December 2001 (42 months)
3. Main airfield improvement	January 1997 – March 2001 (51 months)	December 2002 – September 2005 (34 months)
4. Passenger terminal building	April 1997 – January 2000 (34 months)	December 2001 – July 2006 (56 months)
5. Site utilities	April 1997 - January 2001 (46 months)	April 2001 – September 2006 (66 months)
6. Ground access facilities	January 1997 – December 2000 (48 months)	January 2000 – December 2006 (84 months)
7. Consulting services	January 1997 – December 2001 (60 months)	May 1998 – September 2007 (113 months)
8. Entire period	September 1996 – December 2001 (64 months)	September 1996 – September 2007 (133 months)

Source: JICA appraisal documents and AOT.

Note: The planned project period is based on the planned project period at the time of the Phase I appraisal (1996).

3.4.3 Results of Calculations for the Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

The result of the recalculation of FIRR for this project at the time of the ex-post evaluation was 2.9%, which was lower than the original FIRR of 6.2% at the time of the Phase III appraisal. The main reason for this was that, although on one hand the actual cost was higher than the planned cost, on the other hand the actual benefits were lower than planned because the revenue has not been increased as estimated due to price of the airport service charges such as landing and parking charge being controlled. The FIRR calculation at appraisal was based upon the preconditions below:

<Preconditions of FIRR calculation at appraisal>

- Cost: Project cost, personal expenses, operating expenses, maintenance expenses, rental expenses, depreciation expenses
- Revenue: Passenger service charge, landing and parking charge, office rental fee, concession revenues, and other service charges
- Project life: 15 years after project completion

(2) Economic Internal Rate of Return (EIRR)

The EIRR at the time of Phase VI appraisal was 16.9%. Due to difficulties in collecting the necessary information and data for a recalculation of EIRR, the ex-post evaluation did not exercise a recalculation of EIRR. The EIRR calculation at appraisal was based upon the preconditions below:

<Preconditions of EIRR calculation at appraisal>

- Cost: Project cost, operation and maintenance cost
- Benefit: Additional value by increase of number of passengers and number of takeoffs and landings, Additional value by employment creation by the project
- Project life: 30 years after project completion

The project cost exceeded that planned, while the project period significantly exceeded the plan, therefore the efficiency of the project is low.

3.5 Sustainability (Rating: ③)

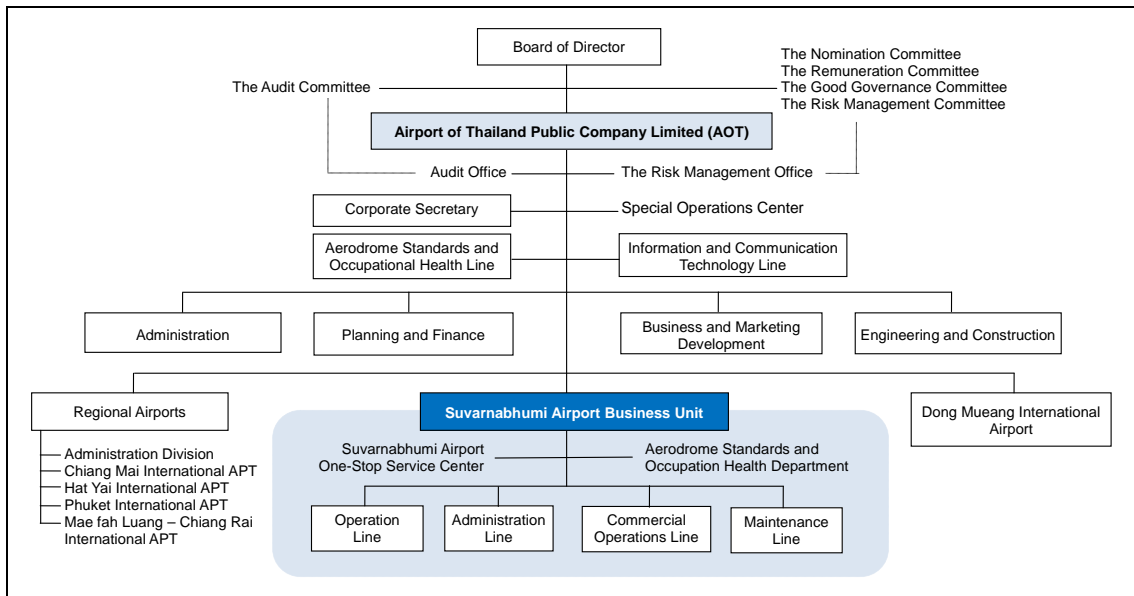
3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance (O&M) agency of the project is the Airport of Thailand Public Company Limited (AOT). AOT was established on September 30, 2002 through the corporatization of the former Airports Authority of Thailand (AAT), which was a state-owned enterprise. At the beginning of project implementation, the New Bangkok International Airport Company (NBIA)³¹ was the executing agency of the project, but it was merged with AOT in December 2004 and AOT has been acting as the executing agency of the project since 2005.

AOT is in charge of the operation and management of the six major international airports in Thailand including Survarnabhumi Airport. The total number of AOT employees is 4,570 and there were also approximately 9,156 outsource workers as of September 2010.

The O&M of the project facilities is undertaken by the following departments under the Operation Line, the Administration Line and the Maintenance Line of Survarnabhumi Airport according to the type of each facility: the Electrical and Mechanical Department, the Airfield and Building Department, the Landside Operation Department, the Airside Operation Department, the Baggage Handling System Department, and the Electronic and Security Department (Figure 2). According to AOT, the number of staff allocated to the respective O&M sections and departments is generally sufficiently. Also, AOT has introduced the “Green Airport” concept and has been developing a cooperative relationship with the Narita International Airport Corporation (NAA), Japan on the various issues, including airport environmental management, having signed a sister airport agreement with NAA in 2010.

The respective O&M sections and departments of AOT are responsible for each project facility according to the type of facilities and there are no particular problems in the structural aspects of the O&M agency.



Source: AOT

Figure 2: Organization Chart of AOT

³¹ NBIA was established in April 1996 by the Thai government as the executing agency of the project.

3.5.2 Technical Aspects of Operation and Maintenance

The O&M of the project facilities are conducted based on the AOT annual maintenance plan, while the maintenance of specific facilities is outsourced to contractors and manufacturers. AOT addresses human resource development of staff, as well as various training programs, including technical training for O&M under the Annual Personnel Development Plan. In 2010, AOT organized (i) 185 Internal Training Courses with a total of 12,107 participants, (ii) 380 External Training Course with a total of 1,016 participants, and (iii) 75 Overseas Training Course with 251 participants.

In parallel with the implementation of this project, JICA conducted a technical cooperation project “Project for Capacity Building for Environmental Management and Airside paved Area Maintenance at Suvarnabhumi Airport” (2004- 2006). In this technical cooperation project, an environmental management plan and operation manual, an airside maintenance management plan, and standard operating procedures for airport facility maintenance were established by JICA experts, and technical transfer of related technical skills and knowledge from JICA experts to AOT was conducted. O&M activities continue to be conducted by AOT based upon the above manuals and procedures. According to the results of interviews with the AOT staff engaged in O&M activities, no major problems regarding their technical capacity has been found.

Therefore, there are no particular problems in the technical aspects of the O&M agency.

3.5.3 Financial Aspects of Operation and Maintenance

Table 11 shows the operation and maintenance budget for Suvarnabhumi Airport in the six years from 2006 to 2011. Since the four years from 2006 to 2009 was under the guarantee period of the manufacturers and suppliers of the facilities, the actual O&M costs in 2006-2009 were far lower than the planned O&M costs. After 2009 both the planned and actual O&M costs increased. Considering that the actual O&M costs have been lower than the planned costs, it can be assumed that the necessary amount of O&M budget has been allocated. The AOT main revenue sources are: (i) landing and parking charges of aircrafts, (ii) passenger and aircraft service charges, (iii) concession revenues and (iv) tenant fees, such as office rental fees and related service charges. The O&M budget is covered by the above revenue sources. According to AOT, there are no major problems in the O&M budget.

Regarding the financial status of consolidated AOT in the last three years, 2009-2011, sales have increased every year and the Return on Sales was at a stable 5-9% in 2010-2011. The sales of Suvarnabhumi Airport account for more than 80% of the sales of consolidated AOT, and thus the revenue from Suvarnabhumi Airport is an important financial source for AOT as a whole (Table 12).

There were no particular problems in the financial aspects of the O&M agency.

Table 11: Operation and Maintenance Budget of Suvarnabhumi Airport

Unit: 1,000 Baht

	Plan (Budget)	Actual (Execution)
2006	50,002	15,187
2007	1,676,755	572,278
2008	1,480,303	489,946
2009	1,920,732	1,051,860
2010	1,764,790	1,376,367
2011	2,712,601	2,101,942

Source: AOT

Note: The above operation and maintenance budget does not include employment costs.

Table 12: Financial Status of AOT and Suvarnabhumi Airport

Unit: Million Baht

Major Operation Indicator	AOT (Consolidated)			Suvarnabhumi Airport Business Unit		
	2009	2010	2011	2009	2010	2011
(1) Sales	21,502	24,032	28,640	18,106	19,934	23,658
(2) Operating Expenses	18,543	20,283	21,432	13,951	15,357	17,025
(3) Operating Income	7,905	8,279	7,865	6,650	7,034	7,263
(4) Depreciation	2,959	3,748	7,207	4,155	4,576	6,633
(5) Profit/Loss before Tax	637	2,177	3,666	3,016	4,915	5,172
Financial Performance	2009	2010	2011	2009	2010	2011
A. Total Assets	149,019	145,832	147,119	117,388	107,424	108,942
B. Current Assets	25,082	28,289	31,954	5,139	5,228	5,171
C. Current Liabilities	13,313	14,176	16,758	43,233	36,404	34,652
D. Total Equity	73,259	74,088	71,554	13,222	15,012	17,069
E. Net Sales	21,502	24,032	28,640	18,106	19,934	23,658
F. Net Income after Income Tax	633	1,376	2,484	734	1,789	2,057
Financial Indicator	2009	2010	2011	2009	2010	2011
Return of Total Assets (F/A)	0.42%	0.94%	1.69%	0.63%	1.67%	1.89%
Return on Sales (F/E)	2.95%	5.73%	8.67%	4.05%	8.98%	8.70%
Total Asset Turnover (E/A)	14.43%	16.48%	19.47%	15.42%	18.56%	21.72%
Current Ratio (B/C)	188.40%	199.55%	190.67%	11.89%	14.36%	14.93%
Equity to Assets Ratio (D/A)	49.16%	50.80%	48.64%	11.26%	13.97%	15.67%

Source: AOT Annual Report 2009, 2010, 2011

Note: The fiscal year of Thailand starts from October and ends in September.

3.5.4 The Current Status of Operation and Maintenance

Just after the opening of Suvarnabhumi Airport in September 2006, various problems and difficulties were observed, such as damage to runways and taxiways, a lack of information signs and toilet facilities, delivery delays and missing checked luggage on arrival. To this was added with unfamiliarity of airport staff with the new airport. However, remedial measures were taken by AOT and most of the above problems and difficulties were solved.

It has been observed that parts of the runways, taxi ways and the apron area are frequently damaged during the rainy seasons. This is probably because the airport was constructed on reclaimed land which used to be a swampy area and when the rainy season comes, the groundwater level rises in proportion to the weight of planes. As a result, a differential settlement takes place in some areas of the runways, taxi ways and the apron. AOT is aware of this serious problem and has been conducting pavement maintenance on the damaged areas. At present, AOT plans to overlay the damaged areas in a two months' period from June to August 2012 in order to repair the damage.

The operational status and O&M procedures for each facility were examined, and no particular problem found.

No major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effects is high.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

The project was highly relevant to Thailand's development plan and development needs, as well as to Japan's ODA policy, and therefore its relevance is high. The operation of the Second Bangkok International Airport (Suvarnabhumi Airport) is generally good. The key performance indicators such as number of passengers, the cargo volume and the number of takeoffs and landings mostly achieved their targets, and they have been continuously increasing. Expected project effects such as improvements in airport convenience and efficiency, improvements in airport safety and improvements in the capacity and function of the airport as an international hub-airport have been achieved. Also, the project has positively contributed to commercial development near the airport, the development of a transport network between the airport and the city center of Bangkok, and the promotion of tourism sector development in Thailand. Noise near the airport remains a pending issue, but mitigation measures have been carried out by AOT and the Thai government. Thus, effectiveness is high.

Project cost exceeded that planned, and the project period significantly exceeded the plan, therefore the efficiency of the project is low. Project sustainability is deemed to be high in the structural, technical and financial aspects, the O&M condition of project facilities and equipment is good.

In light of the above, the project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

It is expected that the noise pollution situation will be improved by the on-going noise mitigation measures of AOT and the Thai government as well as the compensation scheme for affected local residents. In order to bring forward the Second and the Third Development Projects for Suvarnabhumi Airport, the following issues should be taken into consideration:

- (a) AOT plans to introduce technical and economic measures for airport noise mitigation such as: (i) the strengthening of the AOT noise monitoring capacity by the introduction of a noise monitoring system in 2012 together with the promotion of noise abatement flight procedures and operating restrictions, and (ii) the introduction of economic incentives for low noise aircraft and a preferential airport tariff system according to the time zone. The above noise mitigation measures must be given a first priority.
- (b) In order to minimize the risk of the damage caused by objects falling from aircraft, AOT and the Civil Aviation Authority, Ministry of Transport, must strengthen the regulations and enforcement measures for aircraft with problems as well as working on accident investigations.
- (c) The issue of a lack of consultation and explanation with local authorities and people by AOT regarding the compensation scheme for noise pollution and its criteria, the environmental protection measures including the noise abatement measures conducted by AOT, and a future airport development plan was raised by the Ministry of Natural Resources and Environment (MNRE), the Bangkok Metropolitan Administration (BMA), and the two local governments near the airport. This issue may relate closely to the issue of the AOT prolonged compensation process for noise affected local residents. AOT has set up a Community Relationship Unit in the Special Affairs Department under the Administration Line of Suvarnabhumi Airport and the Unit has been making efforts to promote the people's understanding of the project through discussions, dialogue, the provision of information, and participation in community events and activities. However, since the manpower of the Unit as well as their scope of work are limited, the Unit has not yet achieved sufficient success. It is

recommended that AOT strengthen the capacity of the Community Relationship Unit including its manpower and continue to make efforts to establish a reliable mutual relationship between AOT, the local authorities and local people.

- (d) It is expected that the prolonged noise pollution compensation process will be accelerated by fully utilizing the mechanism of the existing Tri-Party Committee. In addition, considering the future possibility for reexamination of the existing compensation scheme and its criteria for eligible households to be compensated, efforts to secure an appropriate budget for sufficient compensation by AOT and the Thai government are very important.
- (e) At present, no laws and regulations for land use near Suvarnabhumi Airport with consideration of environmental impacts have been established. While AOT and the Thai government are in a position to further expand Suvarnabhumi Airport, the construction of a third runway may produce a new noise affected area. There have been protests by some local residents in the existing noise affected areas and they are requesting the suspension of airport operation during the night time. It is necessary that a mechanism is to set up to discuss an appropriate land use plan for the area surrounding Suvarnabhumi Airport in consideration of future airport development plans and their potential environmental impact with the concerned government agencies including the Bangkok Metropolitan Administration (BMA), Samut Prakan Province, the Ministry of Interior, the Ministry of Transport (Department of Public Works, Civil Aviation Authority), the Ministry of Natural Resources and Environment (MNRE), and AOT.
- (f) It is recommend that the experience of other foreign airports which face the same kind of issues is studied including that of Narita Airport and that exchange and sharing of useful information is carried out .

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Although land acquisition for the project site as well as the relocation of people has been planned and implemented since the 1960s, the potential future environmental impact affecting plans for land use in the surrounding area of Suvarnabhumi Airport was not seriously discussed between the Thai government and local residents, partly because their awareness of the issue was not necessarily high. The project site was swampy land with a relatively small population at the time when the land acquisition was completed in 1973, but later the area surrounding the airport became a populated residential area. The situation was further affected in the existing noise affected areas by many housing land development projects and the migration of the people from outside. If discussion on land use near the airport, including restrictions on the land use as well as the possible land acquisition of potential noise affected areas in the future had been made in the initial stage of project planning, the current damage by noise pollution could have been minimized to some extent.

If new airport construction or an airport development project with an expansion of runways is to be implemented, it is necessary not only to address the problem of land acquisition of the project site, but also to carefully examine the issue of land use for potential noise affected areas, including the possibility of land acquisition of such risky areas, in order that preventive measures can be taken at an early stage before the issues become serious.

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
(1) Outputs		
a) Site improvements	Perimeter dikes, Interior canal Storage ponds, Pump stations	Same as planned
b) Main airfield pavements	Two runways: 3,700m x 45m	East runway: 4,000m x 60m West runway: 3,700m x 60m
c) Passenger terminal complex (main terminal, concourse building, frontage roads)	Total area: 500,000 m ² Capacity: 30 million passengers/year	Total area: 540,000m ² Capacity: 45 million passengers/year
d) Site utilities	Water supply plant: - Capacity: 40,000m ³ /day Waste water treatment plant: - Capacity 12,200m ³ /day	Water supply plant: - same as planned Waste water treatment plant: - Capacity 18,000m ³ /day
e) Transformer stations	115kV/24kV	Almost same as planned
f) Ground access facilities	Landside road Elevated highway Airside road tunnel connecting East and West support zones	Some additional scope
g) Ground improvement of east runway	—	Some additional scope
h) Consulting services	<ul style="list-style-type: none"> • Assistance for tender and construction supervision: <ul style="list-style-type: none"> - Professional A: 272 M/M - Professional B: 162 M/M - Local staff: 270 M/M • Project management <ul style="list-style-type: none"> - Professional A: 1,374 M/M - Local staff: 1,899 M/M 	Not available
<p>Note1: The above project outputs are consolidated outputs identified at the time of Phase I appraisal (1996) and Phase III appraisal (1999).</p> <p>Note 2: Items such as f) ground access facilities, g) ground improvement of the east runway, and h) consulting services for project management were added to the project scope at the time of the Phase III appraisal (1999).</p>		
(2) Project Period	September 1996 – December 2001 (64 months)	September 1996 – September 2007 (133 months)
(3) Project Cost		
Amount paid in Foreign Currency	113,520 million Yen	N.A.
Amount paid in Local Currency	230,121 million Yen (71,688 million Baht)	N.A. (N.A.)
Total	343,641 million Yen	382,185 million Yen
Japanese ODA Loan Portion	199,243 million Yen	194,410 Million Yen
Exchange Rate	1 Baht = 3.12 Yen (As of 1999)	1 Baht = 3.114 Yen (Annual Average of 1996-2007)