The Philippines

Maritime Safety Improvement Project-2

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Field Survey: September 2006 – February 2007

1. Project Profile and Japan's ODA Loan

Project area map

Buoy tender

1.1 Background

The Philippines is an archipelagic country consisting of over 7,100 islands[1] where marine transportation plays the second most important role next to road transportation. The country reported 4,455 domestic vessels with aggregate tonnage of 1 million tons as of 1992. The total number of passengers transported in 1993 was 18 million, accounting for slightly less than 10% of total domestic transport, and the volume of cargo transported in the same year was 27 million tons, less than 50% of the total domestic transport. The area around the Visayas islands plays a pivotal role in marine distribution, as the volume of transportation between these islands occupies over 60% of total marine transportation both in terms of passengers and cargo.. The government of the Philippines predicted that the number of passengers and the volume of cargo would both increase by 5% per annum for the period from 1995 to 2010.

While the importance of marine transportation in the transportation sector is recognized, more than 200 maritime accidents occurred annually in the entire sea area of the Philippines. Of those accidents, 32% were caused by human error, 26% by problems related to vessels, 12% by insufficient navigational aids due to the lack of navigational marks, and 30% by other reasons[2]. Regarding the navigational aid system, 419 lighthouses

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1 The Philippines is an archipelagic country consisting of 7,107 islands (according to National Mapping and Resource Information Authority (NAMRIA) website as of June 2007) of various size with an area of 299,404 km^2 (approximately 80% of the area of Japan) and a population of 83.1 million (according to the website of the World Bank as of May 2007).

2 According to the result of the Intensive Engineering Study for Maritime Safety Improvement Project (1)

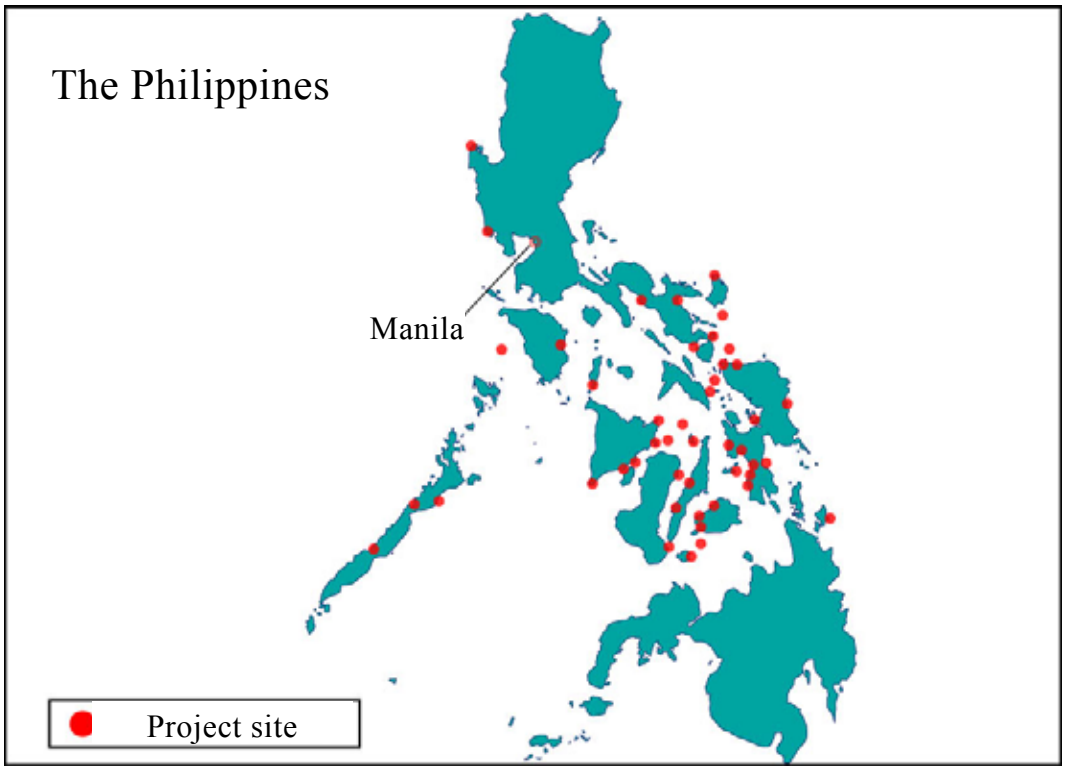
and lighted buoys existed as of February 1995. However, 112 (27%) were not working because of physical damage or poor maintenance. Also considering the complicated routes necessary for navigating many islands of the Philippines, the number of navigational aid facilities was considered to be insufficient. It was pointed out that maritime safety needed to be improved urgently by installing and rehabilitating navigational aid facilities. Following Phase 1, this project was implemented to strengthen the navigational aid facility in the area between Manila and Cebu, to which the highest priority was given by the government.

1.2 Objective

The project objective was to improve the safety of marine navigation by installing and rehabilitating navigational aid facilities mainly along the Manila-Cebu route of the Philippines, thereby contributing to the enhancement of the reliability of marine transportation and development of the local economy.

Figure 1 below shows the project areas.

Figure 1: Project Area Map



1.3 Borrower/Executing Agency

Government of the Republic of the Philippines/ Department of Transportation and Communications (DOTC)

1.4 Outline of Loan Agreement

Loan Amount / Loan Disbursed Amount	5,579 million yen / 5,262million yen	
Exchange of Notes / Loan Agreement	July 1995 / August 1995	
Terms and Conditions -Interest Rate -Repayment Period (Grace Period)	Main 2.7% 30 years (10 years)	Consultant 2.3% 30 years (10 years)
Final Disbursement Date	June 2001	
Main Contractors (1 billion yen and above per contract presented)	Kanematsu(Japan)・John Holland Construction (Phil) Inc.(Australia), Niigata Steel(Japan)	
Consultant Services (100 million yen and above per contract presented)	Overseas Shipbuilding Cooperation Center(Japan)・Martillano, Lansangan, Domingo & Associates, Inc(Philippines).	
Feasibility Study (F/S), etc.	Japan International Cooperation Agency (JICA) (1992)	

2. Evaluation Result (Rating: B)

2.1 Relevance (Rating: a)

2.1.1 Relevance at the time of appraisal

The Medium-Term Philippine Development Plan (MTPDP, 1993–1998) and the Philippines 2000 aimed to enhance international competitiveness and improve people's skills, which will lead to national economic development and poverty reduction. The development strategies for the transportation sector gave first priority to securing safe transportation and set the objective of enhancing the safety plan concerning marine, air and road transportation. Moreover, based on the MTPDP, 2,912 million pesos were allocated to the installation and rehabilitation of navigational aid facilities and salvage boats in the Medium-Term Public Investment Program (MTPIP). It also established a plan to install and rehabilitate more than 300 navigational aid facilities.

In the master plan for this project, "Republic of the Philippines: Master Plan for Maritime Safety (MAPMAS)" (prepared by JICA), it was pointed out that although the country's navigational marks were located at needed spots, they were quite insufficient in number. At the time of appraisal, more than 200 maritime accidents occurred annually in the sea area of the Philippines. In order to ensure maritime safety, improvement of physical infrastructure, such as navigational marks, charts, communication facilities, search and salvage boats, was essential along with institutional improvement to address the problems of aging vessels, overloading and crew training. The "Comprehensive Plan for Navigational Aids" clearly set a target to double the average number of lighthouses along all coastlines of the nation by 2010 to facilitate safe navigation. This project was to

improve maritime safety by installing and rehabilitating navigational aid facilities in the sea area between Manila and Cebu, which was deemed to be the top priority sea area in the above-mentioned plan, and therefore was highly important.

2.1.2 Relevance at the time of evaluation

In the Medium-Term Philippine Development Plan (MTPDP, 1999–2004), the provision of appropriate, safe, efficient, reliable and available services for users was mentioned as an objective in the area of infrastructure development. In order to improve and ensure safety, the plan publicized policy strategies, such as improving the quality of the existing infrastructure through proper operation/maintenance, and repair/improvement and thus forming effective policies, and implementing projects. The objectives in the transportation sector stated in the plan were to provide safe and reliable services for passenger and freight transportation by introducing the principle of competition and to improve the quality of transportation, thereby contributing to the achievement of the government's targets for comprehensive socioeconomic development. Furthermore, in the Medium-Term Philippine Development Plan (MTPDP, 2004–2010) under the Arroyo administration, improvement of safety in marine navigation and transportation is deemed to be an important issue.

As part of the efforts for infrastructure development and safety improvement, the government of the Philippines established the Maritime Safety Improvement Project (MSIP setting targets for 1998–2010) in 1998. In this project, the installation of lighthouses along the busiest route between Cebu and Manila and other important points is stated as an issue of high priority. Under MSIP, the "Comprehensive Plan for Navigational Aids" was drawn up incorporating the issues and projects recommended in JICA's MAPMAS (divided into 8 phases and including a list of MSIP priority projects that should be implemented). The plan also confirms that improving and increasing the number of navigational aid facilities. Thus, this project remains to be of the highest priority.

2.2 Efficiency (Rating: b)

2.2.1 Outputs

Table 1 shows the outline of the project plan and the output. The main part of the project was implemented almost as planned. Additional 11 lighthouses were installed for the purpose of further facilitating safe navigation in the target area, as a portion of the loaned amount was expected to still be available as of December 1998, and its necessity was recognized. At the buoy base in Cavite, a 500 KVA transformer for in-house power generation was installed to supply the minimum amount of electricity necessary in the event of power failure.

In addition, 5 four-wheel-drive vehicles were purchased for the operation and maintenance of navigational aid facilities that are accessible from the land. For supervision of installation of additional lighthouses, the service period of the local consultant was extended to May 2001, and as a result M/M increased substantially (almost doubled).

Table 1: Outline and Outputs of the Project Plan

	Plan	Actual
1. Installation and rehabilitation of navigational aid facilities		
Lighthouse	Installation: 11 Rehabilitation: 29	As planned. Installation of additional 11lighthouses
Lighted buoy	Installation/replacement: 9 Spare: 3	As planned
Radar beacon	Installation: 2	As planned
		5 vehicles for operation and maintenance were purchased
2. Construction of buoy base	Construction of a land base for repair	As planned (a 500 KVA transformer for in-house power generation was additionally purchased)
3. Lighthouse/buoy tender	Buoy tender: 1	As planned
4. Consulting services	International: 151.3 M/M、 Local: 127.5 M/M	International: 144.63 M/M Local: 267.22 M/M

Lighthouses installed under the project

Beacons and lighted buoys

Cavite buoy base

2.2.2 Project period

At the time of appraisal, the project period for the original scope was from August 1995 to December 1998 (3 years and 5 months). Actually the project was completed in June 1999, 6 months behind schedule (115% of the original plan). By item, the installation and rehabilitation of navigational aid facilities was completed in June 1999, the construction of the buoy base was completed in April 1999, and the procurement of a lighthouse/buoy tender was completed in March 1998. The additional procurement and installation of 11 lighthouses started in August 1999 and was completed in April 2001 (1 year and 9 months). As a result, the whole project period was from August 1995 to May 2001 (5 years and 10 months), 2 years and 5 months behind schedule. Considering the fact that the additional lighthouses were installed for the purpose of further improving the safety of navigation and that their installation was completed in April 2001, before the final disbursement date, the extension of the project period was reasonable.

2.2.3 Project cost

The total project cost was estimated at 6,643 million yen (Japan's ODA loan portion: 5,579 million yen) at the time of appraisal while the actual project cost was 6,262 million yen (Japan's ODA loan portion: 5,262 million yen). The cost of navigational aid facilities was increased by approximately 9% due to the above-mentioned additional installation of 11 lighthouses. However, the procurement cost of the lighthouse/buoy tender was 10% lower than planned and only 30% of the contingency was used. As a result, the foreign currency portion of expenditure was approximately 9% lower than planned. As the local currency portion of expenditure was almost as planned, the total project cost was reduced by approximately 6% from the original estimate.

2.3 Effectiveness　(Rating: a)

2.3.1 Change in the number of maritime accidents

Since data regarding the number of maritime accidents that have occurred in the project area is not available, the exact change in the number of accidents before and after the project implementation is not known. Given below is an analysis of the effectiveness of the project based on data for the entire Philippines.

According to the total number of vessels entered nationwide (Table 2) and the gross registered tonnage (Table 3), both the number of vessels and gross tonnage demonstrate an upward trend, although the number fluctuated slightly. In other words, the maritime traffic volume in the Philippines increased during the period.

As for the number of maritime accidents in the country (Table 4), it shows that notable increases in maritime accidents involving vessels over 250 GRT were observed in 2002

and 2003, and those involving vessels under 250 GRT were observed in 2003 and 2004. However, the number of maritime accidents declined substantially in 2005 both for those involving vessels over 250 GRT and under 250 GRT. Among those, the number of maritime accidents involving small vessels under 250 GRT is particularly large (accounting for 80% of the total) and primary causes of accidents are sinking, overturning and drifting due to typhoon and high winds/tidal waves. Following this development, the total number of victims in 2005 decreased substantially from the preceding years (Table 5).

According to MAPMAS in 1992, historically the frequency of typhoon strikes that occur in a given year determine the number of accidents in the Philippines. The average age of cargo vessels of the Philippines is 28.4 years, whereas the average vessel age throughout the rest of world is 11.3 years. This indicates that the replacement and modernization of vessels are necessary. Therefore, in addition to typhoon and torrential rain, the advanced aging of vessels and increase in the maritime traffic volume are some of the major factors for maritime accidents and are considered to be reasons explaining why maritime accidents have not decreased to a great extent after the completion of this project.

Table 2 Total number of vessels entered (Nationwide)

year	1999	2000	2001	2002	2003	2004	2005
vessels	286,651	302,561	278,385	285,958	301,730	321,350	319,764

Source: Philippine Port Authority website (2007.5)

Table 3 Gross registered tonnage （Unit：1000ton）

year	1999	2000	2001	2002	2003	2004	2005
Gross tonnage	288,787	297,923	286,367	292,218	298,608	311,435	314,300

Source: Philippine Port Authority website (2007.5)

Table 4: Number of Maritime Accidents (the entire Philippines)

(Unit: case)

Vessel Size	Cause	1995	2000	2001	2002	2003	2004	2005
Vessels under 250 GRT	Sinking	37	25	21	33	30	24	17
	Missing	0	1	5	6	32	14	4
	Overturning	33	47	49	44	63	64	34
	Drifting	13	14	17	20	41	69	12
	Fire	23	7	10	15	16	7	7
	Collision	17	14	11	10	15	14	5
	Others	58	43	55	34	48	70	43
	Subtotal	181	151	168	162	245	262	122
Vessels over 250 GRT		53	51	57	75	72	59	39
	Total	234	202	225	237	317	321	161

Source：MARINA(2006)

Table 5: Number of Victims Killed and Injured in Maritime Accidents
(The entire Philippines)

(Unit: person)

Year	1995	2000	2001	2002	2003	2004	2005
Injured	121	177	59	73	74	144	25
Missing	97	102	74	146	232	116	47
Rescued/survived	2,050	2,771	1,969	1,178	2,903	4,893	2,920
Total	2,268	3,050	2,102	1,397	3,209	5,153	2,992

Source : MARINA(2006)

2.3.2 Operating rate[3] of lighthouses

According to the hearing from lighthouse keepers and employees of the Headquarters on Aids to Navigation Command (HANC) in the beneficiary survey, the operating rate of lighthouses under this project is almost 100% (365 days/year). The figure seems to have achieved the highest standards set by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), but supporting data were not disclosed. The reason why the operating rate remains high is because all lighthouses and lighted buoys use solar power generation as their power sources. As diesel power generation has been replaced by solar power generation, batteries are always charged by the solar power generator. Electric sensor switches are placed in lighthouses. As a result lighthouse keepers are not required to be stationed all the time. Thus, the reduction in the number of lighthouse keepers has lead to a reduction in cost. Also, since there is no need to rely on unstable power supply from the electric power company and human errors in lighthouse operation have been reduced, safety of navigation has been improved. It is reported that the lighthouses installed under this project are more durable than other lighthouses.

2.4 Impact

2.4.1 Improvement of safety and efficiency

For this ex-post evaluation, a beneficiary survey was conducted at 6 locations throughout the country covering 45 persons in total, such as captains, crew, port staff, Philippine Coastal Guards (PCG) / Government agency employees, lighthouse keepers, company employees, fishermen, and transportation companies. Figure 2 shows the description of the respondents in the beneficiary survey. Following are the results of the survey.

As shown in Table 6, concerning the effects of the installation and rehabilitation of navigational aid facilities, almost all respondents recognized that this project has greatly contributed to the improvement of safety and efficiency of transportation. The reason

[3] The operating rate is a ratio of the actual normal operation time of a lighthouse against the time the lighthouse should be operated. It was evaluated based on an average of the past 2 years.

mentioned by most respondents is that installation and rehabilitation of facilities such as lighthouses and lighted buoys made it possible to check the position of vessels particularly under adverse weather conditions, and thus safe navigation has been further ensured. Another reason is that the use of solar power generation for lighthouses and lighted buoys solved the problem of the lighting range shortening due to a short supply of electricity from the distribution company in question. Therefore, the accuracy of locating the position of vessels and safety were improved. Also, 96% of the respondents said that the project contributed to the revitalization of the regional economy, and 82% said that the volume of transportation including passengers and cargo has increased.

Figure 2: Description of Respondents in the Beneficiary Survey

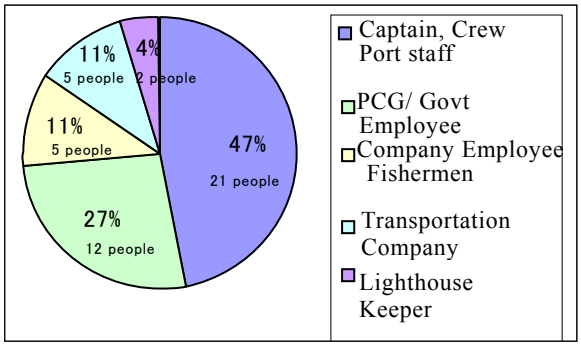


Table 6: Effects of Project Highlighted by Respondents

Effect	Rate of respondents who recognized the effect (%)
Improvement of safety	98
Promotion of tourism	36
Increase in employment opportunities	22
Improvement of community relations	20
Facilitation of businesses	18

2.4.2 Impact on environment

As a result of the interview survey on the beneficiaries of the project (shipping companies, government agency employees and port authorities), it was confirmed that the project has no particular adverse impact on the environment such as air pollution or marine pollution. In this project, a base for the repair and painting of lighted buoys was established in the suburbs of Manila, which helps not only enhance efficiency of operations but also prevent marine pollution.

2.4.3 Employment expansion

Some beneficiaries pointed out the installation of lighthouses contributed to the improvement of community relations and the business environment as well as facilitating

an expansion of employment opportunities. This is particularly beneficial to fishermen residing near lighthouses.

2.4.4 Promotion of tourism

It was found that in popular bathing or diving sites on some islands such as Apo Reef in Mindoro, Bantayan in Cebu and Balicasag in Bohol, the newly installed lighthouses have become major sightseeing spots.

2.5 Sustainability (Rating: b)

2.5.1 Executing agency

2.5.1.1 Operation and maintenance system

The executing agency of this project was the Department of Transportation and Communications (DOTC), and operation and maintenance after the project completion are the joint responsibility of DOTC and PCG. DOTC provides the funds necessary for technical supervision of the repair, improvement and installation of lighthouse facilities, lighted buoys and other navigational aid facilities, while PCG is the agency responsible for the operation and maintenance of navigational aid facilities to ensure safe navigation. The headquarters of PCG is located in Manila with approximately 3,900 employees working as of November 2006, including 400 managerial employees, 3,100 technical employees and 400 clerical employees. Headquarters on Aids to Navigation Command (HANC), which is in charge of the operation, maintenance and repair of lighthouses under the supervision of PCG, is located in Cavite (suburbs of Manila) and has 31 employees.

2.5.1.2 Technical capacity

The technical capability and skills of the specialist staff of PCG are appropriate and sufficient for operating and maintaining navigational aid facilities. The middle and senior level managerial employees of PCG have received overseas training on the operation and maintenance of navigational aid facilities. For employees engaging in day-to-day operation and maintenance activities at lighthouses, domestic or in-house training is provided on a regular basis. Most of the maintenance staff is equipped with the skills to perform basic repair.

2.5.1.3 Financial status

PCG's annual budget (allocated by the government) is shown in Table 7 and the annual operation and maintenance budget of PCG is shown in Table 8. The amounts shown in Table 7 include administrative cost such as personnel expenses. The operation and maintenance budget excluding administrative cost shown in Table 8 is allocated to

operation and maintenance expenses of vessels, maintenance expenses of navigational aid facilities and the cost of training employees. As shown in Table 9, the portion of the budget that can be used for the operation and maintenance activities is only several million pesos. As it shows, the operation and maintenance budget is not enough under the current situation.

As a measure to complement insufficient funds for operation and maintenance, the introduction of user fees for maritime safety facilities such as lighthouses was proposed at the time of appraisal, but it has not been realized to date. The government of the Philippines says that it will consider charging fees only after more facilities to improve safety are established and efficient navigational aid becomes possible.

Table 7: Annual Budget of PCG

(Unit: million pesos)

	2000	2001	2002	2003	2004
Budget	1,010.0	1,033.0	1,175.3	1,231.8	1,350.3

Table 8: Annual Operation and Maintenance Budget of PCG

(Unit: million pesos)

	2000	2001	2002	2003	2004
Budget	228.6	285.8	345.9	360.9	360.9

Table 9: Annual Budget for Maintenance of Navigational Aid facilities

(Unit: million pesos)

2000	2001	2002	2003	2004	2005	2006
18.5	17.3	17.3	7.8	11.7	7.7	7.0

2.5.2 Operation and maintenance status

The main duties of staff engaging in day-to-day operation and maintenance activities at lighthouses consist of turning the lighthouse on/off, maintenance of equipment, checking of batteries, and management of facilities. Among 51 lighthouses and 9 lighted buoys installed or repaired in this project, most of them are working properly 7–8 years after installation, except for 2 lighthouses (in Tagbilaran and Iloilo) and 1 lighted buoy. The lighthouse in Tagbilaran was tentatively removed for a dredging operation and is now under preparation for reinstallation. The lighthouse in Iloilo has not been working since August 2006, and spare parts are urgently needed. As for the lighted buoy mentioned above, there is no problem with safe navigation even though the buoy is not working because a lighthouse is located near the buoy.

PCG currently owns 2 vessels to be used for the operation and maintenance of facilities including the Corregidor, which was procured as part of this project, and the regular inspection system has also been improved. However, because of the shortage of vessels, the Corregidor is used not only for operation and maintenance activities but also for rescue activities. Also, in order to achieve the efficiency standard of 99.8% set by the IALA, HANC is required to have more spare parts for navigational aid facilities and more employees. However, because of the shortage of the budget, HANC cannot conduct adequate periodic inspections under the current conditions.

3. Feedback

3.1 Lessons Learned

Shortages in the supply of electricity by the distribution company, failures or defects of the diesel power generator, a rise in operation and maintenance costs and human error had been the problems in ensuring a stable power source for the lighthouses and proper operation of the marine navigational aids. This project was effective in solving these problems in that it helped introduce photovoltaic power generation as the power source for lighthouses and lighted buoys.

3.2 Recommendations

The review of the project finance indicated the budget for operation and maintenance allocated by the government is insufficient. Though an introduction of fees had already been considered DOTC and PCG, which are in charge of operation and maintenance, need to immediately take measures to secure an adequate budget, including charging fees for the use of navigational aid facilities to cover operation and maintenance costs of navigation facilities.

Comparison of Original and Actual Scope

Item	Plan	Actual
(1) Outputs		
1. Installation and rehabilitation of navigational aid facilities		
Lighthouse	Installation: 11 Rehabilitation: 29	As planned Additional installation of 11 lighthouses
Lighted buoy	Installation/replacement: 9 Spare: 3	As planned
Radar beacon	Installation: 2	As planned 5 vehicles for operation and maintenance were purchased
2. Buoy base	Construction of a land base for repair	As planned A 500 KVA transformer for in-house power generation was additionally purchased
3. Lighthouse/buoy tender	1	As planned
4. Consulting services	International: 151.33 M/M Local: 127.5 M/M	International: 144.63 M/M Local: 267.22M/M
(2) Project Period	August 1995–December 1998 (3 years 5 months)	August 1995–June 2001 (5 years 11 months)
(3) Project Cost (Total) Foreign Currency Local Currency Total ODA Loan Portion Exchange Rate	 5,579 million yen 1,065 million yen (258 million pesos) 6,643 million yen 5,579 million yen 1 pesos＝4.13yen (January 1995)	 5,262 million yen 1,000 million yen (250 million pesos) 6,262 million yen 5,262 million yen 1 pesos＝4.0yen (average weighted rate from 1995-2001)