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DISASTER RECOVERY FUNCTION AND DEBT REDUCTION  
OF THE PORT AUTHORITY IN JAPAN

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# RESEARCH ON THE INTERNATIONAL COMPETITIVENESS, DISASTER RECOVERY FUNCTION AND DEBT REDUCTION OF THE PORT AUTHORITY IN JAPAN

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**ABSTRACT:** The ports and harbors of Japan are operated by local public bodies that act as port authorities. The systems for constructing port facilities are roughly classified into two types depending on their sources of revenue. In the first type of system (used mainly for channels, breakwaters, berths, etc.), the national government and the port authority share the cost of construction. In the second type of system (used for cargo handling facilities, reclaimed lands etc.), the port authority raises funds by itself through a port-related bond-financed project, under which it issues bonds. One characteristic of such bond-financed projects is that the costs of operating the facility and redeeming the bonds are funded through usage fees for the cargo terminal and profit from the sale of reclaimed land.

The authors first described Japan's port facilities and the structure of port and harbor management, and analyzed the financial situation of port authorities. Next, the authors pointed out that as the capital, maintenance, and management costs of port facilities grow in response to the new risks of large-scale natural disasters and other factors, port authorities are being forced to take measures to address this. Lastly, using the example of Hakata Port, the authors argued that incentive assistance to shipping companies and logistics companies could effectively address the conflicting demands of reinforcing international competitiveness, strengthening disaster restoration capabilities, and enabling the smooth redemption of bonds in bond-financed projects.

Based on the above analysis, the authors propose that facility usage fees and land prices be reduced through incentive subsidies as a measure to reduce the deficits of port authorities. This will enable the early redemption of bonds and an increase in local tax revenue, since a greater number of businesses can be attracted, as shown in the case study of Hakata Port.

**KEYWORDS:** port authority, large-scale disaster, debt reduction

## 1. INTRODUCTION

The ports and harbors of Japan are operated by local public bodies that act as port authorities. The systems for establishing port facilities are roughly classified into two types depending on their sources

of revenue. In the first type of system (used mainly for channels, breakwaters, berths, etc.), the national government and the port authority share the cost of construction. In the second type of system (used for cargo handling facilities, reclaimed lands etc.), the port authority raises funds by itself through a

port-related bond-financed project, under which it issues bonds. One characteristic of such loan bond-financed projects is that the costs of operating the facility and redeeming the bonds are funded through usage fees for the ground and profit from the sale of reclaimed land. However, port authorities now require a smooth redemption policy for bonds issued in the past, given future economic prospects for both systems. This is because prior investments are required for the construction of port facilities that takes a long period (between 5 and 10 years) and usage fees and profits from the sale of land must be suppressed to low levels because of political pressure. Further, the costs of establishing port facilities and the costs of early restoration are showing a tendency to rise after the risks of future large-scale natural disasters were reassessed in the aftermath of the Great East Japan Earthquake (2011). This will lead to larger bond issues and therefore a greater necessity for a smooth redemption policy.

The authors first describe Japan's port facilities and the structure of port and harbor management, and analyze the financial situation of port authorities. Next, the authors point out that as the capital, maintenance, and management costs of port facilities grow in response to the new risks of large-scale natural disasters and other factors, port authorities are being forced to take measures to address this. Lastly, using the example of Hakata Port, the authors argue that incentive assistance to shipping companies and logistics companies can effectively address the conflicting demands of reinforcing international competitiveness, strengthening disaster restoration capabilities, and enabling the smooth redemption of bonds in bond-financed projects.

## **2. PORT FACILITIES OF JAPAN AND THE STRUCTURE OF PORT AND HARBOR**

## **MANAGEMENT**

Fig. 1 shows the structure of port facilities in Japan. There are mainly three types of public port improvement projects. The first type comprises port improvement works for which the national government and port authority share the cost. The second type comprises designated port-facility construction works (for which the local public body acting as the port authority procures funds through a bond flotation). The third type comprises local independent works (for which the local public body acting as the port authority procures funds through methods other than a bond flotation). Of these, designated port-facility construction projects are classified into two types according to their purpose based on the Act on Advancement of Construction of Ports and Harbors (Law No. 170, 1953). The first type is Port Facility Development Project (PFDP), which includes projects such as construction of cargo handling facilities (warehouses, cargo handling equipment) and cargo terminals that are necessary for port and harbor activities. The second type is Land Reclamation Project in Coastal Areas (LRPCA), under which land is reclaimed for industrial, urban purposes etc. The port authority issues the Port Facilities Bond (PFB) and Coastal Area Bond (CAB), respectively, to raise funds for these projects from domestic and international sources. The redemption of these bonds can be funded from facility usage fees and the profits from the sale of land.

Meanwhile, port management is entrusted to autonomy of the port authority, and the fees from sources such as the usage of the berths and cargo terminals are used to fund operational costs.

## **3. FINANCIAL CONDITION OF PORT AUTHORITIES**

Project Name	Area of Development	Financing System
Port Development Projects	Water area and outlying facilities, berthing facilities, port traffic facilities, sites for port facilities	National government works project, subsidy system, etc.
Port environment improvement	Port ecological conservation facilities, waste disposal facilities	Subsidy system
Port-Related Bond-Financed Projects	Cargo handling facilities (warehouses, cargo handling equipment, wharf sites), storage facilities, industrial sites, urban redevelopment sites, etc.	Public financing (local government bonds)
Private sector activities	Construction of passenger facilities, port office facilities, port cultural exchange facilities by private entrepreneurs (including the third sector)	Tax incentives, subsidy system, low interest financing

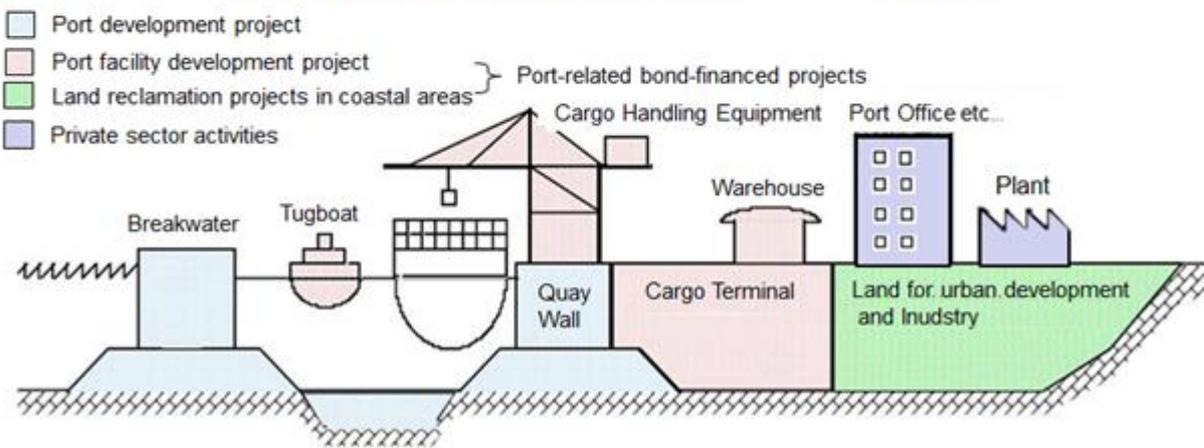


Fig. 1 Port facilities established in designated port-facility construction projects (bond-financed projects)  
 (Source: Based on data from the Ministry of Land, Infrastructure, Transport and Tourism HP and modified by the authors)

In the analysis of the financial condition of port authorities, LRPCA must be evaluated separately. This is because LRPCA is weakly related to port and harbor management when its purpose is land reclamation for housing and school facilities, although it is strongly related to port and harbor management if it benefits port logistics companies. In addition, the source of revenue for LRPCA is different. Unlike port and harbor management, which depend on daily revenues, the profits from the sale of land are used to fund bond redemptions in LRPCA. Therefore, the authors limited the subjects of analysis of the financial condition of port authorities to PFDPs that can be classified as port and harbor management. The subjects of this analysis were all ports in Japan. Regarding LRPCA,

the authors analyzed the individual financial conditions of Hakata Port as a typical example of ports expected to have corporate locations and other criteria related to port and harbor management; and the results of this analysis are provided in Chapter 6.

Table 1 shows the classification of ports in Japan. Fig. 2 shows the revenues for port and harbor management and port improvement, the administrative expenses related to management and construction expenses, and the difference between both for all ports and harbors in Japan, based on port authority finance data provided by the Ministry of Land, Infrastructure, and Transport. This figure shows that expenditure is approximately 1.5 times revenue. This revenue shortfall is funded through transfers from the general account, profits from the

Table 1 Classification of Ports in Japan

All ports	125 ports
Eight major ports	Keihin(Tokyo, Kawasaki, Yokohama) Nagoya Hanshin( Osaka, Kobe) Kanmon(Shimonoseki, Kitakyushu)
International Strategic Ports	5 ports Keihin(Tokyo, Kawasaki, Yokohama) Hanshin(Osaka, Kobe)
Major International Ports	15 top ports excluding the above

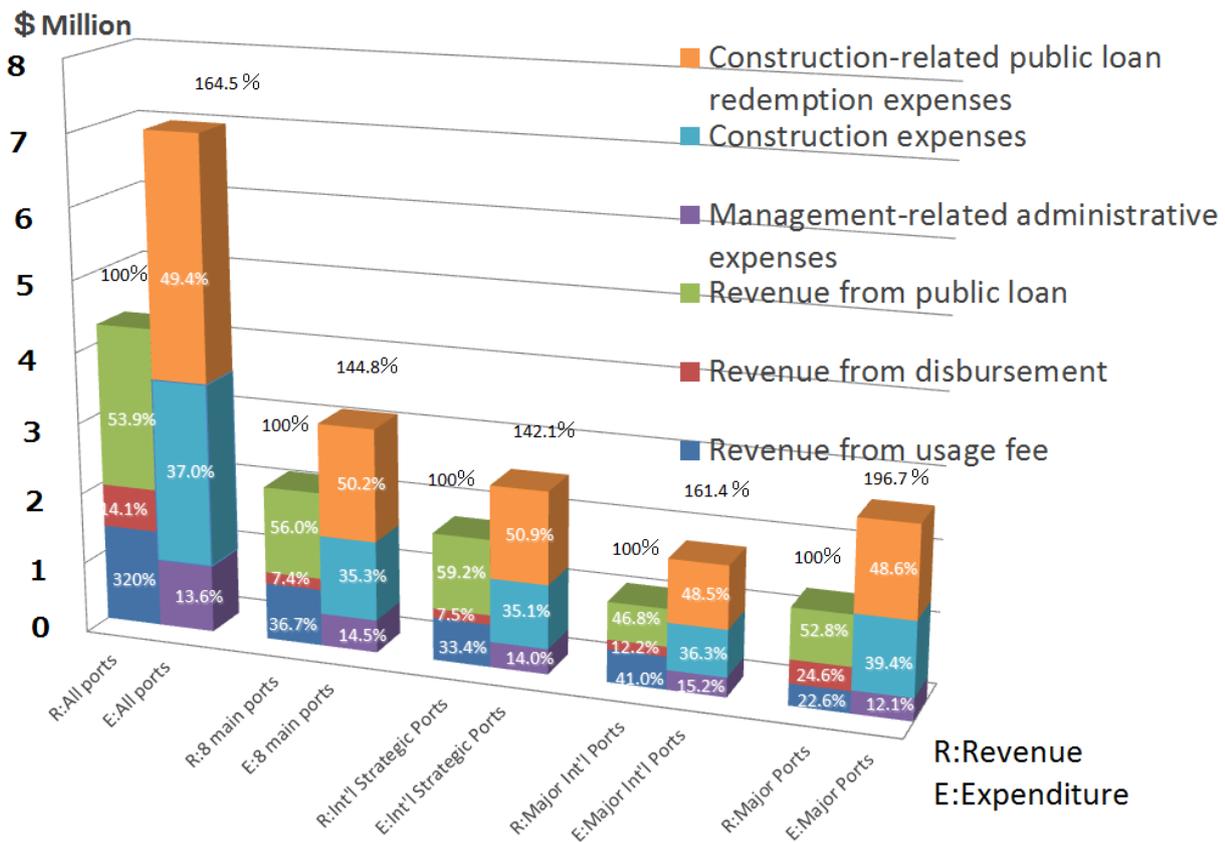


Fig. 2 Financial conditions of ports in Japan

(Source: The author modified and analyzed average data for 5 years (2007 -2011) from the Ministry of Land, Infrastructure, Transport and Tourism)

sale of assets, etc.

Fig. 3 shows the results of comparison between the revenue from port and harbor usage fees and management-related administrative expenses, with a focus on port and harbor management. These

results show that large ports were profitable; with revenue exceeding expenditure by 20-30%. They also show that important ports were registering small losses, with revenue only slightly lower than expenditure.

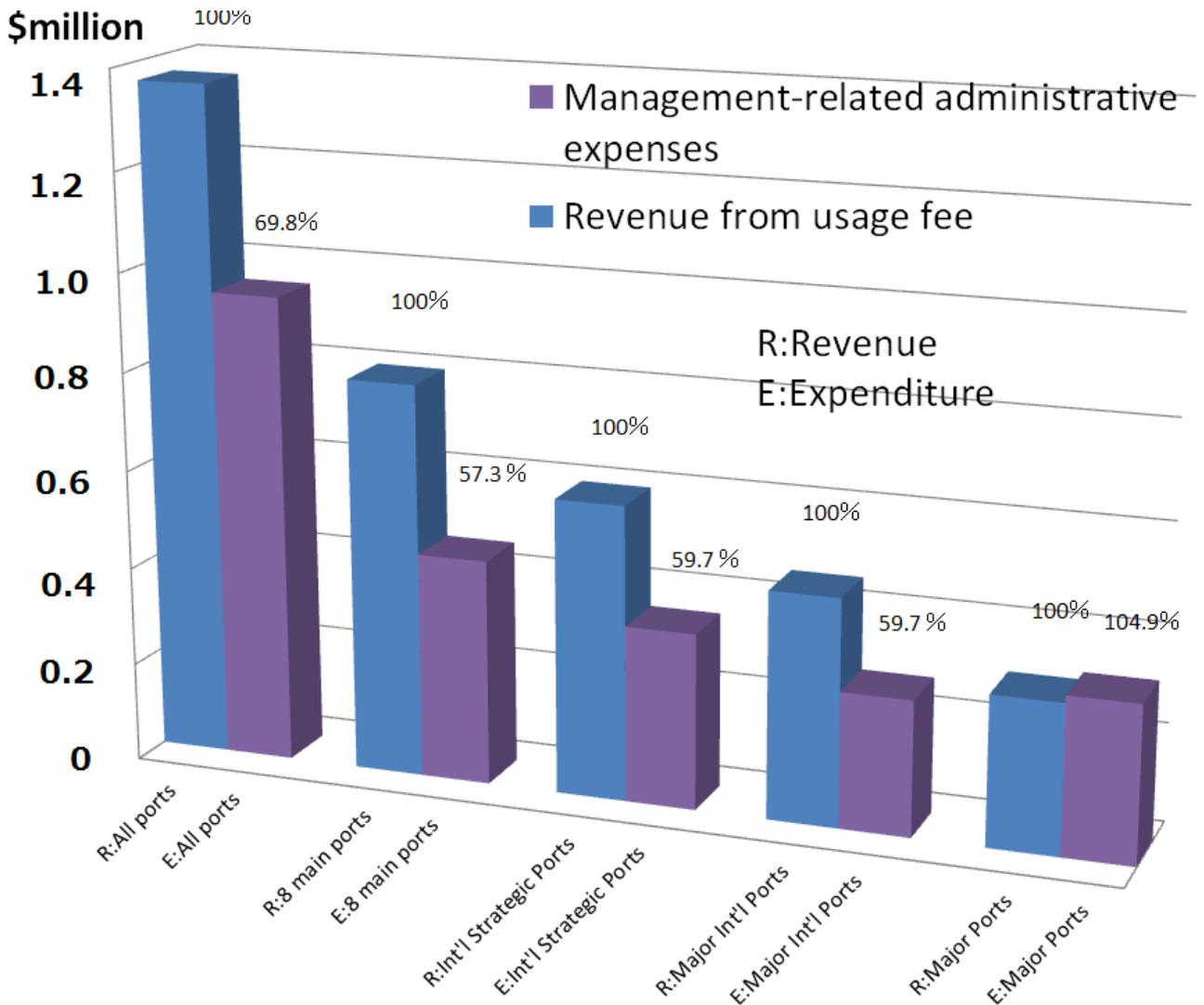


Fig. 3 Financial conditions of ports in Japan (port and harbor management)  
 (Source: The author modified and analyzed data from the Ministry of Land, Infrastructure, Transport and Tourism)

Fig. 4 compares revenue from disbursement and public loans, with expenses related to construction and public-loan redemption for port and harbor construction, as shown in Fig. 2. It shows that expenditure was approximately twice the revenue, and that half the expenditure went towards redeeming public loans.

As discussed above, port authorities are able to earn profits from port and harbor management, but incur losses during port construction. Since the revenue deficit from port construction is much higher than the surplus from port and harbor management, port authorities record losses overall, forcing them to cover the deficit by drawing upon the general account and other revenues.

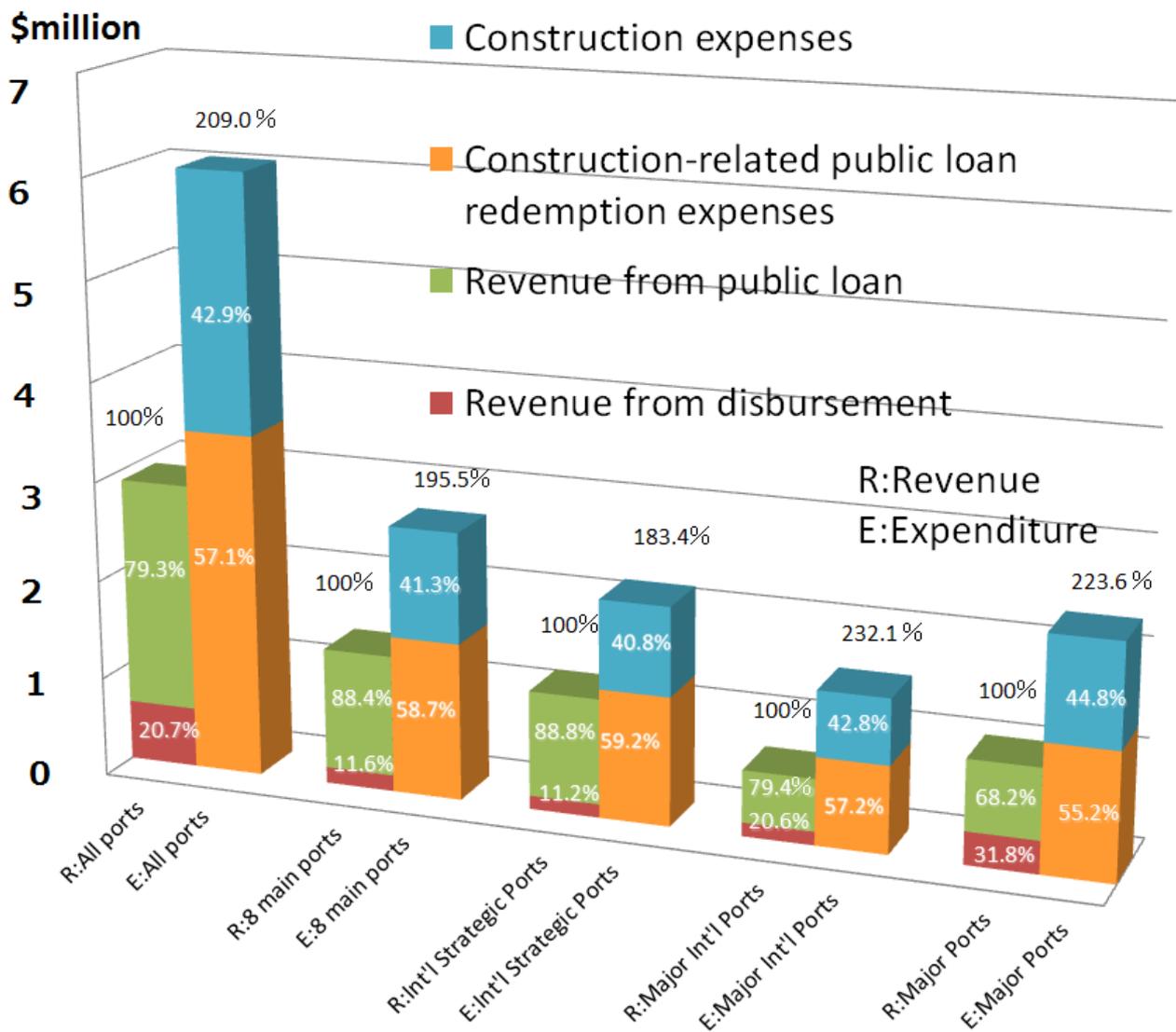


Fig. 4 Financial conditions of ports in Japan (construction-related)

(Source: The author modified and analyzed data from the Ministry of Land, Infrastructure, Transport and Tourism)

#### **4. ISSUES WITH PFDP AND LRPCA**

The purpose of the Act on Advancement of Construction of Ports and Harbors, the foundation law for PFDP and LRPCA, is to limit port improvement projects that directly input the national expenditure to facilities such as berths and breakwaters. Instead, it requires the port authority to procure funding through bond flotation for facilities such as transit sheds, cargo-handling machinery, and land. The port authority can then redeem the bonds with revenues earned through various sources such as usage fees for the completed facilities and profits from the sale of land. If the cost of port construction is small, it is easy to redeem bonds from usage fees and the profits from the sale of land. However, this revenue has to be increased if the amount to be redeemed grows in concurrence with an increase in the cost of port improvements, as described later. If usage fees and the price of land exceed the market value, this may lead to stagnation in the usage of the facility and in land sales, leading to a bond redemption failure. Further, political reasons and competitive pressure often force port authorities to lower their usage fees and the sale price of land below cost price, in order to attract international traffic and business. Given the possibility of an interest-rate hike, the authors believe that the national government and port authorities should implement a policy for the smooth redemption of bonds as soon as possible, in order to avoid the systematic collapse of bond flotation for designated port-facility construction projects.

#### **5. TENDENCY OF CONSTRUCTION COSTS TO INCREASE FOR PORTS IN JAPAN**

The authors have pointed out in his previous report (2013) that the costs of PFDP and LRPCA, which are funded through PFB and CAB, are likely to

increase further because of social factors such as expansion to accommodate for the increase in size of ships, as well as natural factors such as earthquakes and softening ground. An outline of the authors' claim follows.

##### **5.1 Offshore development to address increase in ship size**

Shipping companies are rapidly increasing the sizes of their container ships and bulk ships in order to create economies of scale and reduce the cost of marine transport. It is necessary to prepare ports and harbors to accommodate these large ships.

However, size increases in ports and harbors essentially result in offshore development, since Japan has insufficient land. The cost of constructing port structures in the sea generally grows exponentially with the depth of the water.

##### **5.2 Protection against earthquakes**

Although Japan's islands constitute only 0.1% of the total land area on earth, 10% of all the earthquakes of magnitudes 6 or higher occur on these islands. This proportion has been estimated to be as high as 21% from 1994 onwards. Therefore, construction costs in Japan are inevitably growing faster than in East Asian nations, such as South Korea, China, and Vietnam, or in Europe and Australia to protect against seismic activity in this earthquake-prone zone.

Further, the importance of preparing for unexpected phenomena is being seen in a new light after the Great East Japan Earthquake of 2011. According to the calculations of the authors, using the storm-surge breakwater in Japan's Nagoya Port as a case study, the reinforcement of the breakwater as a measure against L1 and L2 earthquakes would require 10% of the total project cost. In other words, construction cost for this type of breakwater would

be 10% higher than conventional cost, if measures against new earthquake risks were to be implemented.

### 5.3 Measures against soft ground

Much of the economic activity in Japan occurs in its flat lands or the thick, soft grounds of Japan's coastal regions. Attempting to construct port and harbor facilities over these thick, soft grounds leads to a dramatic rise in construction costs, as the soil has to be improved and long piles have to be driven into the basement stratum. Since the ground is softer in Japan than in other countries and has a shallower basement stratum, the construction costs for port and harbor facilities tend to grow when new technologies, special project ships, experienced workers etc. are required in all stages of design and construction.

### 5.4 Rise in construction cost

In addition to a tendency for construction costs for Japanese port and harbor facilities to increase due to social and natural reasons, the authors have pointed out that construction costs in Japan are generally higher than in other East Asian nations.

Increase in port and harbor construction costs leads to an increase in the amounts of PFB and CAB issuance and eventually pushes up usage fees and land-sale profits. Countries facing challenges similar to Japan must think of procurement of construction funds and smooth redemption with the assumption that port and harbor construction costs will keep increasing.

## 6. PORT AUTHORITY'S FINANCES CONSTRAINED BY REDEMPTION OF CAB

### 6.1 Case study of CAB for Hakata Port

There have been several cases where port authorities have experienced CAB redemption pressures.

Therefore, the authors will study CAB redemption pressures in the example of Hakata Port, whose port authority is Fukuoka City.

As shown in Fig. 5, Hakata Port is a Major International Port located in northern Kyushu. Fig. 6 shows the location of Hakata Port Island City that is the subject of CAB verification.

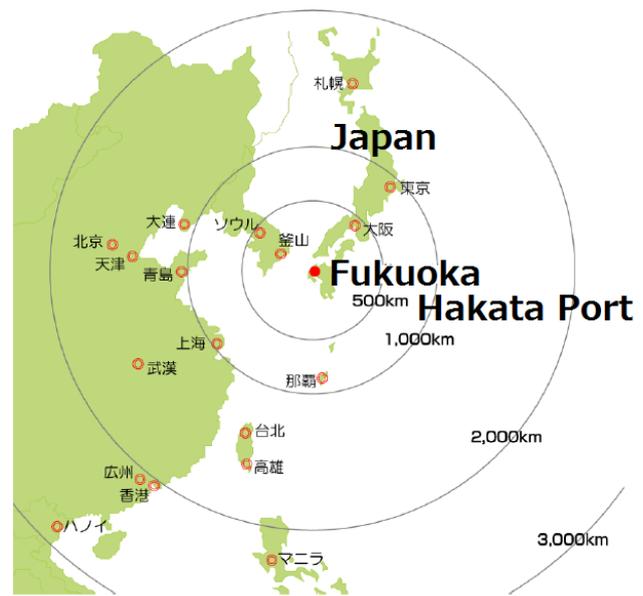


Fig. 5 Location of Hakata Port (Source: Fukuoka City “Island City Future Forum” materials)

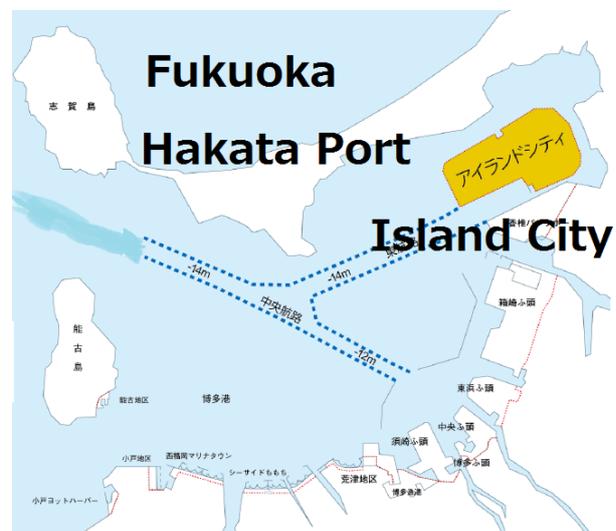


Fig. 6 Hakata Port (Source: Fukuoka City “Island City Future Forum” materials)

Table 2 Financial balance for Hakata Port Island City (LRPCA) at 2039

Region		\$ Million
Port region	Revenue	1516
	Expenditure	1628
	Balance	-112
Residential region	Revenue	1243
	Expenditure	1291
	Balance	-48
Total	Balance	-160

Table 2 shows the financial balance for LRPCA in both the port region of Hakata Port Island City, which is related to port management, and in the residential region, which is not related to port management. Both balances were negative over -\$100 million each, bringing the total deficit to \$160 million for both the regions.

This balance is calculated for 45 years from the start of the project to its completion. Since 20 years have passed since the project was launched, the balance has been calculated based on the records for the 20 years, assuming a drop in land prices to promote land sales, as well as the introduction of various systems such as tax benefits for the next 25 years.

## 6.2 Challenges for CAB

While CAB redemptions are calculated based on various assumptions such as sales and settings for fixed-term land leasehold based on the future plan for land sales in lots, the balance is expected to be negative at -\$160 million even in 2039 when the LRPCA will be completed. This indicates how difficult it is to reimburse CAB only through land sales. While land sales could occur according to plan, there are uncertainties such as the risk of economic-climate changes.

It is also necessary to reduce port usage fees and land prices as a policy to promote the port for international passage and to attract businesses, so that the port can remain internationally competitive. In this case, the funds available for CAB redemption would shrink, making it even more important to ensure additional sources of funds for redemption. What can be done? The authors believe that the incentive assistance described in the next chapter can play an important role in smooth and early redemptions.

## 7. MEASURES TO IMPROVE THE PORT AUTHORITY'S FINANCES

### 7.1 Compensation of financial sources for redemption by local tax revenue

In this chapter, the authors study the financial sources of funds for the redemption of PFB and CAB. It is difficult to use the profits generated from the facilities and lands established through PFDP and LRPCA (specifically, local taxes) as a source of funds for bond (PFB and CAB) redemption. Therefore, the authors propose that the profits be offered to private companies as incentive assistance. The reason for this is that some of the local taxes should be used as the financial source for PFB and CAB redemption as profits for the port authority considering that the port and harbor functions are delivered with the facilities and land as one unit while both PFB and CAB are bonds for procuring the construction costs. Table 3 shows the results of a trial calculation of local tax revenue in the example of Hakata Port Island City. It shows the future estimate of business office tax (asset rate), fixed assets tax, city planning tax, and individual municipal tax as local tax revenue. The tax revenue, which is approximately \$9 million as of 2010, is expected to exceed \$70 million in 2030.

Table 3 Estimated tax revenue for Hakata Port Island City

Anticipated tax revenue \$million	
2010	9
2015	31
2020	52
2025	65
2030	73

(Source: Data from Fukuoka City HP processed by the authors)

However, from the viewpoint of financial sources of redemption, it seems possible to reimburse CAB at an early stage by using at least 1/3 of the tax revenue as incentive assistance, although it is necessary to determine what rate of the overall tax revenue should be used to redeem LRPCA by calculating the profits.

## 7.2 Attracting businesses through incentive assistance

To use local tax revenue as financial sources for PFB and CAB redemption in the form of incentive assistance, it is necessary that the profits from port and harbor facilities and land be estimated to obtain understanding of the public about transfer of the tax revenue.

Therefore, the authors propose the construction of a system to subsidize port users and land purchasers, drawing upon the general account. Incentive assistance from the general account will not only lower practical usage fee and land sales price, but will also lead to an increase in port users and land purchasers that will consequently increase local tax revenue. The extent of incentive subsidy can be determined by estimating future local-tax revenue.

The example of Fukuoka City is used to study this. Fukuoka City passed an industrial-location promotion ordinance in 2012 and offers 3-year subsidies for businesses located in it, as described in Table 4. When a logistics-related business purchases land in Island City and constructs a transit shed measuring 1,000 square meters or more in area, 30% of the land-purchasing expenses and 10% of the acquisition expenses for buildings are reimbursed from the general account of Fukuoka City as a subsidy. The upper limit for this subsidy is 3 billion yen (\$30million), and it amounts to a 30% reduction in land price.

While incentive subsidies aim to reduce facility usage fee and land price, using local tax revenue as a source for funds, they also allows the early redemption of PFB and CAB. In addition, such a policy can trigger a positive spiral, as the construction of new businesses will lead to an increase in local tax revenue.

Table 4 Details of incentives to businesses for relocation (logistics-related and urban businesses)  
(Source: Fukuoka City HP)

<p>New establishment, relocation, or facility provision in important regions (total floor space larger than 1,000 square meters)</p> <p>[Subject] Land, buildings, and mechanical facilities</p> <p>[Standard] 30% of land price, 10% of building/mechanical machinery acquisition</p> <p>[Limit amount] 3 billion yen (\$30million)</p>
<p>New establishment or relocation in regions other than important regions (logistics industry area, seaside region, etc.); (total floor space larger than 2,000 square meters)</p> <p>[Subject] Buildings and mechanical facilities</p> <p>[Standard] 2.5% of the above price of acquisition</p> <p>[Limit amount] 200 million yen (\$2million)</p>

## 8. CONCLUSION

In the past, port authorities have found it difficult to choose between having to raise usage fees and land prices high enough to enable smooth redemption in bond-financed projects (PFBs/CABs) on the one hand and having to reduce usage fees and land prices to reinforce international competitiveness in port logistics on the other. Unless a solution to this problem is found urgently, the finances of port authorities may grow even more constrained, given the rising trend in port construction costs due to the risks of disasters such as earthquakes and growing interest rates. Therefore, the authors have addressed the matter of financial sources for the redemption of bond-financed projects (PFBs and CABs) by port authorities.

In this report, the authors have provided an overview of the financial conditions of port authorities in Japan, and points out that the construction of ports and harbors has been a major cause of deficits, while port and harbor management has been either profitable or balanced.

Further, the authors have analyzed the trend in port and harbor construction costs in Japan, to estimate future increases or decreases in PFB and CAB. This analysis has revealed that construction cost is expected to increase in the future, depending on the increase in the depth of port and harbor structures and the reinforcement of the aseismic strength required after the Great East Japan Earthquake. The authors have surmised that the rise in construction costs would lead directly to a rise in PFB and CAB issuance.

The authors have also argued that that early redemption is desirable for CAB, given uncertainties

such as changes in the economic climate, although no problems will occur if land sales take place as planned.

Based on the above analysis, the authors propose that facility usage fees and land prices be reduced through incentive subsidies as a measure to reduce the deficits of port authorities. This will enable the early redemption of bonds and an increase in local tax revenue, since a greater number of businesses can be attracted, as shown in the case study of Hakata Port.

The authors hope this report will help the port authorities in reducing their deficits.

## ACKNOWLEDGEMENTS

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