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Social Cost-Benefit Analysis of the Land Reclamation Projects in Japan

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SUMMARY

Most urban waterfront developments in Japan are accompanied by large land reclamation from the sea. These reclamation projects shall be appraised not only from the viewpoint of their returns, but also from the viewpoint of social costs and benefits. A new concept of "coastal accounts" is asserted in order to reform cost-benefit analysis to a more suitable style. The finance of local governments, the main planners and developers of waterfronts, is analyzed from the viewpoint of this new concept, and the actual conditions of development profits created by reclamations are explained. The author discusses Japanese land reclamation projects by way of "coastal accounts" by which coastal stocks and flows shall be appraised.

The analysis concentrates on the Nanko project in Osaka and the Port Island project in Kobe. After a brief introduction of the subject matter, the institutional framework and the trend of land reclamation shall be reviewed. Thereafter, the methodology of social appraisal will be explained. Moving onto the main part of this report an analysis of the coastal accounts of the two cities in question is dealt with in depth. After this analysis, a thorough appraisal of the social cost and benefit account is made, followed by the conclusions drawn.

Introduction

Urban waterfront development is one of the important methods which revitalize both declining inner city areas and harbours. Many cities in Western Europe and North America have adopted their waterfront developments as urban renewal policies. In these cases, urban waterfronts have been used for a variety of purposes such as – office buildings, teleports, housing, hotels, retail shops, open space etc. They are called mixed use developments.

There are no exceptions in the case of Japan. However, urban waterfront developments in Japan are quite different from those in western countries, mainly because most Japanese projects are accompanied by large land reclamations from the sea. Land reclamation in postwar Japan was carried out on a large scale, in the era of rapid economic growth (1960s and early 1970s), as a result of the "export oriented" policy and the energy policy by making coastal industrial zones where steel and petrochemical plants were located. Policy makers of the time paid little attention to the external effects or to the long term consequences of their policies. They can hardly be praised from the viewpoint of human welfare either, because environmental and aesthetic factors were not incorporated in the decision making process under the assumption that these factors had no pecuniary value. The social cost resulting from the serious pollution caused by these policies was uncountable. It was natural that these policies were criticized by people in the late 1960s and the trend of land reclamation has been on the downward path in the 1970s.

Nevertheless, we are presently in a second land reclamation boom. Economic activities are reconcentrating in the metropolitan regions, especially the Tokyo area, and central government has promoted deregulation policies in a way that leads to shortcomings and underestimations in environmental issues. The purpose of the land reclamation that is being carried out now is to create urban facilities and amenities. From the viewpoint of coastal zone management

(environmental management), Japanese administrative systems have scarcely changed when compared to those in the first reclamation boom. Furthermore, there is no citizen participation, which is absolutely necessary because of the environmental damages that land reclamation brings. Hence it is not only necessary evaluate urban waterfront developments in the urban context, but also to evaluate them in the environmental context.

1 The institutional framework and the trend of land reclamation

Let us initially review the institutional framework of coastal zone management in Japan. Japan is a small, populous and highly industrialized country with only 80% of the land area of the State of California but six times its population — the land area of Japan is 377,000km^2 and the population is about 120 million. Furthermore, only one fifth of Japan is inhabitable. Under these circumstances, the coastal land and water is used for fisheries, maritime transportation and, industrial and urban facilities. Despite the intensive and diversified utilization of the coast, neither a national nor a local management system has been created to deal specifically with the coastal zone in a comprehensive manner (Shapiro 1984). In the case of shoreline management, for example, responsibilities are shared between three national agencies, they are **the Ministry of Construction (MOC), the Ministry of Transportation (MOT), and the Ministry of Agriculture, Forestry and Fisheries (MAFF).** However, the urban coastal zone comes, often entirely, under the jurisdiction of the port management body. In the case of the Osaka Bay area, for instance, 196 kilometres (53%) of the total shoreline of 376 kilometres is in the port's jurisdiction, all the shoreline of Osaka City belongs to the Osaka Port Jurisdiction (as for the case of Tokyo Bay, see Hanayama et al. 1983). According to the provisions of the Ports and Harbours Act (Law No.218, enacted May 31, 1950), the port jurisdiction includes both land and water areas. The

Ports and Harbours Act is a law which is typical of those introduced into Japan by the Occupation Authorities after the Second World War, in order to democratize Japanese society. Before the war, every port was managed directly by central government. Under the present Act, either the governor of the prefecture, or the mayor of the major city (limited by the act), is entitled to manage the port located in his jurisdiction. Thus, it is the municipal governments of areas such as Tokyo, Yokohama, Osaka and Kobe that are the port management bodies.

These port management bodies have a rather broader range of objectives and responsibilities than those of port authorities in western countries. Therefore, as far as urban coastal zones are concerned, the port management bodies act as if they are coastal management agencies rather than merely so-called port managers. In effect, major policies of the port management bodies are normally concerned not only with port modernization, but also with orderly development and environmental improvement in the urban coastal zones (Inoue 1984).

The port management bodies, that is to say the municipal governments, have the responsibilities to make plans for their coastal zone development and conservation under the guidelines of the MOT. While these MOT guidelines have to be followed, the municipal governments, as port management bodies, have an advantage over central government on the basis of this Act. Despite the power accorded to municipal governments by the Ports and Harbours Act, central government affects local policies by way of the fact that they provide the financial grants. The revenues of local governments owe largely to central grants. Thus, although municipal governments have the power of authority, they are, in fact, dependent on central government. Central government (MOT) has been planning and carrying out the Five Years Plan for Port Construction since 1961. Under this plan the MOT has given local governments grants for port construction. Major ports such as Tokyo, Yokohama, Osaka and Kobe have been constructed under these circumstances. Moreover, these central

grants for port construction are closely connected with the land reclamation projects carried out by local governments as we shall go on to see later.

The procedure of land reclamation is based on the Public Water Areas Reclamation Act (Law No.57, 1921, amended 1973). As shown in **Fig. 1**, there are three actors and two stages under the act. However, in most cases, the developer and the licence holder are the same body. The developer of Nanko, for instance, is the City of Osaka and the licence holder in the area is the mayor of the City of Osaka. Furthermore, the environmental impact assessment is drawn up by the developer himself. Thus, such assessments are naturally apt to lead to underestimation in any environmental damage. The act requires the payment of compensation to fishermen holding authorized fishing rights within the area, but the act does not authorize compensation to citizens, such as sports fishermen, sunbathers, swimmers who have also used the area. In the present process, land reclamation is carried out easily by compensating fishermen only.

Let us now look at the historical trend of land reclamation in postwar Japan. The land reclamation in a port jurisdiction consists of **the Coastal Land Reclamation Project (CLRP),** and **the Land Reclamation for Wharf Project (LRWP).** Furthermore, the CLRP is made up of **the Land Reclamation for Coastal Industrial Zone Project (LRCIZP),** and **the Land Reclamation for Urban Redevelopment Project (LRURP).**

Recently, the annual size of land reclamation has been decreasing at one fifth to one sixth to that of the peak year (see **Fig. 2**). Amongst CLRPs, LRCIZPs decrease gradually, whereas LRURP, in order to solve urban problems, increases[1]. As for the project cost of one hectare of land reclamation, for the fiscal year 1965, it was ¥24.8 million, and for the fiscal year 1985, it was ¥189.7 million. The cost in 1985, therefore, was a 7.6 times increase over that of the 1965 figure. In the same way, the cost for LRURP showed an increase of 18.6 times from ¥26.8 million to ¥498.2 million. The cost for LRWP increased 5.5 times from ¥29.7 million to ¥162.4 million. It is interesting to note that the

deflator for the cost of total civil engineering works for 1985 was 3.5 when 1965 is 1.0. Furthermore, the deflator for the cost of public works is 3.6 for the same period in question. Consequently, the rising rate of land reclamation cost is larger than that of civil engineering and public works. The rising rate of LRURP is especially remarkable. In the metropolitan regions, where there are strong demands for land reclamation, the shallow sea, which is "suitable" for land reclamation, was already reclaimed in the 1960s. Thus, recent reclamation projects have been carried out in the relatively deep sea (15~20 metres below the sea level) and these projects are naturally expensive. Moreover, the innovation in landfill machineries and anti-pollution equipments has pushed up the cost of reclamation.

LRCIZP and LRURP are generally carried out by local governments alone and these fiscal expenditures are treated in the so-called "reclamation account". LRWP, on the other hand, are carried out by local governments, but with grants from central government and this fiscal condition is treated in the "port account". We can see the financial condition of the reclamation accounts of major ports in **Fig. 3.** The condition of reclamation accounts is fairly healthy, but that of port accounts not so good. It is this major point that we shall discuss in this paper.

2 The methodology of social appraisal

In this paper, Japanese urban waterfront developments (Osaka and Kobe) shall be appraised from the viewpoint of "coastal accounts" in which coastal stocks and flows shall be appraised by applying Irving Fisher's methods. The most popular method by which one estimates the public investment projects is the cost-benefit analysis (CBA). Prest and Turvey have defined CBA as "a practical way of assessing the desirability of projects, where it is important to take a long view (in the sense of looking at repercussions in the far as well as the

near future) and a wide view (in the sense of allowing for side effects of many kinds on many people, industries, regions etc.), i.e. it implies the enumeration and evaluation of all the relevant costs and benefits" (Prest and Turvey 1965). On the other hand, Nash, Pearce and Stanley have argued that "there are many ways of performing cost-benefit analysis, each of which is logically consistent within a particular set of moral notions. Thus, there can be no uniquely 'proper' way to do cost-benefit analysis" (Nash, Pearce and Stanley 1975). It is well known that the calculation of costs and benefits in CBA is not grounded on the criteria of equity, but on the criteria of economic efficiency (O'Riordan and Turner 1983).

From the point that concerns us here, their are important problems as to how to treat the social cost of intangible effects such as destruction of wetlands and landscapes and how to treat the inter-generational equity.

Thus, in cases where coastal zone development is appraised, it is necessary to reform CBA to a more suitable style. Here, the concept of stock is discussed and a new concept of "coastal accounts" is appraised by which the stock in coastal zones is evaluated. Coastal accounts can be defined as being made up of both coastal capital (stock) accounts, which indicate the increase or decrease in coastal stock, and coastal current (flow) accounts, which indicate the increase or decrease in benefits from coastal stock and costs maintaining coastal stock.

Generally, the stock (wealth) is made by a course of human actions or public investments. However, if Irving Fisher's concept of wealth (= capital) is adopted, a new paradigm of stocks and flows can be obtained (Fisher 1965, Tsuru 1971). Fisher has argued that every kind of wealth from which man gets useful services is capital (defined here as "stock"). His concept of stock contains not only the social overhead and private capital stocks, but also contains the natural stock that is made up of living resources, landscapes, assimilative power of polluted water, mitigating power of urban heatland phenomena and recreational resources etc. According to this definition, the fact that stock in a coastal zone increases through public or private capital investments is not an easy assumption

to make. Especially when those investments are land reclamations. In a sense, when man made stocks from public investments increase on the one hand, natural stocks decrease on the other.

In this paper, the focus shall be on the public finance of municipal governments who are the main developers in urban coastal zones. The original coastal accounts shall be translated, as mentioned above, into the operational forms from which the financial data of municipal governments shall be analysed. That is to say, the coastal accounts of municipal governments shall be defined as public accounts which are expended for conservation and development in urban coastal zones. To put it concretely, the coastal accounts consist of the port account and the reclamation account of municipal governments. Coastal accounts mean social cost-benefit accounts and hence they do not only contain municipal governments' accounts, but also contain related accounts such as those of central government. Moreover, these portions are added to the unappraised social cost and benefit under the present social system in Japan. *Now, coastal accounts are defined in the broad definition, that is to say, "social cost-benefit accounts" as "port accounts" + "reclamation accounts" + "related public accounts" + "unappraised social cost-benefit accounts". Coastal accounts in the narrow definition are also defined, that is to say "port accounts" + "reclamation accounts"* (see **Fig. 4**).

Public accounting systems, which handle port management and land reclamation, are made up of government (municipal) accounting and local public corporation accounting. Municipal accounting, which is based on the revenue and expenditure budget consists of general accounting and special accounting. The local public corporation accounting, which is based on the Local Public Corporation Act (Law No. 292, enacted Aug. 1, 1952), is a kind of business accounting. Here, the coastal accounts of eight major ports (Tokyo, Yokohama, Kawasaki, Nagoya, Osaka, Kobe, Shimonoseki, Kitakyushu,see **Fig. 5**) shall be classified, as shown in **Table 1.** There are four types among them.

The first type is that of the case of Kobe. Both the port account and the reclamation account are business accountings. Therefore, the revenue and expenditure of each local undertaking is independent of the municipal general account and comprehensive. The second type is that of the case of Nagoya. The port management body of Nagoya has the general account, the port business account and the reclamation account. In this case, the port accounting consists of the general account, and the port business account. Moreover, the port business account and the reclamation account are business accountings. The third type is that of the cases of Tokyo and Yokohama. In this type they have the general account, the port management account and the reclamation account. The port management account is a special account and the reclamation account is solely business accounting. The fourth type is that of the case of Kitakyushu. Kitakyushu has the general account and the port management account. The port management account includes the reclamation account and it is a special account. In the case of Osaka, it has the general account and the port management account. The port management account is a business accounting and it includes the reclamation account. Consequently, the case of Osaka lies between that of the second and fourth types.

In the following two sections, the financial condition of land reclamation projects in Osaka and Kobe shall be analysed from the viewpoint of coastal accounts in the narrow definition.

3 An analysis of coastal accounts for large cities [I] Osaka

The problem of Osaka's coastal account shall be analysed, focusing on reclamation accounts, and especially costs and profits involved in reclamation projects. As we have already seen, the management of Osaka's coastal accounts is carried out in two ways. Firstly, there is the General Account (Part one; control and operations, and Part two; construction improvement) which centres

on control, operations and construction of base institutions. Secondly, there is the Business Accounts Formula of Port Management Accounts which centres on control, operations and construction in port facilities, and the Nanko reclamation project — the biggest project in Osaka Bay since the war[2]. The composition and change of annual revenue and expenditure of the General Account is shown in **Table 2.** The General Account's income and expenditure level is consistently in the red and the scale of settlement of accounts, in recent years especially, have increased. In 1985 a deficit of ¥11,258 million was recorded. The primary cause for this is, on the one hand, the drop in ratio of rental charges and national treasury expenditure in the composition of annual income, and on the other hand, the rise in the rate of public loan costs in the composition of annual expenditure. If we look at the change of revenue related income and expenditure of the Port Management Account of business accounts, a deficit is recorded until 1974, but after that, though small, a profit is shown (the profit in 1985 was ¥238 million). The capital account is derived from the Harbour function facilities maintenance project and the Nanko reclamation project. As far as the Harbour facilities project income and expenditure are concerned, they are always in the red, and when insufficient revenue in capital related income and expenditure is yielded the Nanko reclamation project shows a deficit — or there is a surplus, but it cannot cover the deficit in harbour facilities income and expenditure. From the above, a chart can be drawn of Osaka's coastal accounts which shows the occurrence of losses in "port accounts" and profits in "reclamation accounts".

Let us, then, analyse the actual state of reclamation profits, looking at the largest project in the port of Osaka (936.8ha), that of the Nanko reclamation project. This project was calculated in the 1957 preparatory investigation expense and started construction in July 1958, initially, as a coastal industrial land creation project, but it has reached its present status with the revision in 1965 of the land use plan as harbour function and city re-development land (Ando

and Okada 1985). As shown in **Fig. 6,** land use is composed of the following proportions: wharves and its related use 52.9%, housing 6.7%, parks and greenery 8.7%, business and commercial use 5.5%, urban industrial site 10.2%, roads etc. 16%. At the end of 1986 the Nanko Port Town residential area had a population of 29,000 — with a total projected population of 40,000. The area of parks and greenery per person at this time was 28 square metres per person — a figure which is nine times greater than the average for the rest of Osaka, which has an average of 3 square metres per person. Included in the parks and greenery there are bird sanctuaries etc., and all in all it is a pioneering experiment of waterfront developments in Japan.

A total of 577.1ha (61.6%) of the 936.8ha is planned to be sold, and at the end of January 1987, the total area actually sold was 433.6ha — a rate of 75.1% (because the Nanko project is an independent business account, included in the figures are sales to other departments in the City of Osaka). At the end of the fiscal year 1986, the land ownership and management of Nanko was in the following proportions: City of Osaka 532.1ha; Public Sector 116.3ha (Osaka Port Wharves Corporation 65.9ha, City Housing Facilities Group 16.2ha, Disaster Prevention Projects Group 18.6ha, Central Government 2.5ha, Osaka Prefecture 7.7ha, Others 5.4ha); Private Sector 288.4ha. The private sector, therefore, accounted for a little over 30%. The essential points of Coastal Zone Planning and Management are Coastal Land Use Planning and Management (Godschalk and Cousins 1985). Consequently, when it comes to use and disposal of land created by reclamation of valuable sea areas, public control, which is possible through long term flexible planning, becomes important. As for this point, both from the point of view "the solution of urban problems" which is given as a reason for reclamation, and from the point of redistribution of urban functions and planned formation of urban amenities, it is a natural demand. From this standpoint, as for reclamation, keeping it as public land is desirable. However, reclamation projects as regional independent projects that are based on modern

loan issuance systems, are dependent on land sales for loan interest and repayment (as explained later there are also exceptions like that of Tokyo).

Under the Public Water Areas Reclamation Law there is only a ten year rule concerning change of land use. In reality, public control is in a difficult situation. The redevelopment of coastal land used by heavy industries, which is becoming a modern problem, truly reveals this point. The appraisal of reclamation projects from the point of land policies of this kind of urban self-governing bodies will be examined in the final chapter.

An exact evaluation of the Port Management Project Account, is not possible due to the fact that the profit and loss account concerning the Nanko reclamation project has not been established, but the change of capital income and expenditure is shown in **Table 5.** The reclamation project's expenses peaked in 1975, 17 years after the commencement of construction, and even concerning business loan repayments and business debt expenses, having peaked in 1983 and 1982 respectively, the final stages of the project can be verified. The aggregate of capital income and expenditure at the end of 1985 was a surplus of approximately ¥1,561 million (The figures are not deflated. They are so-called mixed yen. Hereinafter same.). To this the balance of the city maintenance fund of ¥19,751 million, which belongs to City of Osaka Port and Harbour Bureau, — appropriated funds which were profit reserve — was added and the total of ¥21,312 million became a kind of standard of development profit at the end of 1985. Of course, against the comparative balance sheet of the land creation account of ¥193,292 million, the aggregate of land sales is ¥155,743 million and there is , therefore, a balance of ¥37,549 million. If sales proceed satisfactorily, development profit will increase greatly. However, the problem with Osaka's coastal accounts is that the entire Nanko reclamation project is managed in the General Account and not the Port Management Project Account which means that development cost was underestimated. Shoreline protection, breakwater and port transport facilities which are basic facilities, and in the same way greenery

maintenance, which are Government supported projects, are carried out under the general accounts of the Osaka Port repair fund and the expenditure for the six year period, taken from the data for the 1980−1985 period, amounts to ¥10,296 million (excluding foreign trade wharf project funds which differ in character). There is a problem as to how we integrate this kind of expense in land creation project costs, but at the very least it is undoubtedly a reclamation related project expense,and if we include this in the calculations our perspective on the development profit evaluation of the Nanko reclamation project changes somewhat.

4 An analysis of coastal accounts for large cities [II] Kobe

Let us now analyse the City of Kobe which is highly rated as a public creator of development profit.

As stated in Part 2, Kobe's coastal account is the only one in Japan made up from the "Port Operation Account" (Port Authority Section) which is totally managed under the business account and, the "Land Development Project Account" of the Land Development Section which is related to the inland land creation project and reclamation project.

As far as the changes of revenue related income and expenditure of "Port Operation Account" in 1972 are concerned, a pure loss (¥85 million) was calculated, but in other years a more satisfactory change occurred. What is most noticeable about the composition of profit, is the increase of rent revenue of land etc. The component ratio in business revenue, a mere 2.9% in 1965 rose to 22.1% in 1975 and 24.1% in 1985 and moved closer to the level of harbour finances of western countries. Table 4 shows, as an example of those types of harbour finances in the west, the business income and expenditure of the Port of San Francisco[3]. Harbour space, in the west, is almost all public land. This allowed the Authority to secure a stable income base by a public land use formula, even at

the time of redeveloping. In addition the complication of private property rights, like that of Japan, did not exist which enabled the planning to be carried out smoothly (Wrenn 1983). As for capital income and expenditure, in recent years insufficient source of funds of a little less than ¥2,000 million has been recorded. In income component, a ratio drop of national treasury expenditure is noticeable (from 20.8%, 1975 to 3.5%, 1985) and that has been compensated by transferring funds from property income and the harbour projects fund. In the expenditure component, the construction improvement cost has dropped and investment towards harbour project fund creation has increased[4].

The revenue related income and expenditure of "Land Development Projects Account" are satisfactory and land sales were carried out smoothly. In capital related income and expenditure an insufficient source of revenue was recorded from 1972 and this was made good by carrying forward the previous year's construction fund and a profit and loss account reserve fund. An important aspect of the present development section project is in the inland land creation project of the Kobe Research Park, Kobe Distribution Housing Project etc. Land sale income in profit and loss income and expenditure was expended as replacement revenue of these projects. From the above, a compositional arrangement can be drawn that shows that Kobe's coast accounts add up to a small profit in harbour projects and a large one in reclamation projects.

Let us now analyse the first stage reclamation project of Port Island (436ha) which was the first big scale project in Kobe Harbour. The Port Island project started as a result of three factors. Firstly, from the overcrowding of ships as a result of the sudden increase in the amount of foreign trade through the high speed economic growth. Secondly, from the necessary high-tide measures resulting from the typhoon damage of 1965. Thirdly, from the commencement of building the South Wall breakwater wharf in April 1966 by the 3rd District Port Construction Bureau, Ministry Of Transport. As shown in **Fig. 7,** land use is made up in the following proportions: wharves and its related use 65.6%, urban

facilities use 26.4%, transport function use 1.1%, dangerous goods treatment facility 0.7%, and greenery 6.2%. At the end of 1986 the population was 14,000 — with a total projected population of 20,000. The area of parks and greenery area per person at this time was 15.7 square metres — a figure which is approximately two times greater than the average for the rest of Kobe which has 7 square metres per person (Shiozaki and Ensyu 1985).

Land use is made up in the following proportions: wharves 36.7%, harbour related use 28.9%, city function use 26.4%, transport function use 1.1%, dangerous goods treatment facility 0.7%, and greenery 6.2%. If one compares it with the Nanko project the development of harbour functions that is noticeable. A total of 274.9ha (63%) of the 436ha of Port Island is planned to be sold, and at the end of the fiscal year 1986 the actual amount sold was 270.9ha (98.7%). Compared with the Nanko project sales are being carried out speedily. Land ownership and management was in the following proportions: the City of Kobe 206.3ha; Public Sector 160.2ha (Kobe Port Wharves Corporation 146ha, City Housing Facilities Group 11.2ha, Disaster Prevention Projects Group 0.5ha, Central Government 1.8ha, Hyogo Prefecture 0.7ha), Private Sector 69.5ha. The rate of land ownership by the private sector is approximately 16% and it is roughly half that of Nanko. This is due to the importance of harbour functions in land use.

As can be seen in **Table 5,** there were three parties involved in the construction of Port Island; Central Government, the Hanshin Foreign Trade Wharf Corporation and Kobe City (Land Development Section and Port Section). Although the City of Osaka's Nanko reclamation project was carried out almost completely as a City of Osaka project, in the case of the Port Island project the role of both the Central Government and the Hanshin Foreign Trade Wharf Corporation was extremely important (investment ratio in 1979 was Central Government 50%, City of Osaka 16.2%, City of Kobe 33.8%). Actual results of land sales and land creation costs are shown in **Table 6** and **Table 7.**

Against a total sales figure of ¥160,139 million with creation costs of ¥138,059 million, the City of Kobe made a development profit of ¥22,079 million. One has to be careful here as the creation costs of Table 7 are based on Kobe's reclamation land creation, greenery maintenance and transport related facilities in **Table 5.** The quay and wharf construction project which surrounds the reclamation project has not been integrated — that is to say Kobe's ¥2,210 million share of the south wall protection wharf has not been integrated in the cost. If we appraise the reclamation project expense from the viewpoint of the broad sense of coastal accounts, because the Kobe harbour section project and the Hanshin Foreign Trade Wharf group project are business accounts, it is not necessary to integrate the entire project expense into the reclamation project expense, but it is necessary to integrate National treasury expenditure funds towards directly controlled government projects and parks and greenery and port transportation facilities. If we provisionally accept Central Government's project cost of ¥21,700 million in Table 7, it roughly counterbalances the development profit which the City of Kobe absorbed. Furthermore, if we look at sales unit prices in business use land, which was most expensive in the late 1970's, it was ¥150,000 per 1m2, and with prices being from 1/4 to 1/6 of city centre land prices, in reality it was the land buyer who absorbed the development profit.

5 Social cost and benefit account

In sections 3 and 4, the coastal accounts of Osaka and Kobe, concentrating on the development costs and development profits (project profits) of respective representative reclamation projects, have been analysed. The approach that has been employed took [port accounts + reclamation accounts + related public accounts] of coastal accounts of the wide definition described right at the beginning. "Unappraised social cost and benefit accounts" have, as yet, not been

dealt with and it is in this section that a thorough investigation shall be made into them. To begin with let us put emphasis on the treatment of social cost. The reason for this is that in coastal zone and harbour space in modern Japan, the needs of the economic actors (shipping capital and industrial capital etc.) which enjoys the benefit of a reclamation project are easily reflected as administration demands through the administration process of the Harbour Commission of Inquiry etc. Conversely, the needs of those who should naturally enjoy the benefits of the reclamation project, and indeed, the views of the future generations who may be disadvantaged as a result of the project, are difficult to reflect in the administrative process. As shown **Table 8,** the composition of the Harbour Commission of Inquiry of Osaka and Kobe only indirectly reflects the needs of the average citizen. This means it is important that, at the time of the compensation test, which is a basic matter of cost benefit analysis, the premise of the social cost which accompanies sea reclamation is clarified. Here, social cost does not mean the so-called unpaid cost which depends on external uneconomic effectiveness, but is defined as the opportunity cost on the occasions when the natural resources which are used in the said projects (and the resources which are lost through that) are used for other services, and even project cost (namely internal cost), which is the cost of finished appraisal, is included in this the definition.

The social cost, which is the problem here, can be divided into 3 categories.

The first social cost can be thought of as the cost (opportunity cost) which results from the loss of the sea surface. That is to say the costs that result from the following:

① The reduction of marine biological food resources − namely the loss of co-operative fishing rights.

② Marine leisure e.g. pleasure boating and sports fishing. If one considers

that it is only recently that marine leisure has become popular in Japan, the opportunity costs for future generations is strong. The disappearance of the sea surface of both coastal areas is something which reduces considerably the variety of choice for future generations.

③ Increased shipping disasters due to the reduction of sea lanes.

④ The destruction of the landscape, and climatic changes (increase in temperature etc.).

Amongst these first social costs, in reality, the only compensation being carried is that for the loss of fishing rights[5]. During the Osaka Nanko reclamation project, according to the Electric Power Development formula ([outline of loss compensation as a result of submergence accompanying development of power resources] which was a cabinet understanding in 1953) between January 1961 and August, compensation was paid in the following amounts: ¥260 million to Osaka Fisherman's Co-op (240 members) (surrendering Nos.1 & 2 type Co-op fishing rights); ¥85 million to Osaka Sumiyoshi Fisherman's Co-op (43 members) (surrendering Nos.1 & 2 type fishing rights); ¥46 million to 25 fisherman's co-ops to the south of Sakai city (1,955 members) (cooperative fishing area) — a total of ¥391 million (City of Osaka-Port and Harbour Bureau 1971). Again, as for Kobe's Port Island project, under a cabinet decision formula [loss compensation standard outline which accompanies acquisition of public land] which was a 1962 cabinet decision, in 1966 ¥1.38 billion was paid in compensation to 10 unions (764 members) other than the East Kobe Fisherman's Co-op union (surrendering co-op fishing rights and abolition of fishing permit), (Port Island Building History Editorial Committee 1981).

The second social cost is that which accompanies building work. Within this there is reclamation works cost (including compensation cost related to

earth and sand gathering[6]); social capital maintenance costs (ports, roads, over and underground water pipes and public benefit building etc.); atmospheric and marine pollution costs done by works; noise pollution costs and amongst these it is building works costs that are the finished appraisal.

The third social cost is that after land creation and the cost which is produced by human activity related to this land creation. Included in this is the upkeep and administration cost of social capital, and waste and drainage administration cost as a result of livelihood, and economic activity on newly created land and the damage cost (unappraised) which occurs from the present level of administration. Furthermore congestion cost etc., which is an accumulated demerit is conceivable. Again, for the Nanko and Port Island, as already stated, Harbour transport facilities (production related social capital) and housing land (livelihood related social capital) already co-existed together and concerning residential environment it is thought to act as a minus factor. As for this minus factor it is not necessarily reflected in those house prices.

Like the above, many social costs resulting from land reclamation projects are costs which are difficult to actualize in modern social systems. At the time of the public land reclamation those who emerged as the people with powers were the heads of the city self-governing bodies (generally the Governors of the urban and rural prefectures) who were the administrators, and the fishing unions. Consequently, in order to actualize the unappraised social cost it is necessary to substantially guarantee the routes of various citizen participation towards the planning process. Citizen participation should not be limited to public hearings. It is important that civilian environmental protection groups play an active part in the planning and decision making processes of inquiry commissions etc.[7].

With respect to unappraised social cost what we ought to consider is social benefit, especially that which restores to the public the development profit which materializes as an increase in land prices. These various points will be stated as

conclusions in the final section.

Conclusions

There are three conclusions which are derived from our analysis. Firstly, in the case of Osaka's coastal accounts the present administration and accounting system yields an underestimation of development costs. Secondly, like Kobe, even employing "the actual price method" taking the largest base of reclamation cost price, it is impossible to absorb development profit. That is to say the development cost in modern Japan's "coastal area administration" is underestimated and furthermore even the restoration to the public of development profit is difficult. Thirdly, as for many social costs which accompany sea reclamation, in the present social system actualization is difficult and it is necessary to have a system plan which guarantees citizen participation in the planning process.

What is important with respect to unappraised social cost is the restoration to the public of development profit. The reason for this is that unappraised social cost is something which occurs as a result of development action by public departments of publicly owned sea area. (Regarding the "actualization" of social cost related to environmental protection we ought to take care to wait for a long time lag as can be seen in the blue tide of Tokyo Bay (Furota 1987)). As for the city self-governing bodies who are those project subjects, a long term plan is required. The point that we have to take care about there is the scope of discretion of self-governing bodies in the creation of development profit. That is to say the inland residential development based on the New Urban Housing Development Act (1963) and the coastal land development based on the Public Water Areas Reclamation Law (1921)[8]. There are two policy measures in development profit i.e. the relocation to the public of the increase in land prices. Firstly, a land tax system which absorbs the increase in price through a

charge taxation, and secondly, a land nationalization policy. This is because land which is created through a marine land creation project is from the beginning public land, it is therefore possible to appraise the actualization of this[9].

ADDITION

An earlier version of this paper was presented at the 2nd Asia-Pacific Environmental Conference, Korea, March 28th, 1993.

NOTES

1) As for sea surface reclamation in harbour space there is reclamation which is carried out as waste matter reclamation shoreline protection maintenance project, but because one cannot draw a time series for it, it is excepted. In the outline of the plan of the waste matter reclamation shoreline protection maintenance project in 1981, national total shoreline protection extension was 57,731m, the amount of waste matter registered was 263,110,000m3, area of 2,135ha and the shoreline protection maintenance situation at the end of 1980 became an extension of 39,452m and plan rate of 68.5% (Yasuharu Yabe "Maintenance concept of integrated administration of a large area" (in Japanese), *Harbour*, October 1981).

2) About accounts classification – it is explained in the following manner in "An Outline of works projects". (Amongst projects that are controlled by the Harbour Authorities the following expenses are calculated in the "General Accounting Budget": basic harbour facilities such as the sea wall and breakwater etc. and the maintenance of harbour greenery; the Osaka port repair project which carries out harbour pollution protection; the harbour zone disaster prevention project which carries out tide protection facilities etc. for the high tide policy; the harbour environmental maintenance project which carries out the maintenance of the waste matter reclamation protection wall. Furthermore amongst both the reclamation projects and the harbour facilities the harbour facilities supplies project which provides loading and unloading machinery, warehouses and tugboats under the revision of the Local Financial Act of 1957 as expensive projects of a profitable nature it came to be accounted as a special account, but under the revision of the Local Public Projects Act of 1963 and the projects which applies to the financial regulations of the said law, these expenses were calculated as in the "Port Management Projects Accounts". Furthermore, because local public corporations under the revision of the Local Public

Corporations Act came to be established in law, "regulations concerning establishment of harbour projects etc." were enacted 28 December 1966.), City of Osaka Port and Harbour Bureau, "Outline of works projects" (in Japanese),1987,p.93.

3) The data is a little old, however, the ratio of property (land) rent revenue in business income in the Dutch port of Rotterdam and the American ports of Seattle and Long Beach are respectively 23.2% (1974), 34.0% (1974), and 22.4% (1975). Akiyama,R. and T. Okabe, "Harbour Administration and Finances of Various Western Countries" (in Japanese), volume 1, 1977.

4) The Harbour Projects Fund, as investment in surplus profit and capital accounts which occurred in earnings related income and expenditure (profit and loss accounts), as something reserved for the future, in 1985 ¥236 million was profit surplus. Furthermore, ¥867 million was put aside as investment and at the end of 1985 the balance was ¥46,254 million (however, quantitatively this is small, but this includes a partial payment of debt). (City of Kobe, *City of Kobe Harbour Projects Accounts Settlement Report* (in Japanese), 1985.)

5) In contrast to most other country, Japan has assigned virtually all fishing areas to local fishermen in cooperatives, on the basis of traditional fishery areas and patterns. These fishery rights do not constitute ownership of the resources or the area but, in fact, they have the same power as the other private property rights.

6) As for the Osaka Nanko Reclamation Project, as a once only compensation as a result of sand collection in Dangose (Kagawa Prefecture), a total of ¥373 million was paid to Ieura Fisherman's Co-op between April, 1962 and December, 1964. (City of Osaka-Port and Harbour Bureau 1971).

7) The San Francisco Bay Conservation and Development Commission, which carries out general coastal administration of San Francisco Bay holds the Citizens Advisory Committee and within this the representatives of citizens environmental preservation groups such as the Save San Francisco Bay Association participate. (San Francisco Bay Conservation and Development Commission, *Annual Report*, 1986, p.30.).

8) In the New Urban Housing Development Act derived from Senri New Town (Osaka prefecture), which is the base law of Tama New Town (Tokyo) and other similar developments, a land disposal plan is integrated in the development plan and concerning the sale of housing land a cost price method, that is to say "cheap and fair price", is provided for. However, the Public Water Areas Reclamation Act is a "procedure law" and there is no provision like that of the New Urban Housing Development Act.

9) In the 1974 Tokyo metropolitan Harbour Commission Report concerning "the land management of Tokyo Bay reclamation area" (in Japanese), it states that the government should hold land ownership rights, and rent to private users. Recently in "The master plan of Tokyo coastal sub-urban-centre building" (in Japanese, June 1987), for stabilizing land price the government holds land ownership.

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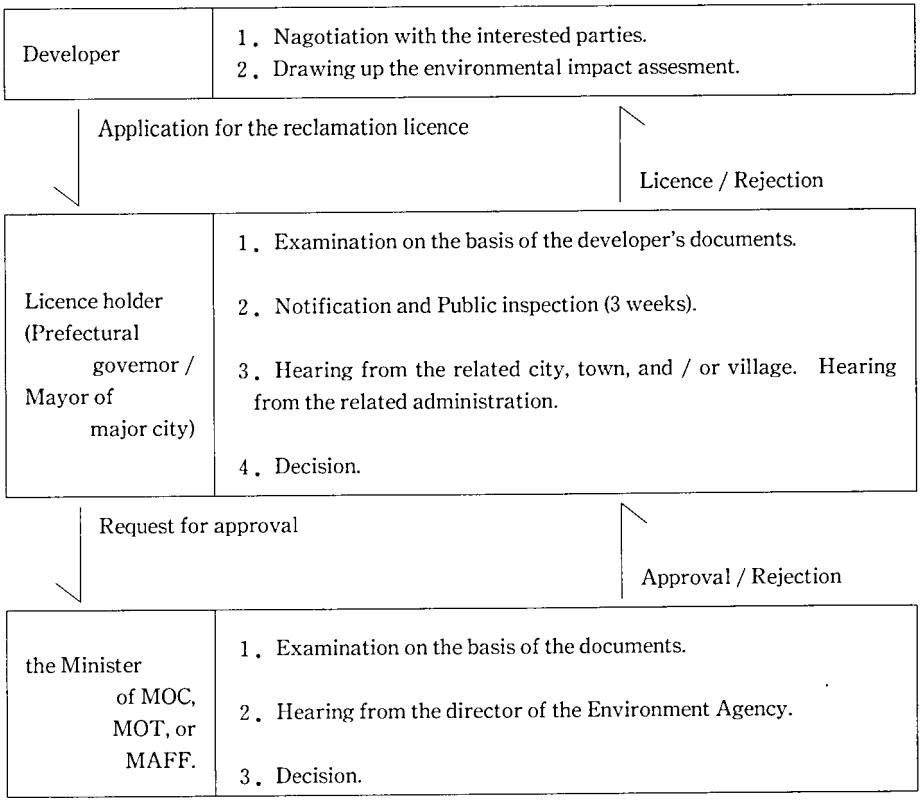
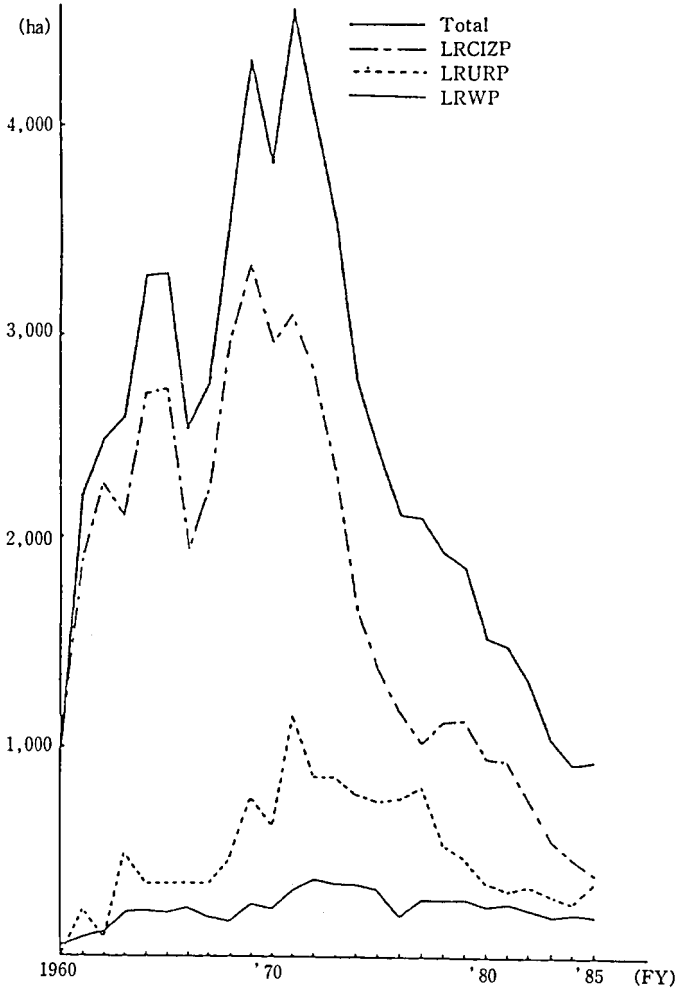


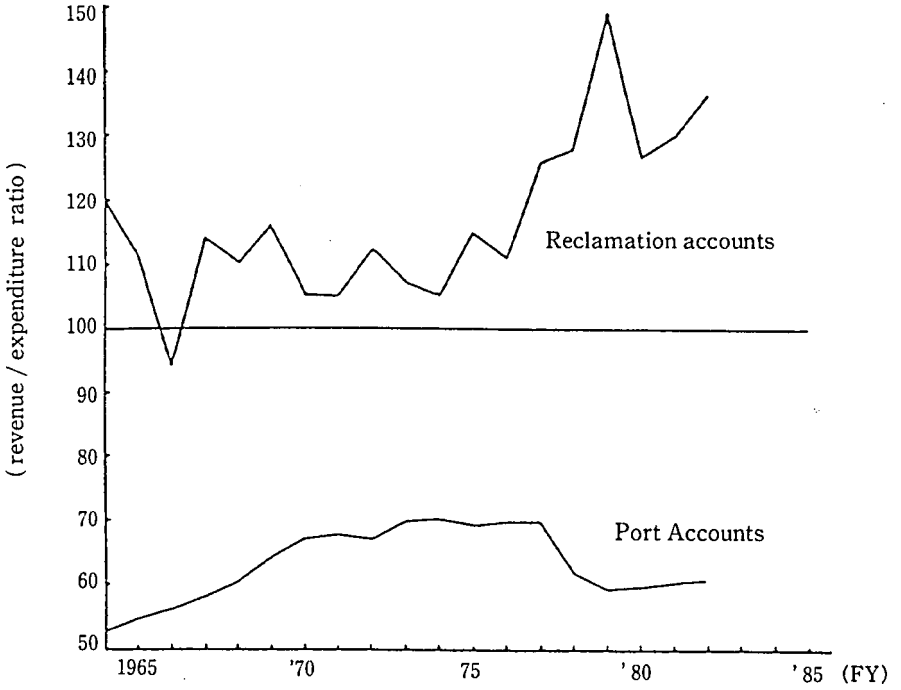
Fig. 1. The procedure of land reclamation



N o t e: The Japanese fiscal year (FY) starts on April 1st of the year and ends on March 31st of next year.

Source: Ministry of Transportation.

Fig. 2. The annual size of land reclamation in port jurisdictions



Note: 1. Reclamation accounts means the reclamation business accounts which are Tokyo, Yokohama, Nagoya, Osaka, Kobe, and some other ports.

2. Port accounts are the total eight major ports' accounts which treat port operations.

3. Revenue/expendifure ratio means that revenue ÷ expenditure × 100.

Source: Ministry of Home Affairs, *Annual report of local public corporations*, each year.

Ministry of Transportation, *White paper of transportaion*, each year.

Fig. 3. The financial condition of the major port accounts and reclamation accounts

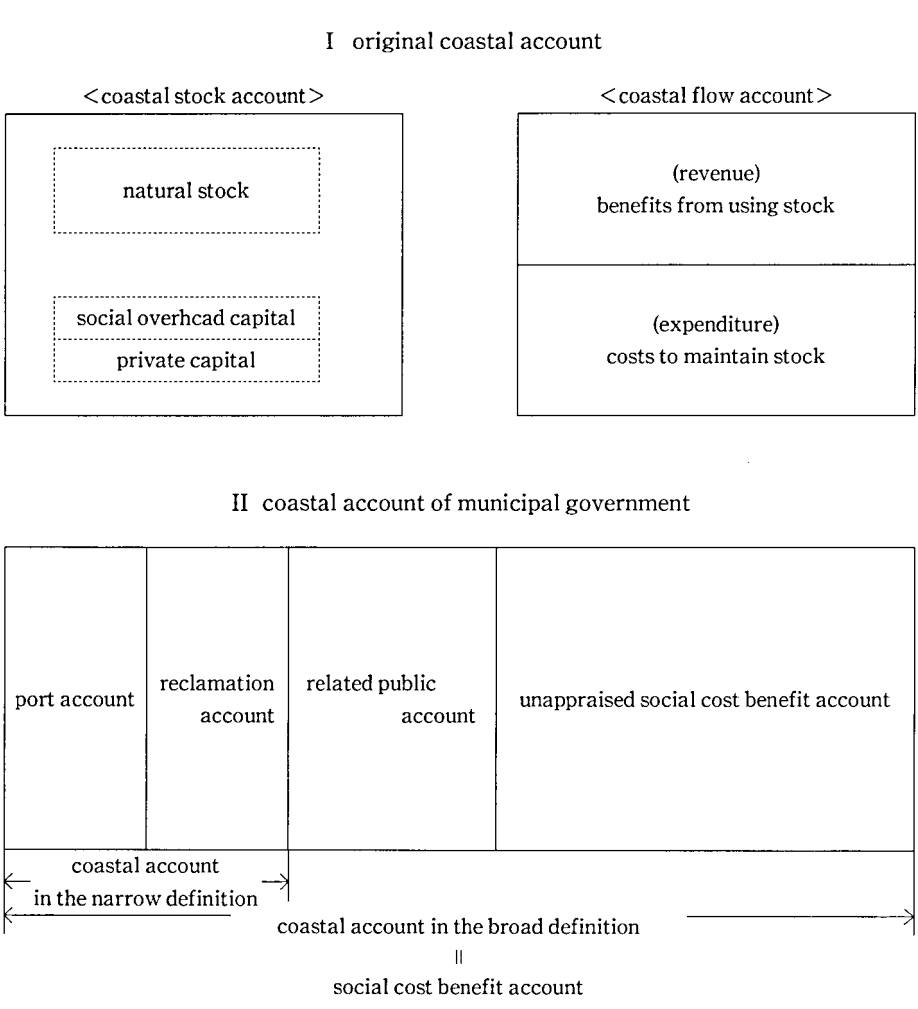


Fig. 4. The framework of coastal accounts

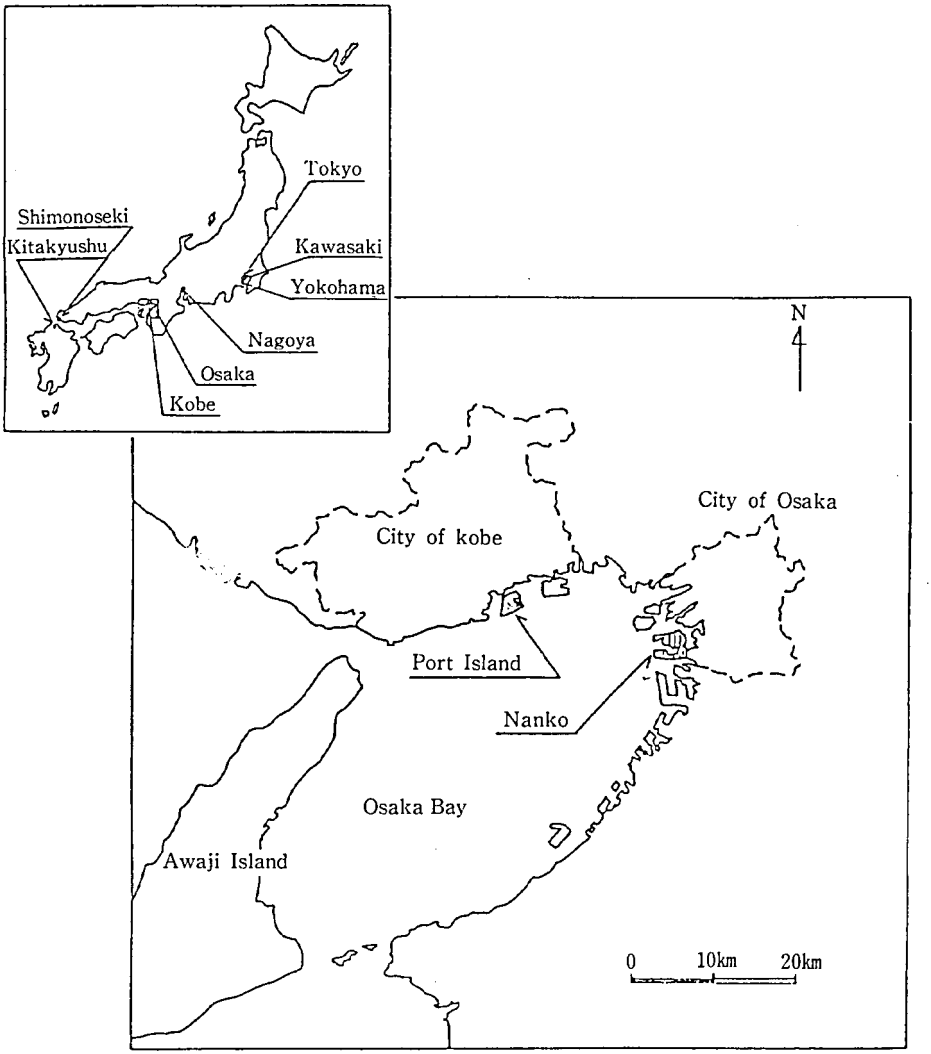
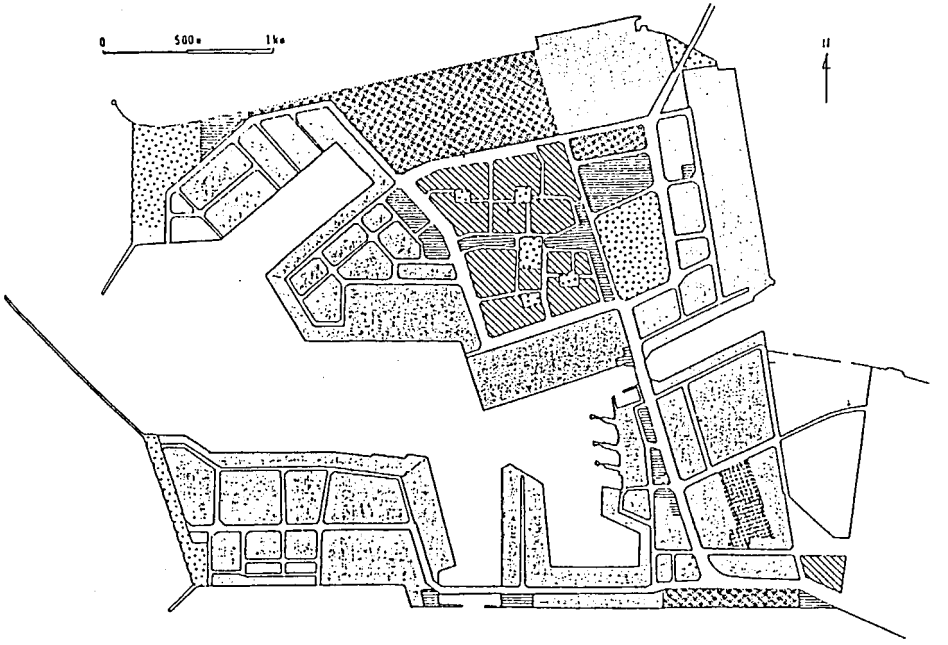


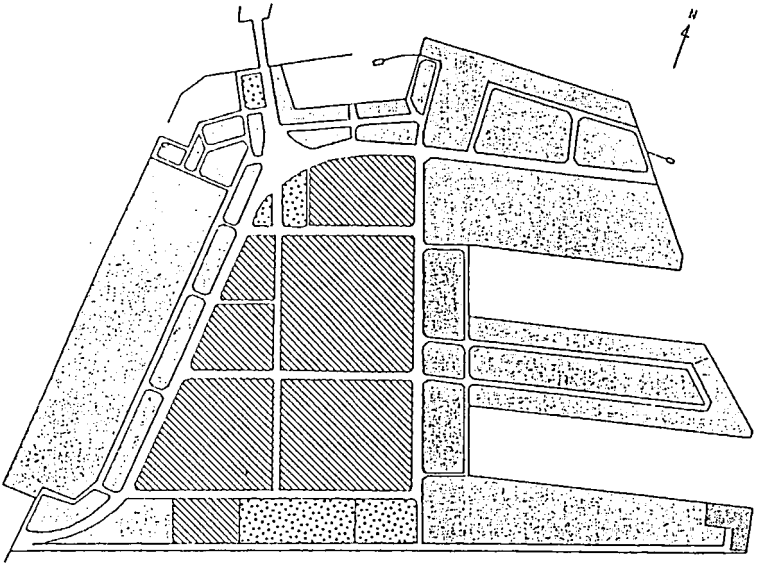
Fig. 5. Location of eight major ports, Nanko in Osaka, and Port Island in Kobe



Legend	Land use	Size(ha)	Ratio(%)
	Wharves and its related use	491.6	52.9
	Housing	62.1	6.7
	Parks and greenery	81.1	8.7
	Business and commercial use	51.5	5.5
	Urban industrial site	94.3	10.2
	Roads etc.	149.0	16.0
	Total	926.6	100.0

Source: City of Osaka.

Fig. 6. Land use of Nanko(Osaka)



Legend	Land use	Size(ha)	Ratio(%)
	Wharves and its related use	286	65.6
	Urban facilities	115	26.4
	Transport function use	5	1.1
	Dangerous goods treatment	3	0.7
	Parks and greenery	27	6.2
	Total	436	100.0

source: City of Kobe.

Fig. 7. Land use of Port Island(Kobe)

Table 1. The coastal accounts of eight major ports

Port	General Acc.	Port Acc.	Reclamation Acc.
Tokyo	Have	Special Acc.	Business Acc.
Kawasaki	Have	Special Acc.	Special Acc.
Yokohama	Have	Special Acc.	Business Acc.
Nagoya	Have	Business Acc.	Business Acc.
Osaka	Have	Business Acc.	Business Acc.*
Kobe	None	Business Acc.*	Business Acc.
Shimonoseki	None	Special Acc.*	Special Acc.*
Kitakyushu	Have	Special Acc.*	Special Acc.*

Note: * denotes the same account.

Source: Each port management body's annual report.

Table 2. The revenue and expenditure of the General Account, the Port of Osaka.

(in millions of yen)

Fiscal year	1970	1975	1980	1985
Revenues:	6,548	12,641	20,124	27,017
Users charge	9.7%	9.7%	7.2%	7.1%
Central grants	57.8	39.8	33.3	23.7
Property rentals	13.6	15.7	14.5	14.5
Transfer from city budget	17.9	29.4	38.9	42.2
Other	1.0	5.4	5.3	12.5
Expenditures:	9,299	20,044	29,594	38,276
Operations	10.9%	9.6%	10.3%	9.8%
Loan costs	—	18.1	23.3	31.0
Osaka Port repair fund	61.6	34.0	34.9	35.8
Disaster prevention	25.8	18.5	4.4	2.0
Environment	—	18.6	25.3	16.2
Other	1.7	1.2	1.8	5.2
Net income	△2,751	△7,403	△9,470	△11,259

Note: △ denotes the red (hereinafter same).

Source: City of Osaka.

Table 3. The capital income and expenditure of Nanko reclamation project.

(in millions of yen)

F.Y.	Revenues				Expenditures			
		Bonds	Land Sales	Others	Recla. Cost	Dept Expe.	Loan Repay	Transfer
1957	—	—	—	17	17	—	—	—
1958	397	397	—	405	400	—	5	—
1959	257	257	—	292	260	29	3	—
1960	1,049	922	126	996	932	61	3	—
1961	2,678	2,144	515	2,464	2230	158	75	—
1962	4,123	3,734	369	4,197	3655	431	109	—
1963	3,810	2,993	659	3,992	2996	898	97	—
1964	2,489	2,282	206	3,658	2283	1,284	89	—
1965	5,650	1,794	2,955	4,053	2295	1,723	34	—
1966	3,262	1,960	781	4,440	2432	1,967	40	—
1967	6,446	2,228	3,972	4,940	2613	1,264	1063	—
1968	5,080	1,317	3,650	5,008	2452	1,511	1044	—
1969	5,540	944	4,330	5,602	2607	1,596	1043	—
1970	4,623	1,250	3,243	5,179	2399	1,734	1045	—
1971	1,2178	2,612	9,083	7,341	4721	1,574	1046	—
1972	14,065	5,938	6,683	1,246	7073	1,552	1130	—
1973	11,178	6,467	3,407	13,027	9897	1,526	1602	—
1974	11,753	6,917	4,003	16,246	10667	1,572	2331	—
1975	17,951	8,153	8,558	16,894	12005	1,463	2850	5
1976	20,411	6,600	11,774	17,729	12004	1,848	3372	—
1977	17,649	5,985	9,369	1,935	11580	1,923	3617	3
1978	17,030	7,951	4,422	16,052	9490	2,097	3756	3
1979	25,100	6,742	17,027	22,988	8581	2,287	4116	8,002
1980	17,098	3,669	10,949	16,930	6497	2,461	4278	3,692
1981	20,136	3,906	13,395	19,334	6447	3,092	4390	5,404
1982	15,157	3,452	7,950	19,092	6616	6,684	4456	1,335
1983	19,249	2,288	8,993	19,402	5543	7,641	4118	1,600
1984	15,299	405	11,177	17,532	4756	7,712	3674	1,389
1985	13,794	1,387	8,136	13,485	4741	3,199	3267	2,276

N o t e: 1. "Transfer" in expenditures means that it transfers to the City Maintenance Fund.

2. The land scale which has been planned to sale is 577.1ha (Nanko is 936.8ha). At the end of 1985FY, 417.6ha was alredy sold(72.4% compare to the plan).

Source: City of Osaka.

Table 4. The revenue and expenditure of the Port of San Francisco.

(in thousans $)

Fiscal year	1984/85		1985/86	
Operating Revenues:	29,121	100.0%	29,411	100.0%
Property rentals-commercial	14,458	49.6	14,692	50.0
Property rentals-maritime	4,879	16.7	4,803	16.3
Wharfage, dockage, and demurrage	7,789	26.7	6,335	26.7
Commercial power	1,207	4.1	1,145	4.1
Other	789	2.9	2,436	2.9
Operating Expenses:	23,653	100.0%	24,664	100.0%
Operations	7,555	31.9	9,950	40.3
Maintenance	10,296	43.5	9,592	38.9
Depreciation	3,824	16.2	3,631	14.7
Commercial power	965	4.6	924	3.7
Fire boat operations	1,013	4.3	927	3.8

Note: 1984/85 means a fiscal year which is from July 1st, 1984 to June 30th, 1985.

Source: The Port of San Francisco, *Wharfside*, January/February 1987.

Table 5. The development fund of Port Island.

(in tenmillions of yen)

	Central Government	Hanshin Foregin Trade Coporation	City of Kobe	Total
Port Facilities	217	942	58	1,217
Land Reclamation	—	—	742	742
Parks Greenery	—	—	99	99
Transport Facilities	—	—	200	200
Total	217	942	1,099	2,258

Source: Port Island Building History Editorial Committee, *Port Island Building History* (*in Japanese*), City of Kobe, 1981.