

CHARACTERISTICS AND COST SHARING OF TRANSPORT INFRASTRUCTURE

Hirota Yamauchi*

SUMMARY

In general, infrastructure may not be adequately supplied solely by the private sector. Transport infrastructure such as roads, ports and airports is indispensable for a country's economic activity, and is characterized such that its appropriate provision justifies or calls for involvement of the public sectors.

There are three principles on the question of who should bear the costs of a large-scale facility such as transport infrastructure: the user pay principle, the indirect beneficiary pay principle and public financing. Institutional arrangements for developing transport infrastructure include public corporations, special budget account and private finance initiative (PFI), which tap private sector resources.

Transport infrastructure in Japan has been developed primarily based on the user pay principle. However, it has been pointed out in recent years that the user pay principle has limitations in the capacity of bearing costs due to soaring costs of construction, large externalities and prolonged periods of recovering investments. There are also problems of fiscal burden and, for the special account system, of intergenerational equality. Therefore, we have to devise a system of sharing cost burden to alleviate the problems of the user pay principle by considering the nature of transport infrastructure.

In developing countries where transport infrastructure is a pressing issue, an examination of the methods employed in Japan for developing transport infrastructure and how its costs have been borne is likely to provide many suggestions.

1. INTRODUCTION

Transport infrastructure such as harbors, airports, roads are usually provided with some form of public involvement

within a variety of institutional frameworks. The term “*SHAKAI SHIHON* (infrastructure)¹”, as defined by the Economic Council of Japan, is “goods whose supply falls short of a desirable quantity if we rely solely on the private sector”. In other words, to ensure the optimum supply of such goods, the involvement of public sectors is justified or called for.

It is true that in general infrastructure may be characterized as goods that cannot be sufficiently provided for by the private sector alone. However, the arguments as to why such supply shortfalls occur are not necessarily uniform. Economic science has identified several reasons for which the market does not function effectively and calls such a situation “market failure”. By observing individual transport infrastructure, particular reasons for such supply shortfall within the conceptual framework of market failure may be revealed. And depending on these causes, the manner in which the public authorities intervene may vary.

In developing countries, in addition to the factors causing market failure, the macroeconomic environment, including deficiency in domestic private capital accumulation, has significant effect on the situation. Therefore, when exploring financial means for developing infrastructure, approaches based solely on the theory of market failure as it is applied to advanced economies will be insufficient. Despite this reservation, the microeconomic approach enables us to analyze concrete methods for promoting the development of infrastructure, including the question of who should and how to bear the cost. It is believed that this will lead to a prescription for absolute shortfall of capital.

Section 2 discusses the characteristics of transport infrastructure and provides a simple economic theory on its cost burden. Section 3 examines public corporations and special budgetary accounts as specific means used in Japan for providing infrastructure, as well as the private sector participation in infrastructure development. Section

* Professor, Faculty of Commerce, Hitotsubashi University

1 *SHAKAI SHIHON* is translated into “infrastructure” in this paper.

4 provides a brief summary and section 5 presents implications for developing countries.

2. IMPROVEMENT OF TRANSPORT INFRASTRUCTURE FROM AN ECONOMIC POINT OF VIEW

Basic transportation facilities such as roads, ports and airports are vital for national economic activities and are classified as “transport infrastructure”. As pointed out in Adam Smith’s “Wealth of Nations”, in general the development of infrastructure is a typical area where the government must assume responsibility. This is because infrastructure is generally not provided by private economic activities, or is provided in insufficient amount.

2.1 TRANSPORT INFRASTRUCTURE AS PUBLIC GOODS

One reason why infrastructure is not properly provided by private economic activities is that it has characteristics of public goods in the sense used in economics. Ordinary goods are usually consumed by one consumer, and not simultaneously consumed by many consumers. The consumption of such goods can also be prohibited to those who do not pay (exclusion principle). Public goods are defined in economics as goods that do not fulfill these two conditions.

The optimum allocation of economic resources such as labor and capital is not achieved if public goods exist. Goods provided to one person can also be consumed by others and consequently each individual does not reveal his or her own demand. Furthermore, since consumers that do not pay the price cannot be excluded, there is a “free-rider” problem. In other words, since the amount needed by the society as a whole cannot be clearly defined and it is not possible to charge prices, private enterprises have no incentives to provide public goods.

Another case where infrastructure cannot be adequately provided by private economic activities is that externality effect is so large that the project is not viable unless careful consideration is given to this externality effect. It is well known that there are two kinds of externality: negative externality and positive externality. Problems of environmental degradation such as air pollution and noise are typical examples of negative externalities. On the other hand, positive external effects include developmental benefits arising from the improved transport infrastructure. In both cases, an appropriate

amount of supply cannot be obtained if we rely solely upon the market. Such shortfalls in supply occur particularly in transport infrastructure (there is an over-supply of goods causing pollution in the case of environmental pollution). This is because a firm cannot make profit, in principle, unless the benefits provided to parties other than the firm can be reclaimed.

Shortfalls in the supply of transport infrastructure are also caused by uncertainties and incomplete information. For example, in the case of large-scale projects in which huge capital investments are needed, private businesses are unable to make investment decisions, even if the investment could be repaid over 30 to 40 years. The uncertainty is so large during such period, that is, the risks firms assume are too large. In such case, there would be no shortage in financing if information about the future were complete and perfect. However, long-term financial markets cannot be perfect. For this reason public intervention to reduce risk, or a supply by the public sector is called for.

2.2 WHO WILL BEAR THE COST OF TRANSPORT INFRASTRUCTURE?

Transport economics often divides the principles regarding who will bear the costs of large-scale transport infrastructure into the following three categories:

- (1) User pay principle
- (2) Indirect beneficiary pay principle
- (3) Public financing

The following is a brief explanation of these three methods.

(1) User Pay Principle

Roads are seen as goods that can be used by anyone without paying, or “public goods”. However, there are many goods in transport infrastructure that may not be called public goods. Railways are one example. Since fares must be paid to use railways, they cannot be called public goods in this sense. However, railway service is still different from ordinary goods in that a large number of people can board the same train to simultaneously make use of the service. Such goods are called as “quasi-public goods”.

Fees (fares) are collected from the users of quasi-public goods, and they may be used as revenue. This type of cost burden is called “user pay principle”. Charging the user for the cost is the method ordinarily used by companies. Railway companies collect funds (equity capital) from investors through issuing stocks, and by

receiving financing from financial institutions (debt). The railway companies use these funds for the construction of railways and purchase of rolling stock. From revenues of collected fares, dividends are paid to investors and loans, including interest, are repaid. In such a flow of funds, the costs are actually borne by users of the railway service.

The costs being paid by the user practiced by private companies is a very common method of bearing cost. However, use of this method does not stop there. For example, highways in Japan are constructed, maintained, managed and operated by Japan Highway Public Corporation. Here Japan Highway Public Corporation uses subscribed capital and borrowings as sources of capital much in the same manner as a private enterprise. However, in this case the investor is the Japanese government and not a private enterprise. Furthermore, the accounting method used is slightly different from those used by private companies. This unique characteristic will be explained in detail in a later section.

Public intervention is used for goods whose cost can be borne by the user because the facilities are very large, in other words, their construction will require a large amount of financing, and a very long period will be required for the collection of invested funds. For a typical company, investment plan usually foresees a period of three to five years. However, transport projects usually stretch several decades. Therefore the decision-making process of private enterprises is not suitable for such large projects due to uncertainties and incomplete of information about the future. However, this alone does not justify the appearance of public organizations and semi-public organizations such as public corporations. It is possible for private enterprises to enter this market if the public sector assumes the risks of private enterprises in an appropriate manner. This point will be discussed later.

User pay principle can also be applied to ordinary roads. In Japan taxes are levied on automobile fuel. These tax revenues are pooled in a special account (Special Account for Road Improvement) and then used for financing the construction of roads. In this case, the taxes on fuel are not borne by the user as distinct as railway fares and road tolls. However, the fuel must be definitely consumed when driving cars on roads, and therefore taxing the fuel has the same effect as road tolls.

(2) Indirect Beneficiary Pay Principle

Under the user pay principle, the user is, in principle, asked to pay for the benefits received from transport infrastructure. However, precisely speaking, users are not

the only ones benefiting from transport infrastructure. For example, when a railway has been constructed, the people living around the station and those owning lands near the station gain benefits even if they do not use the railway. In other words, they are indirect beneficiaries. This benefit arises from the reduction of travel time to the city by the railway. From an economic perspective this is seen as a peculiar externality.

When the lands near the station become more convenient by construction of the railway, their values will naturally increase. This translates into monetary benefit for those who live or own lands around such stations. If these people decide to sell their lands, they will earn profits greater than the amounts they would normally have expected (windfall gain). Such gain is a manifestation of the convenience brought about by the railway, and so has originated from benefits provided by the railway. Thus emerges an idea that somehow these benefits may be incorporated into the financing of railway construction.

As mentioned earlier, under the user pay principle, the costs of railway construction are paid for by the revenues generated from fares. However, railway construction requires enormous funds, and, in reality, fare revenues alone are not adequate. Therefore, there are cases where these fare revenues are combined with some form of payment from those who benefit indirectly from the railway. According to microeconomic theory, the construction of transport infrastructure using funds that include payments from such indirect beneficiaries may be justified on theoretical grounds.

This proposition is based on the following two rationales. First, for efficient allocation of economic resources, under certain conditions, the total economic external effects (development benefits) that arise for land owners from railway construction is equivalent to the loss that occurs when the railway services is operated with fares equal to its marginal cost (Henry George theorem). Therefore, if economic gains from externality are properly recovered to the railway operation, and if the marginal cost pricing principle is applied, the supply of facilities and the volume of railway service will be determined such that the satisfaction (the sum of utilities) of the members of the economy will be maximized. The efficient allocation of resources explained above is the first rationale for bearing the cost by the indirect beneficiaries.

The second rationale comes from consideration for income distribution. This theory is extremely simple. As mentioned above, the benefits landowners receive as a result of the construction of the railway are “windfall

profits”, which are not earned by any economic activities on the part of the landowners. Depending on the point of view, it could be said that these gains were unfairly obtained and it is desirable that they should be returned to the business operator who originally generated the benefits.

The indirect beneficiary pay principle (recovery of development benefits) is what economic theory calls for. However, it is not always so easy to directly put such argument into practice. This is because it is very difficult to accurately measure the scope and extent of benefits indirectly received and to obtain consent from the beneficiaries. Still, there are some examples where cost burdens were borne by indirect beneficiaries in Japan. At the time of the construction of the Midosuji Subway Line in Osaka prior to World War II, a contribution to the subway was collected from the landowners and merchants within a 700 meter radius of the proposed stations.

In addition to direct contribution, there is another method adopted by Japan’s non-governmental railway company. For example, the Hankyu Railway in Japan’s Kansai region and the Tokyu Railway in Tokyo first purchased the land around the stations at the time of the construction of new railway lines. After the construction was completed, these companies then sold off the land as residential lots. As explained above, the land can be sold at much higher prices than when there is no railway line nearby, and accordingly the railway companies can make profit through the sale. In an indirect manner, these funds were used for railway construction. Furthermore, the railway company or affiliate firms can then build department stores and other commercial facilities at the station, and make profits from them. This is another method for recovering development benefits.

As a government policy, “Special Law for Measures that Promote Integral Housing and Railway Development in Major Urban Areas” was enacted for the construction of New Joban Line with an aim of recovering development benefits. However, it was difficult to implement a new large-scale development project in the metropolitan area that has already been well-developed. As it turned out, this approach was not necessarily effective due to delays in making institutional arrangements. The large-scale or effective cost burden by indirect beneficiaries is currently not adequately realized in Japan. This is seen as an important issue for Japan’s overall infrastructure development policy.

Hong Kong’s Mass Transit Railway (MTR) is one of the examples of adopting a scheme for recovering development benefits in Asian countries. The Mass Transit Railway Corporation, which is an operating company,

developed the real estate on the upper part of the stations and storage yards, managing them in an integral manner.

(3) Public Financing

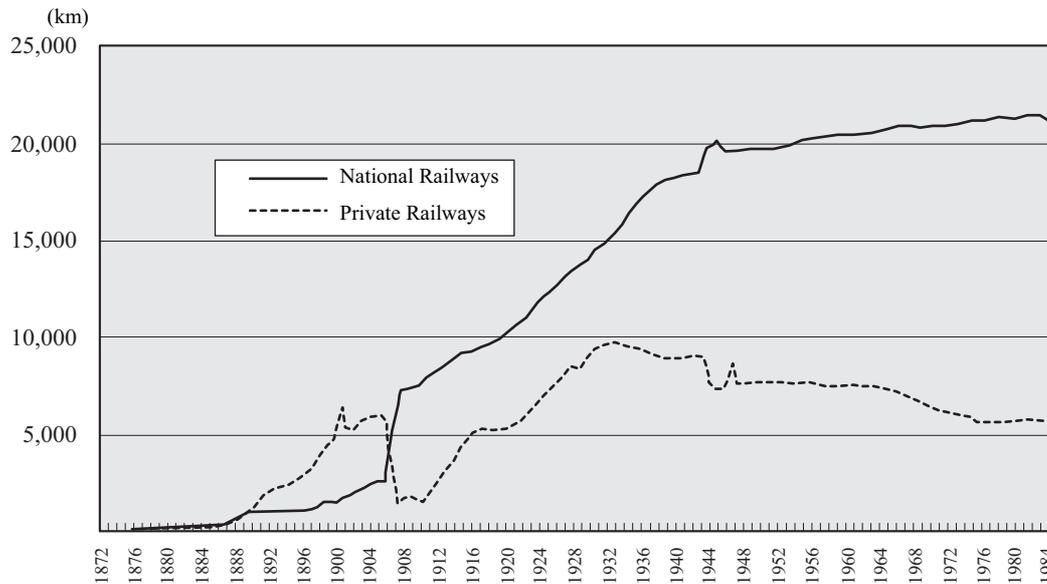
The methods explained above may be used when transport infrastructure is semi-public goods. On the other hand, for example, town streets are more often used by pedestrians in their day-to-day lives than by cars. In such cases, it is practically impossible to collect user fees or retrieve the indirect benefits. Here the construction of facilities must be financed purely with government budget. This method may be called “public financing”.

Pure public goods are a typical example which requires bearing of the cost burden by the public. However, they are not the only cases where public financing is appropriate. In the case of indirect beneficiaries in the previous section where the number of beneficiaries is relatively limited like railway stations, it can be justifiable to require beneficiaries to bear some burden one way or another. However, when indirect benefits occur over an extensive area, or in cases where benefits are extended over the entire country, costs should be borne by general budget.

For example, construction of a major international airport (class 1), provides benefits not only to the surrounding areas, but also to the entire nation. Such an airport helps to vitalize international transactions and expand the overall economy. It may also be argued that the existence of an international airport helps to enhance the nation’s prestige. The construction of a port for international trade has a similar impact. In these cases, it is desirable that infrastructure be built by fiscal appropriations or funds collected from the general public.

However, in the case of airports and sea ports, it is possible to charge user fees from the planes and ships every time, they actually use the facilities. In other words, users can bear the cost. Therefore, it is desirable to share the cost burden by the user, the public financing and even indirect beneficiaries.

A typical example of how the public shoulders the burden (= subsidizes) in putting in place transport infrastructure in Japan is subsidies for subway construction started in 1962. The country assumed part of the expenses for subway construction. These amounts to an arrangement where taxes collected from the public were used to pay for subways in some cities. The private railways cannot directly receive government subsidies, because they are private businesses. Therefore, the private railways entrust the construction to the Japan Railway Construction Public Corporation (a government-financed public corporation established to promote the smooth construction of railways)

Figure 1 Expansion of National and Private Railway Lines over Time

and interest subsidies (for constructing lines which will be leased or whose ownership will be transferred) are provided for this public corporation. This is essentially a type of subsidy.

Subsidies for such businesses as railways include “construction cost subsidy” and “operating cost subsidy”. From the viewpoint of economics, construction cost subsidy can be justified, but operation cost subsidy is undesirable. This is because it is highly likely that such subsidy will undermine operational efficiency. Furthermore, if the marginal cost pricing is applied based on the theory of efficient allocation of resources, operational cost, which is conceptually close to marginal cost, should be borne by the users, and the fixed cost portion, for which the users do not bear the cost (construction cost), should justifiably be borne by the public sector.

3. METHODS FOR DEVELOPING TRANSPORT INFRASTRUCTURE

Focusing on the unique characteristics of goods known as transport infrastructure, the question as to who should bear the costs was briefly considered above. This section provides a brief description of representative methods used in developing transport infrastructure, taking into consideration the principles discussed above.

3.1 PUBLIC CORPORATIONS

Public corporations are independent entities financed by the government that develop and operate facilities by using fares and other fees. As these entities are financed by the

government, the state is the actual owner of the business and ultimate responsibility rests with the state.

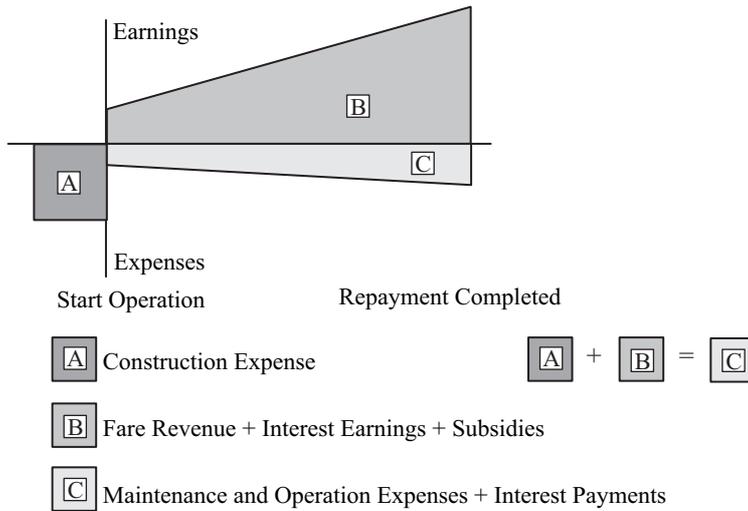
The primary example of public corporations in Japan was the former Japan National Railways, which has already been privatized. Japan National Railways was formed through the purchase of large private railways between 1906 and 1907, and took on the form of a public corporation after World War II. Despite its status as a public corporation, the accounting principles were the same as those used by private enterprises. Annual expenditure was financed by fare revenues, and under this system, repayment for loans including interest was made from their revenues.

The development of railroads in Japan from the Meiji Period is shown in Figure 1.

As seen in Figure 1, the development of railways first started in Japan during the early part of the Meiji Period (1870’s and 1880’s). The basic framework of a national network of railways emerged from around 1910 to the early 1940’s. Rapid growth for both national and private railway lines during this period was remarkable. The railway infrastructure built during this period has enabled Japan to continue a high reliance on its railway system compared with other developed countries to this day.

It should be noted, however, that while private railway lines began to decrease from the 1960’s to 1970’s, national railway lines continue to increase, though gradually. National and private railways are not amenable to simplistic comparison as they differ in terms of scale and markets they serve. Still, private railways began scaling back the scope of their operations in the face of evolving motorization during this period. However, the national railways did not or rather was unable to take such measures, mainly

Figure 2 Diagram of Japan Highway Public Corporation’s Redemption System



because of numerous political interventions. This in itself was a major problem. The slight increase in the length of private railways from the mid-1980’s shown in Figure 1 was attributable to the construction of new subways in urban areas.

The further development of railways was basically due to the fact that fare revenues were ensured from ridership. The government initially provided support for railway construction, but Japan National Railways had operating surplus during the early Showa period (1925 to 1945). Japan National Railways even continued posting profits for some time after reorganizing itself into a public corporation following World War II. Private railways developed railroads on their corporate account. In other words, the development of railroads was at least possible by self-financing.

A large public corporation with a distinctive management system is Japan Highway Public Corporation. There are two main pillars to the way Japan Highway Public Corporation finances its business operations: the payback system and pool system (see Figure 2).

Under the payback system, fares are calculated such that the sum of construction cost and maintenance and operational expenses (including interest payment) for the repayment period of between 40 and 50 years is equivalent to the total of the toll revenues (including interest earnings) and subsidies for the same period. These toll revenues are used to repay loans. A unique characteristic of Japan Highway Public Corporation’s payback system is that it is suffice if revenues are equal to expenses over the entire redemption period. Unlike corporate accounting, annual profits and losses are in principle not regarded as issues. After redemption is completed, the highway is transferred

to the state to be used as a general road free of charge.

The second pillar of Japan Highway Public Corporation is the “pool system”. This is a redemption system that adds up expenses and revenues for all highways. It was introduced in 1972 based on a report by the Road Council’s Toll Road Section. The characteristic of the pool system is that there is a unified redemption for all highways. This system is that roads with comparatively small traffic volume (poor profitability) can still be constructed by utilizing proceeds from more profitable roads such as the Tomei (Tokyo-Nagoya) and Meishin (Nagoya-Kobe) Expressways with large traffic volumes (high profitability). The level of tolls is uniform nationwide. This is cross subsidy from profitable roads to unprofitable roads. In recent years, there has been much debate about the grounds for this system and the legitimacy of its scope.

The problem for the cases of the former Japan National Railways and Japan Highway Public Corporation is in what process a decision-making in investment should be made by semi-public entity. As stated at the outset of this report, transport infrastructure cannot be sufficiently provided solely by the private sector; thus some sort of intervention by a public entity can be justifiable. Given this postulate, public intervention is a problem of economic efficiency. In this context, an intervening public organization needs to be fully aware of the need of intervention for the reason of economic efficiency and this should be reflected in the decision-making, when a decision is made on how much intervention should be provided to what regions.

However, in the case of public corporations, which are semi-independent from a purely governmental body, decision-making on investment is not necessarily made in

an ideal manner. Even in comparison to purely public entity, public corporations may potentially distort their decision-making because they are subject to various governmental and political noises. For example, if we use the agency argument, in the case of an organization that is semi-independent from the government, it is thought that the trustor-agent relationship is likely to become more complicated than general administrative organizations.

If we use the agency theory, the public provision of public services may be understood as follows. The general public and the legislature, a decision-making body that works under the mandate of the former, constitutes the first stage of trustor-agent relationship. The second stage is a trustor-agent relationship that exists between the legislature, a decision-making body under the representative system, and the administration. Such multi-layered relationship can bring in many uncertain elements: the effectiveness of having the trustor manage the actions of the agent, monitoring cost and the problem of designing incentive mechanisms. In the case of such semi-independent entity as a public corporation, an additional trustor-agent relationship will be formed between this organization and the government department that has jurisdiction over it. Furthermore, as can be seen in the “political rail routes” of Japan National Railways, a trustor who leapfrogs or is, in terms of hierarchy, on a par with the administrative department that has direct jurisdiction over it may appear, depending on specific cases. The decision-making for the development of infrastructure that results from such highly complex trustor-agent relationship will most likely differ significantly from the one done from the point of view of economic efficiency as mentioned earlier.

The rationale of public corporations cannot be lost solely by this problem. Considering that a large amount of economic resources have to be put into the development of infrastructure and that it will affect the overall economy for decades, it seems necessary to design a system that minimizes several theoretical problems.

3.2 SPECIAL ACCOUNT SYSTEM

Special account is created as part of the general budget, with its use being restricted to a special purpose, thereby making an express account of its cost burden. Special accounts of this type were created in the countries across the world from the beginning to the middle of this century. Well-known among them are the Federal Aid Highway Trust Fund and Airport and Airways Trust Fund established in 1955 in the United States. The representative special accounts in Japan in the area of transportation are the Special Account for Airport Improvement, Special Account

for Road Improvement and Special Account for Port Improvement. In this paper, the first two special accounts will be described briefly.

The Special Account for Airport Improvement consists of revenues and expenditures. The revenues are taxes, fees, and borrowings. A majority of tax revenues comes from aircraft fuel tax, with eleven thirteenth of the revenue being allocated to this special account. Fee revenues consist of landing fees and charge for using air navigation support facilities. The annual budget for this special account was 478.8 billion yen in fiscal 1997.

The Special Account for Road Improvement is responsible for most of investments in roads. As mentioned above, this is a form in which the user pays the cost. Japan’s annual investment in roads currently amounts to around 14 trillion yen, of which 3 trillion and a few billion yen provided by the central government its outlays comes almost entirely from this special account. In addition, 3 trillion and a few billion yen used for toll roads is financed by funds from the Fiscal Investment and Loan Program. Ultimately this amount will be borne by the users in the form of toll revenues. Expenditures by prefectural and municipal governments total 7 trillion and a few billion yen, of which 30 percent comes from special revenue source, which is a specifically earmarked portion for this purpose of the tax revenues related to automobile usage and the wear and tear of the roads. The small share of special revenue source for prefectural and municipal roads is attributable to the fact that a major portion of their spending on road improvement goes to roads used by pedestrians in their daily life and not necessarily be used primarily by automobiles, and this part should be borne by the public sector. In public finance theory, a comparative disadvantage of the special account in the budgetary system has been pointed out. The reasons are, first, since the special account uses fiscal resources for a specialized purpose, it will lead to the rigidity in budget outlays. The budgetary resources should be allocated in consideration of efficient allocation of resources and for uses that will bring greater social benefits in the annual budgetary process. Second, behind this argument is that economics points out the fact that social benefits derived from implementing a specialized budget are less than non-specialized budget of the same amount. For example, if a person receives specialized funds (say, a book coupon), obviously he will obtain smaller utility than when he receives non-specialized funds (cash). It is for this reason that public finance literature points out that the special account system is always inferior to the general account.

However, the actual budgetary process does not necessarily bring about the ideal allocation of financial

resources as public finance theory assumes. Moreover, it is not made clear in allocating the budget what use will achieve the highest economic efficiency. Therefore, despite the conclusions drawn from pure theoretical grounds, if we consider the actual budget allocation process, the case can be made that the special budget system has its own advantages.

The following advantages are often cited.

- (1) Since stable funding is ensured every year, work for improving facilities will proceed smoothly.
- (2) As demand rises, tax revenues increase, which, in turn, helps promote improving facilities. Thus the special account has a pseudo-market function.
- (3) Because the relationship between benefits and costs is fairly clear, it is easier to obtain social consensus.

Furthermore, apart from neoclassical microeconomics, those who take a position that seeks to incorporate the political and administrative process into economics sometimes argue the validity of the special account system. For example, some researchers of public choice theory, which originates from Nobel laureate J. M. Buchanan, argue that distortions in budget allocation can be avoided to some extent by the special account system as such institutional arrangement has transparency in that those who benefit bear the cost. Combined with the advantage (3) above, it is easily accepted by the general public.

However, this argument is valid to the extent that payment by the user is the main funding source for the special account, as is the case with special accounts for road improvement and airport development. When the main revenue source is receipts from the general budget account, as in the case of the Special Account for Port Improvement, the solid rationale has to be given for contributions from the general account. As mentioned earlier, in the case of class 1 airports, this rationale comes from the recognition that benefits generated extend beyond those using them to the entire country. For road improvement, it comes from the recognition that roads include city streets which are characterized as pure public goods and that roads play an important role in configuring the layout of a city and preventing disasters in urban areas.

The public corporation system described in the previous section and the special account system described in this section are schemes for developing transport infrastructure based on the user pay principle. Japan has been successful in developing infrastructure based on the user pay principle. However, there has been growing

awareness in recent years that this approach alone is insufficient. In the case of railways, efforts are underway, especially for improving urban rail service, to resort to public financing or make institutional arrangement to embrace the indirect beneficiary pay principle. This is also true for other major infrastructure such as airports.

3.3 USING PRIVATE SECTOR PARTICIPATION

As a global trend, there is an opinion that private sector funds and expertise should be utilized in the development of transport infrastructure. In particular among developing countries where investment funds are in short supply there are expectations that private sector involvement will help raise funds. J. A. Gomez-Ibanez of Harvard Kennedy School cited as advantages of infrastructure development using private sector participation: (i) increased investment as a result of developing new financing instruments; (ii) quality improvement in selecting projects.² In this context one can restate that we can entrust the private sector to develop infrastructure on the premise that the user pay principle is applied. Private sector participation in developing infrastructure began in Great Britain in early 1990s with Private Finance Initiative (PFI). As institutional groundwork for PFI are currently underway in Japan, it has received wide-spread attention. In fact, developing countries have long been broadly using private financing technique. The most typical form is the BOT (Build-Operate-Transfer) scheme. There is no need to describe BOT in detail. Simply stated, a private enterprise or consortium reaches agreement with the government on financing to construct transport infrastructure and build the facility (Build). It is then operated for a specified period, providing its service (Operate). Upon completion of the contract, the facility is handed over to the public sector (Transfer).

As a variety of the BOT scheme, there are BTO (Build-Transfer-Operate), BOOT (Build-Own-Operate-Transfer) and BOO (Build-Own-Operate). Under the BTO scheme, a private enterprise builds the facility, and then upon completion of construction, transfers it to the government free. Based on the initial contract, the private enterprise holds the right to operate the facility for a specified period and charge fees. BOO is similar to BOT. The private enterprise builds as well as owns the facility and operates it for a specified period, but the ownership is not transferred to the government at the end of this period. BOOT is also similar to BOO.

2 J.A. Gomez-Ibanez et al., "The Prospects for Privatising Infrastructure," *Journal of Transport Economics and Policy*, Vol. 25, 1991.

By comparison with infrastructure developed by the public sector, the BOT scheme has the following characteristics:

- As it is not a public project, the government does not have to bear the financial burden.
- Even in the event that huge amounts have to be financed from overseas, that will not take the form of direct borrowing by the public sector.
- Higher efficiency may be expected as the private sector takes over the work from design to operation.
- Advanced technologies, machinery and facilities and operating knowhow can be introduced by allowing foreign private enterprises to participate in the project.

In Japan, railways have been constructed by Japan National Railway or private firms, and roads and airports have been built by using the special account system. Thus there is no example of using the BOT scheme. However, numerous BOT schemes are observed in Asian countries. And examples where Japanese companies got involved in the BOT scheme include the second tunnel in Hong Kong, the second highway in Thailand and the super-highway in China.

The main consideration in using the BOT scheme is how to estimate business risks. Since a very large investment is required for transport infrastructure, project risks are considerable. Therefore, it is hard to tell whether the project is viable on a commercial basis from the viewpoint of a private firm. If the BOT scheme is to be successful, the government must reduce project risks, and for that purpose it has to consider some instruments.

First, it is observed in the examples of failed BOT projects in the developing countries that after the BOT contract was signed, the government changed its provisions. Such risk is entirely unforeseen by the executor of the BOT scheme. It may be avoided as long as the government takes a consistent policy.

Second, the government should not adopt any policies that can have a negative impact on future demand, which is forecast by the executor of the BOT project. For example, if the government builds a toll-free road that may substitute for a toll road being build by the BOT project executor, the very basis for this project is greatly undermined.

Third, government involvement should be encouraged if it helps to reduce financing cost. After all, financing cost depends on the size of the risk, and the success or failure of the project depends on financing cost. In some cases, guarantees and other measures by the government can help to lower the costs of obtaining financing, leading to the success of the project.

To repeat, the size of project risk is the key to the

success of the BOT project. This is the reason behind the recent phenomenon that there has been concentration of the BOT scheme in power and telecommunications projects, which require relatively small amount of investment compared with transportation projects, in the developing countries. In Asia there are many examples of successes and failures of BOT projects for developing transport infrastructure. Careful study of these examples is in order.

One Japanese example of private participation is the New Kansai International Airport Project in which a large-scale airport was built by a corporation. In this case, investment accounted for one third of the total project cost. Of the total investment, two-thirds was provided by the Japanese government, one-sixth was supplied by the relevant regional and municipal governments and the remaining one-sixth came from the private sector. In this sense, this was not a pure case of private project. However, it set a precedent for the way the user pay principle is embraced through the corporate accounting. Like a BOT project, this project executor assumes the commercial risk, which is problematical. Thus it was decided to take a special measure when the airport would be expanded.

4. RECOMMENDED DIRECTION FOR FINANCING COST BURDENS

In Japan transport infrastructure has been developed primarily based on the user pay principle. This is not necessarily confined to such infrastructure as railways that operate on a self-paying basis. In general, even for services apparently operated under the budgetary system where the cost burdens are financed by tax revenues, the special account system has a similar effect.

In recent years it has been pointed out that there is a limitation in the amount of cost that can be borne by using the user pay principle. This does not mean the cost burden has increased simply because the cost for constructing facilities has risen sharply. Rather, the magnitude of externality and the prolonged period for recovering investment have brought about a situation where the principle predicated on the market process can no longer meet the cost burden sufficiently. In the case of the special account, the single year principle of fiscal budget has given rise to the problem that the cost of the facilities put in place today is solely borne by the current users, creating inter-generational inequality in cost burden. If we consider the characteristic that transport infrastructure provides benefits to the users over an extended period of time, its cost burden

should take into account the generations of the population that use the facility.

In order to ease the problem of the user pay principle, the system itself has to be reexamined before we consider other principles for assuming cost burdens. The problem of inter-generational equality may be dealt with by some ingenious ways to finance and recover investment. In the case of investment by the public sector, the shortcoming that it may be cancelled and withdrawn after a single year can be overcome by incorporating the credit creation process, in which the credit is secured on the assets of the operator after it is privatized or turned into an independent entity. The ingenious use of the user pay principle will reduce the sense of burden for the users and, at the same time, contribute to the allocation of resources in the society.

In order to alleviate the remaining problem that the principles on who should share the cost burden are biased against the users even after making some technical improvements, we have to consider carefully the characteristics of transport infrastructure and explore a mechanism that has theoretical consistency and is conducive to social consensus. The most important point in this context is that, as mentioned at the outset, transport infrastructure has substantial external effect. In reverse, one can say that transport infrastructure is constructed for the purpose of realizing its external effect.

Given that transport infrastructure is essentially characterized by externality, the sharing of its cost burden has to be consistent with this effect. This means specifically that the shares of public financing and the cost borne by indirect beneficiaries have to be increased. This is called recovering development benefits or internalization of externality.

Measures that internalize external effects have been argued and considered in the past. However, except those adopted by private railways on their own, they have not been implemented sufficiently. Such problems as how to measure the magnitude of external effect and how to define benefits and the scope it occurs are posing a barrier to their adoption. Despite these problems, a variety of methods have to be employed to recover development benefits, including direct recovery, indirect recovery through regional and municipal budgets. Internalizing economic externality not only contributes to fair sharing of cost burden but also increases the efficiency of resource allocation. The maximum effort has to be made to form consensus for introducing a desirable mechanism.

The scope of the external economic effect generated by transport infrastructure has to be considered in a flexible manner. When a means of transportation is put in place,

landowners or land developers in surrounding areas receive large benefits. At the same time, it will contribute to the economic independence of cities or, more broadly, affect the overall cohesive structure of the national land. If we consider these factors, the public has to assume the cost burden for transport infrastructure such as roads, airports and railways must be increased.

However, in considering an argument in favor of public financing, we should be careful not to fall into irresponsible arguments seeking “the money from the state coffers” or “public money.” Obviously a country’s finances rest on the “burden” imposed on the members of the society in the form of taxes. And the capacity for assuming this burden is not infinite. As mentioned at the outset, considering the recent strains on the Japanese general budget, prioritizing facilities to be improved and greater cost efficiency should guide us as the minimum required conditions.

In order to increase public burden in such area as transport infrastructure where there is clearly significant economic effect, it is necessary to implement “reallocation of public works expenditure.” Despite the fact that on many occasions lack of rationality has been pointed out with regard to funds that are classified and spent as public works expenditure, there is rigidity in government outlays of the annual budget. Even if a major reform of the present budgetary allocation process may be difficult, we must explore ways to allocate fiscal resources by combining them with the user pay principle and improving the process through carefully measuring the effect of investment and using it as the criterion for budget allocation.

Summing up the discussion above, the cost burden of transport infrastructure should be thoroughly based on the principle that the burden should be shared by the beneficiaries in the broad sense (including the users as direct beneficiaries and those who enjoy positive externalities). At the same time, it is also necessary to increase the public financing when it is possible and justified. Furthermore, it will be easier to promote the development of transport infrastructure if some ingenious methods regarding user pay principle will effectively lead to greater diversification of revenue sources.

5. IMPLICATIONS FOR DEVELOPING COUNTRIES

As mentioned earlier, transport infrastructure has been developed in Japan primarily based on the user pay principle. The method adopted for developing transport

infrastructure in Japan is centered around this principle. This is augmented by the indirect beneficiary pay principle and public financing. Transport infrastructure development predicated on the user pay principle requires a certain economic capacity, capital and the accumulation of savings. In this sense, the Japanese method may not necessarily be appropriate for the current conditions of developing countries.

However, as seen in the special account system, if the user pay principle is imposed broadly on the means of transportation whose demand is expected to increase, stable and growing revenues may be ensured even if such burden is relatively light. It is not impossible to develop roads and airports by tapping the financial resources obtained in this way. In fact, this seems an effective tool.

Using private funds primarily with BOT projects is an attractive method for the developing countries.

However, it should not be forgotten that its success hinges on risk mitigation. For developing countries, policy consistency is called for in the first place. Depending on specific cases, some degree of government involvement may be required even for BOT projects. Since there are a number of BOT examples in Asian countries, we should start from analyzing these examples.

REFERENCES

- J.A. Gomez-Ibanez et al., "The Prospects for Privatising Infrastructure," *Journal of Transport Economics and Policy*, Vol. 25, 1991.
- Shigehiko Naoe, ed. (2000) "A Study of Network Industry (Japanese)". Tokyo: Hosodaigakukyoiku Shinkokai.
-