

Developing Private Finance Initiatives (PFI)/Public-Private Partnerships (PPP) for Urban Environmental Infrastructure in Asia

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Abstract

Developing countries in Asia have attached increasing importance to the development of urban environmental infrastructure (UEI) including sewer and wastewater treatment facilities and garbage treatment plants, to overcome deteriorating pollution in urban life. Difficulties of government finance and shrinking fund for ODA, however, are recognized as a barrier to accelerating UEI construction in this area, as large-scale initial investments are required. Thus, this paper proposes that the private finance initiatives (PFI) be introduced for UEI as a new and promising measures to realize the sustainable development in Asia.

This paper also discusses on the current status of private sector's investment to the development of UEI in Asian countries and identifies the principle of PPP (public-private partnerships) and the risks associated with PFI projects towards establishing PPP which is a new scheme to realize PFI, as well as designs the entire framework for promoting PFI, develops the promotion strategy including establishing special governmental organizations, appropriate measures to avoid risks and preferential measures, and presents preliminarily a manual for the formation of PFI projects.

Key Words: urban environmental infrastructure, private finance initiative, public-private partnership, investment, Asia

1. Introduction

With the start of the 21st century, increase in urban population has accelerated especially in Asia, and Asian urban population is expected to occupy about 51% of the world's urban population. In many Asian cities, however, development of urban environmental infrastructure (UEI) such as sewage systems, wastewater treatment facilities, and waste management facilities is still insufficient, causing serious problems of urban pollution due to wastewater and solid waste, considerably obstructing sustainable growth of Asian countries. Funding difficulties in this area are recognized as a barrier to development of UEI, and raising necessary funds in a short period is the key to the problem. In this paper, the authors propose private finance initiative (PFI)⁽¹⁾ as a new method to raise funds to solve the problem, and discuss necessary conditions to build new public-private partnership (PPP) for realization of PFI.

Conventionally UEI has been considered to be publicly provided property in many countries. Since the 1990s, however, some developed countries have promoted infrastructure development by PPP/PFI as an innovative and flexible option for reconstruction of the national economy, increase in efficiency of the public sector, and quality improvement of public services. Meanwhile, in developing countries, expectations of private-sector funds have grown because of insufficiency of public funds for construction of UEI, requiring rapid development. This urged many countries to adopt an environmental policy based on the polluter-pays principle and establish surcharge and user charge systems, allowing participation of the private sector. Additionally, technical innovation in UEI and efforts toward an resource recycling society made such activities as waste-to-energy, use of recycled water, and waste recycling business fields profitable, and this stimulated the private sector to enter into this area.

This paper first clarifies efforts toward development of UEI in Asian countries and causal relationship between PFI for UEI development and sustainable growth, and proposes PFI which is necessary for UEI development. Then it presents current status of PFI for UEI development in Asian countries and its available options, points out that appropriate role sharing between the government and the private sector depends on realization of optimum risk sharing and profit sharing, and discusses potential risks and problems. Finally the authors design a framework for promoting PFI in Asian countries, propose establishment of special organizations for promoting application of PFI, appropriate measures for the private sector to avoid risks, and development of policies to support participation of the private sector. In addition, they make attempts to provide criteria for appropriateness of PFI introduction for local governments with insufficient know-how and implementation capability concerning promotion of PFI. In short, this paper presents an effective prescription of funding to many Asian countries that are rapidly developing UEI, and urges them to establish an optimum regime for UEI development.

This study is also a part of the study of environmental measures funding mechanism being conducted by a task force of China Council for International Cooperation on Environment and Development (CCICED), which is a high-level international forum of Chinese and foreign specialists to discuss environment and development and to make proposals to the Chinese government. The authors plan to make practical and concrete proposals to the Chinese government concerning design and management of environmental measures funding mechanism suited for China, especially, appropriate public-private role sharing in private sector participation in UEI construction, management and diversification of funding methods based on this research.

2. Status of UEI development in Asia

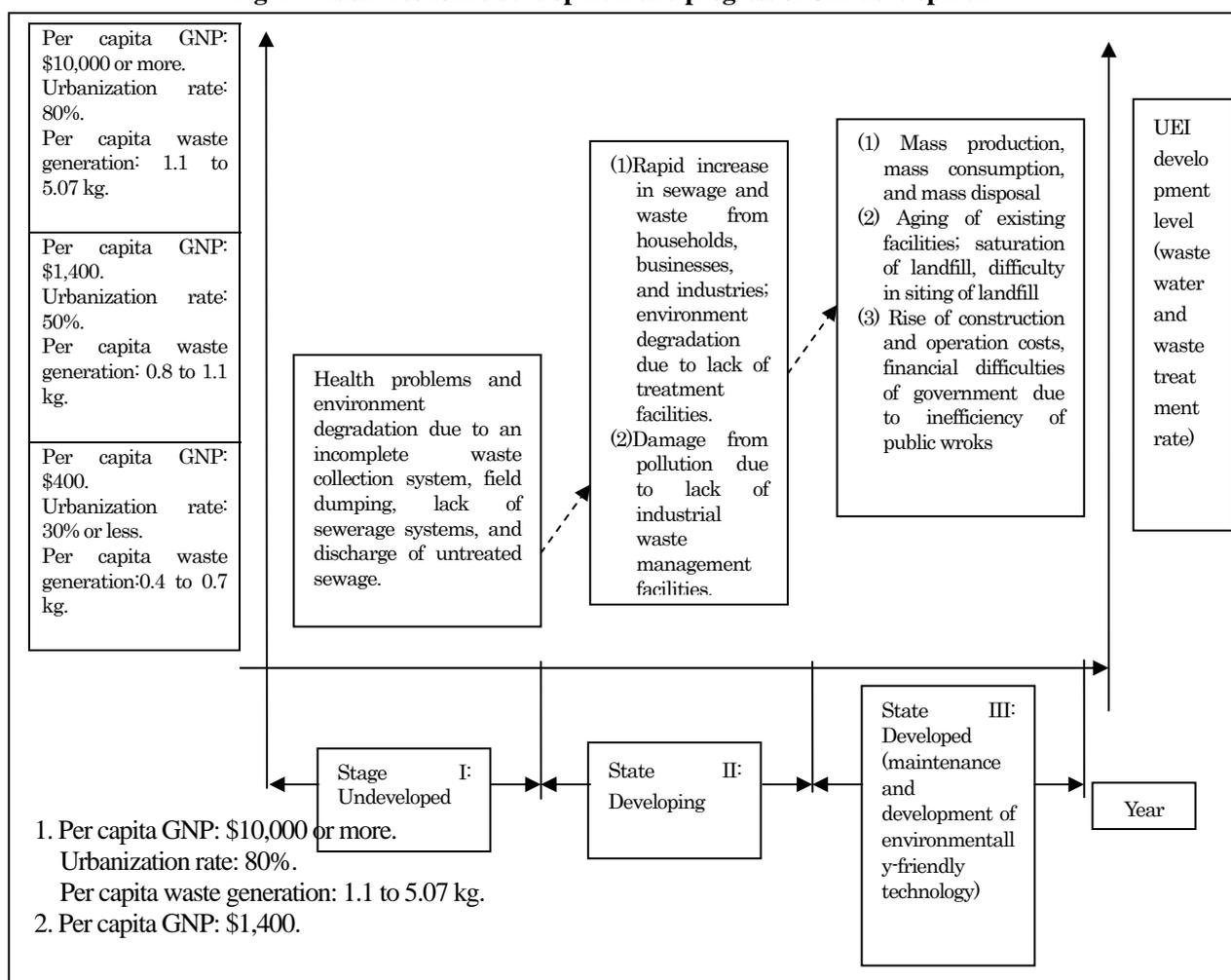
2.1 Economic development and progress in UEI development

Situations of UEI development in Asian countries can be roughly classified into three stages. Bangladesh, Nepal, Myanmar, Vietnam, India, Laos, Sri Lanka, Indonesia, and the Philippines are low-income developing countries, where the urbanization rate is low, water consumption and amount of solid waste per capita are small, and UEI has hardly developed yet, with poor needs of UEI development that are smaller than those of electric power, roads, and tap water. Conventional health problems such as air pollution, diseases due to water pollution, and stink and pathogens due to uncollected or dumped wastes are still serious.

In Chinese large and medium cities undergoing rapid economic growth and urbanization and in Thailand and Malaysia that are medium-income countries, household drainage is rapidly increasing, polluting both surface water and groundwater. Though municipal solid wastes are collected, they are just transported to dump yards without appropriate technical treatment. Even in cities that are exceptionally implementing sanitary treatment of solid wastes, the treatment processes are short of the standard, causing secondary pollution in areas around landfills. In these cities and countries, needs of UEI development are rapidly increasing, and they are planning UEI development and increasing UEI budgets.

In high-income countries and regions such as Japan, South Korea, Hong Kong, Macao and Singapore, UEI has been developed on a high level, but water consumption and urban waste generation per capita are large. Waste reduction, improvement of the recycling rate, and energy conservation measures are required. There are various problems such as maintenance of aged facilities, introduction of new technology to them, and management innovation for reducing management and operation cost (Fig. 1).

Fig. 1 Asian Economic development and progress of UEI development



Source: Authors

2.2 Rapid progress of UEI development

Enhancement of UEI development can be considered to be one of the most urgent measures for realization of Asian countries' sustainable growth. Chinese Tenth Five-Year Plan (2001-2005), Thai Eighth Five-Year Plan (1997-2001) and Ninth Five-Year Plan starting from this year, Malaysian Seventh Five-Year Plan (1996-2000), Korean Five-Year Plan (2001-2005), and the like, include enhancement of UEI development. For instance, China has set targets of 60% or more sewerage treatment rate in cities of 500 thousand or more population, and 70% or more in municipalities directly under the central government, province capitals, individual national plan cities, and important tourism cities, which is to be achieved by 2005, and Chinese target for 2010 is 60% or more sewerage treatment rate in all cities (Table 1). In order to achieve these targets, China has to construct 1,000 or more new treatment plants for treating a total of 40 to 50 million tons of wastewater per day, for which investment of 100 billion RMB is planned. For solid waste management, new treatment plants for 5 million tons of waste per year have to be constructed, and investment of 65 billion Rmb for municipal solid waste management facilities and centralized treatment of hazardous waste (Chang, et al., 2002) (Table 2). Beijing is planning to increase its solid waste treatment rate from 68% of 2002 to 100% by 2005, and Taiwan is planning to construct 36 new incineration plants by 2003 for 90% solid waste treatment rate. For countries going to enter a UEI construction rush, however, funding for it is an urgent problem for the central and local governments.

Table 1 Status of sewerage infrastructure development in major cities in China

City	Sewerage infrastructure (2001)		Development plan	
	Capacity	Treatment rate	Capacity	Treatment rate
Beijing	Treatment plants: 6 1.325M tons/day	52%	2.80M tons/day (2008)	90% or more (2008)
Shanghai	Treatment plants: 27 1.011M tons/day	44%	New plants: 2.70M tons/day (class 1 treatment) (2005)	70% (class 1 treatment) (2005)
Tianjin	0.66M tons/day	43.8%	1.49M tons/day (2005)	85% (2005)
Guangzhou	Treatment plants: 5 0.62M tons/day	26%	New plants: 4 Investment: 6.5B Rmb 1.52M tons/day (70%) (End of 2003) New plants or expansion of existing plants: 3.75M tons/day (planned for 2010)	70% (2005)
Chongqing	—	7.4%	New plants: 30 Investment: 9.82B Rmb (2005) 0.51M tons/day (June 2003)	70% (2005)

Source: Authors

Table 2 Estimates of Chinese urban sewerage treatment capacity and technology/equipment market

Treatment rate (%)	10.8	22	35	50
Treatment capacity (M tons/day)	10.44	22.20	38.70	60.25
Current capacity (M tons/day)		10.44	22.20	38.70
Construction required (M tons/day)		11.76	16.50	21.55
Construction investment per ton/day capacity (Rmb)	1200~1500			
Operation cost per t/day capacity (Rmb)	0.5 ~0.8			
Investment for construction (billion Rmb)	9.0 (including operation cost)	14.1~17.6	19.8~24.7	25.8~32.3
Yearly operation cost (billion Rmb)	1.57~2.5	3.33~5.28	5.81~9.9	9.04~14.46
Technology/equipment market size (billion Rmb)	—	4.94~7.92	6.93~11.11	9.05~14.55

Notes: 1) The operation cost was calculated assuming that the number of working days in a year is 300.

2) The actual technology/equipment market size will be larger than these values, because they do not include costs of chemicals for operation, equipment updating, etc.

Source: China Environmental Protection Industry Association 2001.

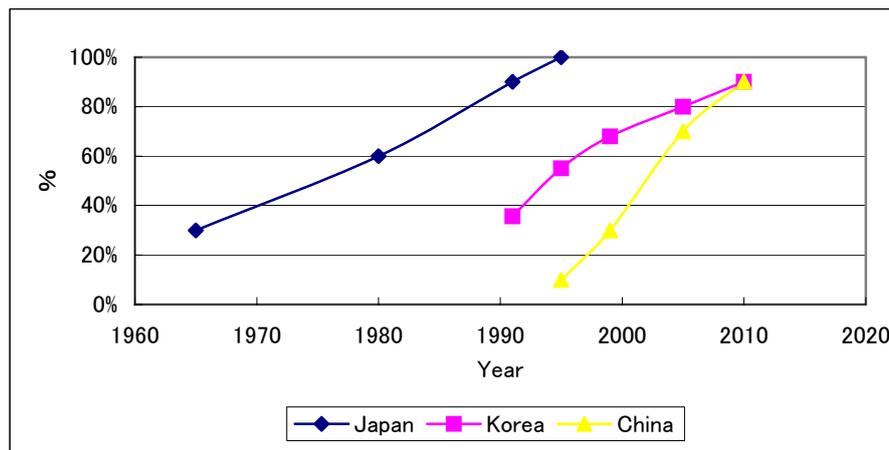
2.3 Diversification of UEI development funding sources

In Japanese large and medium cities, sewerage system coverage was improved from mid-1960s to mid-1990s. The coverage improvement period will be from early 1990s to 2010 in Korea, and from mid-1990 to 2010 in China. That is, the time required for sewerage system development in urban area is 30 years in Japan, 20 years in Korea, and 15 years in China, showing a tendency that the later the start, the shorter the development period (Fig. 2). One of its causes is diversification of UEI development funding sources. Now funding for UEI development is being supplied not only by the government but also by ODA (official development assistance), FDI (foreign direct investment), and the domestic private sector. Among them, especially the role of the private sector has increasingly become important.

Possible backgrounds are: (1) in some developing countries, necessity for private-sector funding has emerged, because the government finances cannot cover rapidly increasing needs for enhancement of environmental measures and environmental infrastructure services due to growth of environmental consciousness, (2) private-sector investment has been boosted by international system changes such as deregulation, privatization, and globalization, and (3) multinationals have begun to pay attention to the possibility of investment to concession contracts (including BOT projects) and joint venture business because of their long-term property and stability of public works.

When UEI development is very slow, it is funded chiefly by a small amount of government finance and ODA. When development is accelerated however, it is funded by the most diversified funding sources, including the government as the main funding source, private-sector (domestic and FDI), user charges, and ODA.

Fig. 2 Changes in sewerage system coverage of large and medium cities in Japan, Korea, and China



Source: Authors

3. PFI for UEI development and Asian sustainable development

As to Asian UEI development, a short-term target will be improvement of UEI level, and long-term targets will be provision of low-price and high-quality environmental infrastructure and service expansion to low-income areas. In order to attain these targets, diversification of funding sources is required. Especially, private-sector funding is important, and in this section the authors discuss policy effects of PFI promotion and PPP establishment.

3.1 Acceleration of UEI development by expansion of funding sources

In the early stage of economic development, people's desire for environmental infrastructure is still weak, and government finances are of a very small scale, causing construction of economic infrastructure to precede UEI development so that the growth of GDP becomes out of balance with UEI, and serious urban environmental problems are aggravated. In developing countries, currently 80% to 90% of investment for infrastructure is funded by the governmental sector, but only very small funds are invested in environmental infrastructure¹⁾. Most of the UEI facilities have been constructed by ODA. With limited government finances and shrinking ODA funds, PFI is the best option to expand funding sources and good measures to bridge the temporal gap between UEI development and economic development, leading to reduction in the cost to cope with damages by avoidance of "subsequent treatment" (Fig. 1).

3.2 Cost reduction by early development and "avoidance of government failure"

Experiences of developed countries show that early development of UEI in effect leads to cost reduction, because too late UEI development becomes much more difficult due to soaring land price, difficulty in procuring land, and rise of labor wages accompanying the rapid growth of economy²⁾. In developed countries, subsidies have been granted to environmental infrastructure, and water supply and solid waste collection services have been provided at low prices. This, however, caused unfairness of resource sharing, because the larger the consumption, the more the government's subsidies. Governmental intervention on the market has many adverse effects on efficient sharing of resources, obstructing market mechanism to achieve efficient sharing and leading to corpulence of vested interests in many cases. In addition it hinders incentives to development of energy conservation technology and its related

measures, improvement of production efficiency, cost reduction measures, and improvement of service quality, as a result weighing heavily on the national finance even after the shift to a mass consumption society. Based on such recognition, many developed countries started efforts toward restructuring including deregulation and privatization even in areas that have conventionally been considered to be covered by governmental activities.

PFI brings private companies opportunities of innovation leading to design of efficient facilities taking into consideration the construction, operation, and maintenance costs. Maximization of efficiency and minimization of cost allow improvement of investing effects and provision of high-quality services. For Asian developing countries enjoying merits of those who started later, it will serve for building up long-term strength for international competition to avoid “government failure” and establish a low-cost infrastructure system.

3.3 Promotion of environmentally friendly consumption pattern formation

People who have conventionally used UEI as publicly provided property for free or at low prices have little idea of paying fees, and have used it irresponsibly, which brought about a mass production, mass consumption, and mass disposal society, one of the causes of today’s urban pollution. On the other hand, PFI activities are supported by collected user charges so that they require establishment of an appropriate charging system for their implementation. Establishment of a rational charging system not only supplements the construction and operation costs of facilities, but also has effects to promote formation of environmentally friendly consumption pattern such as water saving and waste reduction from the early stage of economic development, contributing to sustainable development of Asian countries.

3.4 Improvement of environmental technology and promotion of environmental business in Asian developing countries

In Asian developing countries, coverage of water/wastewater systems and implementation rate of solid waste management are low, and we can see there a huge environmental market. Application of PFI to Asian developing countries provides domestic and foreign environment business with great business opportunities, contributing to growth of environmental industry. Especially, advance of foreign environmental companies into Asia will accelerate necessary technology transfer, and contribute to improvement of environmental technology.

4. International view of PFI for UEI development and outline of its options

4.1 International view

Concept of PFI presented by UK in 1992 was an idea of system innovation and effective in improving efficiency of infrastructure construction and operation. Many Asian countries must construct new infrastructure, and in many cases use PFI as a measure to introduce private funds. For this reason, these countries planned projects in view of introduction of market mechanism, and further stepped forward to development of relevant laws, regulations, and policies (Table 3), but many of such projects were those in economic infrastructure areas such as power, telecommunication, and transportation, and there are only a few environmental infrastructure projects, of which water supply projects prevail over wastewater and waste management projects.

Table 3 Status of PFI/PPP in UEI construction in developed and Asian developing countries

Japan
<p>Significant effects in the improvement of management and technology and the sound development of social capital stock/national economy appear in the field of construction, care & maintenance and management (including planning) owing to the introduction of private capital.</p> <p>“The law on the utilization of private capital in the construction of public facilities” (The law No. 117, 2000)</p>
UK
<p>The main aims of PPP was to reduce the size of government and to stop the public sector doing things which the private sector could do equally well or better (presented by Mrs Thatcher’s government of the 1980s). The improvement of the quality of public services and efficiency of the governmental sector will be aimed at by the followings: Transfer of even funding as well as design/construction/management of public services into the private sector; Full consideration for the risk the private sector faces; Conclusion of the contracts; Fulfillment of the duties</p> <p>In 1992 PFI new concept – an application methodology of capital, management and creative capability was come up with and political targets and work procedures were clarified. Enactment of “Citizen’s Charter”. The idea of optimal service was come up with by “Value for Money”.</p> <p>The water supply and sewerage undertakings in England and Wales were privatized after 1989 and have been</p>

operated and managed by 10 companies.

More than 100 years have passed in parts of the water supply and sewerage laid in some areas of Scotland and they are aged. In recent years EU has made the environmental criteria stricter and the need for modernizing the technology has been increased, resulting in planning for improving the 10 facilities by means of PFI method (budget: 650 million pounds)

China

The participation of private sector is necessary in order to solve financial troubles of the government. In particular, local governments expect the introduction of private funds.

Since the latter half of 1990s the enhancement of urban environmental infrastructure business has been aimed at and after the target plan for the establishment of urban environmental infrastructure was developed in the 10th Five –Years plan, capital funding and formation of market have been prompted by the participation of the private sector and the introduction of advanced technologies from foreign countries and the growing of domestic industries have been promoted. In May of 2000 government decrees “Policy on municipal solid waste disposal and pollution prevention technology” and “Policy on urban sewerage treatment and pollution prevention technology” were issued. In September 2001 State Development Planning Commission abolished the review and ratification system for the five kinds of investment projects including ones for urban water supply and sewerage and transferred the right of review and ratification for some projects with the introduction of foreign capitals into province, autonomous district, city under the direct control or individual planned city. In March 2002 State Development Planning Commission, State Economic & Trade Commission and Ministry of Foreign Trade and Economic Cooperation published “Guideline for investment industries by foreign companies” together. This guideline includes sewerage treatment facilities, municipal solid waste disposal facilities and hazardous waste facilities. In some local regions various privatization projects such as BOT (Build-Operate-Transfer), BOO (Build-Operate-On) , TOT (Transfer-Operate-Transfer) and etc. have already been performed.

South Korean

Under the New Economy Five–Year Plan (1993 to 1998) the construction of environmental infrastructure was enlarged and private investment in the environmental field was promoted. In 1996 the loan options for environmental measures fund were expanded.

In April of 1999 “the Act on Private Investment in Social Overhead Capital Facilities” came into effect and “the Act of Infrastructure Construction” was modified to introduce the BOT method. BOT method is effective for the South Korean contractors to take orders of infrastructure construction and is favorable for them to get the contracts of foreign big projects. In recent years (2001 to 2002) the percentage of private sector investment in the infrastructure field has reached 40%, which is 10% higher than the target value. Between 2001 and 2005, 319 sewerage treatment facilities will be built newly and consequently the total sewerage treatment capacity of 11,601 thousands tons per day will be added and the sewerage treatment rate is expected to achieve 80% and more.

Malaysia

The construction of sewer has been performed since 1968 by Environment and Sanitary Division of the Department of Health as a public hygiene works. In 1983, the privatization policy was adopted aiming at the reduction of governmental financial administration and administrative burdens, the improvement of efficiency and productivity, promotion of economic growth and achievement of the target for national development. In 1989 the plan for privatization was developed. In 1993 “the Act of Water Project” was established. The jurisdiction for sewer and sewerage treatment in the local cities were transferred to the federal government and the privatization was started under the control of the federal government from 1994. Up to now 19 cities developed its sewer plan all over the nation and 8 cities performed its plan actually. The diffusion of sewer is not smooth under the circumstances such as rapid industrialization and urbanization, financial difficulties of government and labor shortage and etc..

The sewer and sewerage treatment field: 82 local governments have finished the privatization among 48 cities and wards (143 local governments exists and 50 % of total population live). Patent contract (Design-Build-Operate-Transfer) method is used. The 28 years contract period is popular. Since 1994 the Water Service Division of the Housing & Local Administration Department has been in charge. Total investment amounts of 6.2 billion Malaysian Ringgit (RM) are planned to be spent for the privatization projects for 28 years in future. New sewerage treatment facilities will be built and old ones will be modified.

Municipal solid waste: The whole country was divided into four blocks and private solid waste treatment companies were founded and took over the solid waste disposal works having been under the jurisdiction of the local governments.

Thailand
<p>“1992 National Environmental Protection Act” and “Royal Act of Private Participation in State Affairs” have been performed. The legal system for infrastructure construction and participation into operation by the private sector has completed. The privatization policy for treatment works of sewerage from daily life and industrial wastewater has been implemented. Concrete works have been performed by the Ministry of Science, Technology and Environment (MOSTE) and the Liquid Effluent Administrative Bureau.</p> <p>During the period from 1995 to 2000, the governmental division and multilateral financial agencies have increased markedly the amount of investment for environmental projects. Since 1992 the privatization for environmental infrastructure had been accelerated but it hit a setback for change of regime, feud among governmental departments, technical difficulties, defectiveness in the profit guarantee system for private capital and etc..</p>
Indonesia
<p>After 1990s, the foreign aid has decreased and government expenditure for public works have become difficult more and more. As a result, the participation by the private sector is expected. Current stage is under development of privatization policy by each division.</p>
Philippine
<p>Improvement of the level of public services for the water supply and sewerage system and its efficiency are expected. The participation by the private sector has been supported because of the reduction of burden of government expenditure.</p> <p>In 1990, the first BOT Act was established in Asia. BOT center was founded which is a dedicated organization under the Department of Treasury in charge of the implementation of BOT projects. The roles of this center include the implementations of relative policies, regulation and oversight of PFI projects, supports for private sector, improvements of implementation capabilities of PFI works by local governments.</p>
Vietnam
<p>The trend depending on foreign capital becomes strong. In 1993 BOT Act was established.</p>
Nepal
<p>Since parliamentary democracy was established in Nepal in 1990, the development of policy that fosters the involvement of the private sector has been adopted as one avenue towards sustainable economic growth. This policy was facilitated by the liberalization of the foreign investment regime, formalized under the 1996 amendment to the Foreign Investment and Technology Act of 1992. In order to speed up the process of private sector participation to meet development objectives, the Ministry of Finance established a Privatization Cell working under the guidance of a technical adviser from UK-based Adam Smith Institute. This cell promoted an English model of privatization and as a result, most initiative concentrated on full privatization of national entities i.e. on the lease or sale of public undertakings at the national level rather than partnership arrangements at the local level. The Government of Nepal has confirmed the commitment to the promotion of private sector involvement in the development of the country, through a number of policy statements and laws (Foreign Investment and Technology Act, 1992; Privatization Act of 1994; Contract Act of 1999; Local Self Governance Act, 1999; Environmental Conservation Act of 1999, etc)</p> <p>Capacity development for private sector participation: Nepal-German Co-operation Project Urban Development through Local Efforts aims to provide some capacity building through its municipal support program, now being undertaken in 10 municipalities; ADB funded technical assistance to the KMC: Activities under the ADB funded technical assistance project Institutional Strengthening of Kathmandu Metropolitan City specifically include private sector participation capacity building (and also include solid waste management operations); UNDP Public Private Partnerships for the Urban Environment: The intention of this project is to contribute to the creation of a healthy environment and the improvement of living conditions in the urban and peri-urban areas of Nepal.</p> <p>The most significant private sector participation activity in Nepal has developed in Kathmandu. The most recent efforts have focused on the development of a policy framework for private sector participation in KKMC functions in Solid waste management partnership.</p>

Source: Picked up from Chang, M., Ren, Y., and Imura, H., 2001.

4.2 Options of PPP/PFI

a) Outline of options

PFI options being applied in Asian countries can be divided into the following four patterns in terms of role sharing between public and private sectors (Fig. 3) in the public sector's role descending order:

- 1) Service contract, management contract, and lease contract: The public sector has ownership and funding and constructing responsibilities of facilities, and entrusts operation and maintenance of existing facilities to private

companies.

2) Joint venture: A local government and one or several private companies make a joint venture, own its shares, and provide services based on their partnership and contract.

3) Concession contract: Management responsibility (including funding) of local environmental infrastructure is given to a private company for a certain period.

BOT (build, operate, transfer) contract²⁾: This is an effective method for project funding, and is often used in developing countries where many new facilities have to be constructed.

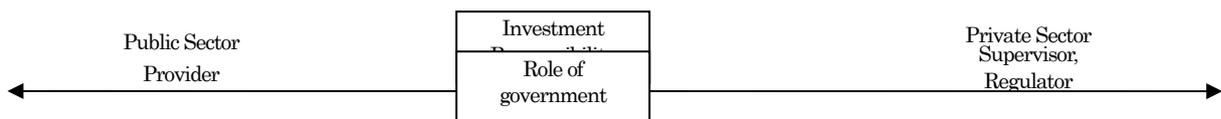
In 2) and 3), the public sector owns the facilities, and the private sector bears responsibilities of funding, construction, and operation/management.

4) Full privatization: Selling of existing facilities to the private sector, or ownership, construction, and management of new project by the private sector.

Risks of options 1) to 4) become larger depending on increase in the private-sector responsibility of funding and change in the role of the public sector (from provider to supervisor, regulator).

Fig. 3 Main relationships between public and private sectors in environmental infrastructure development

Fully Public Sector (government budget)	Passive Private Sector Investment (issue of government bonds)	Traditional Public Sector Contracting (Design and Build)	Service Contracts (Operate, Maintain, Lease)	Joint Ventures (Co-ownership, Co-responsibility)	Build, Operate and Invest (BOT, Concession)	Passive Public-sector Investment (Equity, Debt, Guarantees, Grants)	Full Private-sector
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Source: Bennett, E., et al., 1999

b) BOT projects of sewerage treatment and solid waste infrastructure in China

In China, many sewerage treatment and solid waste infrastructure BOT projects have been started (table 4).

Table 4 Examples of wastewater infrastructure BOT projects

Company	Project	Funding	Estimate of profit
Beijing SOUND Environmental Industry Group Corporation (2001)	<i>BOT contract of sewerage treatment facility construction with more than ten cities including Xiangtan, anchang, Jiangzhou, Jiangyin, Geermu, and Suqian.</i> <u>Scale:</u> 1.7 million tons or more total daily treatment capacity, 2 billion RMB or more investment, 25-year contract <u>Feature:</u> Chinese first sewerage infrastructure BOT project by domestic private company	Finance: China Construction Bank, National Development Bank, securities firms, Shenzhen Development Bank, etc.	Investment to be recovered in 10 years, then 15 years of profitable period
Beijing Golden Sources Environmental Protection Equipment CO.,LTD. (foreign capital: USA)	<i>Beijing Economic Development District Sewerage Treatment Plant</i> <u>Scale:</u> 20 thousand tons of daily treatment capacity, 32 million RMB investment, 20-year contract <u>Feature:</u> Beijing's first sewerage treatment plant financed, built, and operated by a foreign company	Self-financing: 26 million RMB 6 million RMB by district government in the form of land use right	Investment to be recovered in 10 years
Joint venture of アメリカ地球公司 and Guangzhou	<i>Guangzhou Xilang Sewerage Treatment Plant (second stage)</i> <u>Scale:</u> Three pipelines and 200 thousand tons of daily treatment capacity, 1 million RMB	Finance: Industrial and Commercial Bank of China Separate bidding for	Repatriation rate: 5.5%

Tunnel Development Company	investment, 20-year contract Feature: Chinese first sewerage treatment plant built by project financing	constructor and operator	
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Source: Prepared by authors based on field study

In the solid waste management area, many projects of incineration plant construction and operation/management will be proposed, because waste-to-energy is attractive to the private sector in terms of profitability (Table 5).

Table 5 Examples of waste-to-energy BOT projects

Private company	Facility	Scale	Power selling price	Processing price	Return on investment
Singapore Jibao Infrastructure Construction Co.,Ltd.	Shenzhen Baoan Laohukeng Environmental Protection Zone	Daily processing capacity: 1,200 tons (planned to be completed in 2002) Investment: 490 million RMB	0.52 RMB/kW Yearly generation capacity: 100 billion kWh	60 RMB/ton	10% Investment to be recovered in 12 years Construction: 2 years Operation/management: 25 years
Shenzhen DOW's Waste-To-Energy Technology Co.,Ltd..	Nanhai City, Guangdong province (commissioned in November, 2001)	Daily processing capacity: 1,000 tons	0.83 RMB/kW	Not charged	Investment to be recovered in 12 years Construction: 2 years Operation/management: 25 years
	Dongwan City, Guangdong province	Daily processing capacity: 1,000 tons	0.6 to 0.7 RMB/kW	Not charged	
	Jilin City	Daily processing capacity: 600 tons	1 RMB/kW	8 RMB/ton	

Source: Prepared by authors based on field study

5. Establishment of the concept of PPP for UEI development—optimum role sharing

Participation of the private-sector has required a new scheme—public-private partnership (PPP), which is a measure to satisfy interests of both public and private sectors in order to realize optimum construction and operation/management. Ideal role sharing between public and private sectors, which is the concept of PPP, will mean realization of optimum sharing of risk and profit.

5.1 Optimum risk sharing

PFI activities for UEI development in Asian countries have many negative factors such as inadequate regulations and implementation as well as immature market mechanism, and their business risks are larger than those of PFI activities in developed countries. Setting aside unavoidable risks, there will be risks related to policy, business, and finance (Table 6).

Table 6 Risks of PFI projects for UEI development

Policy risks

- Occurrence of responsibility and credit problems due to local government personnel changes and administration changes
- Risk of neighborhood environment degradation due to incomplete safety of treatment caused by inadequate regulations and defective implementation
- Difficulty in obtaining approval or permission as a public works, difficulty in securing appropriate investment recovery rate due to lower profitability as compared with economic infrastructure; on the other hand, risk of public sector's economic loss when approving private sector's high investment recovery rate, due to difficulty in grasping the market size and price trend
- Risk of delayed policy implementation and policy change, concerning taxation system and incentive to foreign fund, which are necessary from the viewpoint of public property of environmental activities
- Land ownership risk concerning land use right, because of long-term (20 or more years) property and large-scale land use of PFI

Business risks

- Risk of participation of private sector with insufficient financial and technical capabilities
- Business risks similar to those of ordinary infrastructure business, such as delay of construction, cost increase, defects due to corner cutting and the like, and plants operating below required standards
- Operation scale unaccomplishment risks, such as insufficient wastewater and solid waste supplies, lowering of operation rate, and cost increase
- Risks of establishing the charging system, opposition to fee increase, service price setting, fee collection rate, and the like

Financial risks

For foreign private companies, foreign exchange risk, risk of prohibition against currency exchange and remittance, interest rate fluctuation, and inflation risk

Source: Picked up by authors from Iguma, H., Institute for Development Support, Overseas Economic Cooperation Fund, 2000.

In a long range, implementation of PFI projects may cause rise of public service prices and lowering of governmental intervention capability due to natural monopoly, and enlargement of the development gap between metropolises and poor regions due to concentration of projects on large cities having economic power. In order to solve such problems, appropriate governmental intervention and guidance are required. Prior grasp of risks and their rational sharing are the key to avoid them.

5.2 Optimum profit sharing

Optimum profit sharing means maximum satisfaction of public sector's interests (plans, regions, and communities) and private sector's interests (profit pursuance). Public sector's benefits are low-cost development of infrastructure, provision of high-quality and stable public services, and improvement of the living standard, and private sector's benefits are assurance of profits, avoidance of business risks, and avoidance of "market failure"³⁾. Profit pursuance of the private sector and public interest of social players must be balanced with each other. This control is done by the public sector in the form of project contract.

6. Proposal of PFI business promotion policies for UEI development

The whole frame of PFI business promotion has to be designed for optimum risk sharing and profit sharing. First, relevant legislation, basic planning, and establishment of implementation system (government officials training and establishment of specific organization) are required; then risk-avoiding measures, national and local governments' promotion policies (legal, taxational, and financial supports), and transparency of financing must be examined in the policy determining stage; business process development, clarification and evaluation of available project options, and manual preparation for contract items must be promoted; and finally selection and implementation of a model project, information issuance, and capability improvement are required. In what follows, consideration is given to promotion policies from relevant viewpoints.

6.1 Implementation system—establishment of specific organization

In order to promote application of PFI, not only planning and implementation of relevant policies and support of

private sector's PFI activities but also establishment of a specific organization to regulate and supervise PFI activities for reducing PFI project risks is required. British Labour Party established a "task force" in Her Majesty's Treasury for realization of recommendation for PFI activation. The task force consisted of a policy team and a project team; the former discussed policy-related problems, standard contract forms, simplification of procedures, and so on, and the latter supported the former by checking concrete project proposals and making advice. PFI specialists from private companies also joined the project team. In the Philippines, a BOT center for planning and implementation of PFI-related policies, technical supports, and information provision was established, and its activities turned out to be very effective.

6.2 Policies for PFI promotion

a) Measures against risks

First of all, a complete set of laws/regulations and decrees have to be enacted early. For smooth implementation, standardization of project forming processes, preparation of relevant manuals, and establishment of a supervising and regulating system are required. Since clarification of possible risks and the method to shear them directly affect the future profit of private companies, measures against possible risks and troubles must be discussed by the bidding companies and local government, and clearly prescribed in the contract (Table 7).

Table 7 Measures against risks

Provision of relevant laws/regulations and decrees
(1) BOT or PFI promotion law (2) Legislation of sewerage user charge payment obligation: Establishment of rate system linked with water charges from the viewpoints of sewerage charges default prevention and water saving (3) Issuance of official statement by applicable administrative agency concerning deregulation in environmental infrastructure field (4) Rules on advance of foreign capital into environmental infrastructure field
Establishment of implementation system
(1) Manual preparation for PFI processes (2) Preparation of environmental infrastructure construction and operation/management manuals (3) Intensification of PFI supervision and environmental monitoring
Contract items
(1) Conditions of entrance to and exit from market (2) Regulation on ownership and limitation of profit margin (3) Conditions of facility transfer (4) Setting of treatment cost and its fluctuation (5) Measures to share costs in case of unaccomplishment of target wastewater/waste amounts (6) Waste-to-energy: Recommendation of power customers and fee setting Use of recycled water: Recommendation of water customers and fee setting (7) Compliance with environmental standards (8) Introduction of penalty provisions against construction/operation risks (9) Securing of guarantee of central government or the like (10) Securing of incentives (11) National compensation for losses due to unavoidable causes

Source: Authors

In addition, in order to cope with problems of monopoly and fairness, which may cause long-term risks, the central government must regulate and adjust the relevant industry structure, and adjust allocation of the fiscal disbursement.

b) Policy for Promotion

Government's preferential measures become a very important tool to assure the revenue of private sector. The following incentive measures can be considered for utilization, some of which can be adopted by local governments as appropriate (see Table 8).

Table 8 Government Incentive Measures for PFI Business

Financial support
<ul style="list-style-type: none"> ● Establishment and implementation of government supports (business fund support, compensation of earnings, low-interest loan, incentive system for business, etc.) ● Tax incentive measures (income tax exemptions for specified periods, exemption of value added tax or granting of subsidy of the equivalent amount), In particular exemption of value added tax on profit of private sector investing into waste-to-energy plants, the reuse of recycled water from sewerage treatment plants and the waste recycling. ● Support for access to very low-interest loan (ODA, multilateral financial agencies, environmental funds, etc.) ● Permission of sharing with private sector of revenues from existing public infrastructure facilities and promise of non-nationalization, etc. ● Support of invested companies in listing their stocks
Support in utilization of land
Investors are provided with land for project free of charge or at low price.
Support in implementing projects
<ul style="list-style-type: none"> ● Concession of infrastructure facilities is provided to investors for a long enough period to meet their needs. ● Improvement of profitability of environmental businesses due to permission of joint implementation with businesses in commercially prospective other fields (in the privatization project of Manila Metropolitan Waterworks and Sewerage System (MWSS), a joint implementation with cable lines for information and communication business and fiber cable system business is permitted in connection with the rights to use water/waste water pipelines treatment facilities and associated land). ● Permission of concession of patents such as advertisement in a certain period, and promotion of sightseeing, amusement and cultural and sport industries in parallel with construction of project.
Practical support
<ul style="list-style-type: none"> ● Support in official activities and procedures relevant to construction and management of projects. ● Simplification of the process up to contracting to reduce the cost for bidding.

Source: Prepared by the authors

c) Transparency of Financing

It is important to make clear the method to share operating costs and the sources of fund when promoting the participation by private sector. In general, construction expenses are covered with government finance and operation/management expenses are covered with fees collected from citizen. In the PFI project, however, a certain level of fee needs to be collected even during its construction stage. Such a fee is better to be collected to recover part of construction cost and, at the same time, to keep measures of security as well as enhance citizen's awareness of paying the cost.

6.3 Establishment of business process

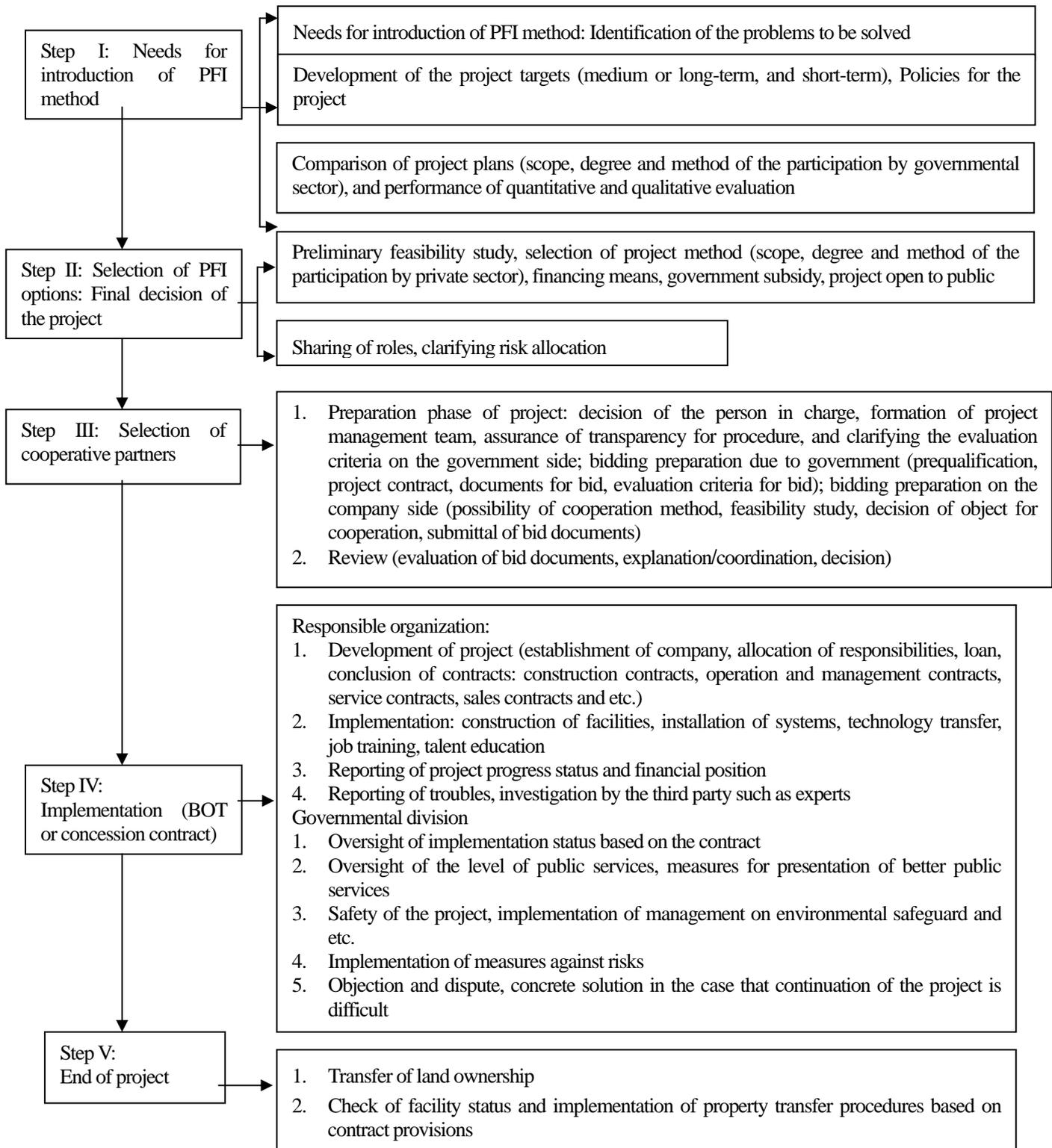
For the purpose of promoting PFI business and settling down PPP schemes, preparing manuals for the business development process and developing model projects for various options are very important (Figure 2). To this end, in addition to efforts of local governments, forming a scheme strengthening cooperation with central government and multilateral financial agencies is called for. In the PFI business process, the step to determine whether or not a PFI support measures needs to be introduced is extremely important, and the criteria for such determination include the following elements, which are a key for success of the business:

- (a) Resolution of hardships of government finance: Is the shortage of fund available from government sector in the project can be covered with the fund from private sector?
- (b) Improvement of investment efficiency for project: Presentation of the possibility to realize the steady cost down and the level of cost reduction due to participation by private sector through comparison of investment and operating cost in various types of project.
- (c) Establishment of system facilitating loan in the case of financing.
- (d) Improvement of the efficiency and capacity of local and central governments
- (e) Introduction of advanced technologies: Introduction of new technologies due to participation by private sector, scale and level of environmental industry, and in particular promotion of technologies leading to improvement of the effective use rate of sewerage sludge and the resource recycling rate.
- (f) Providing of services with higher and stable quality, and spread of services into the areas with poor people in an interim and long term.

- (g) Minimization of adverse effect due to personnel cut, and creation of new employment opportunity.
- (h) Revolution of the conventional political style with feature of sharing in the profit due to improvement of the transparency of economic process, and driving out the distrust of politics
- (i) Promotion of forming an environmentally- friendly living pattern.

In individual projects, the target of government's PFI project promotion needs to be clarified quantitatively and qualitatively, and the technical and financial analysis of the project also needs to be conducted strictly.

Fig.2 PFI works processes- - in the case of BOT or Concession contract



7. Conclusions

For the government sector and private sector of Asian developing countries, UEI development has become a new public works field as well as a new industrial field. From the viewpoints of economic growth and environmental protection, higher priority has to be given to promotion of these fields. Discussions must be made for setting clear numeric targets, developing funding methods for their achievement, and determining role sharing between the central and local governments and between the public and private sectors. For Asian developing countries requiring acceleration of UEI development under conditions of limited government budget and reduced ODA funds, PFI has such political effects as acceleration of UEI development by more abundant financing, cost reduction and improvement of investment efficiency, promotion of environmentally friendly consumption pattern forming, technology transfer to developing countries, and promotion of environmental industry. This paper has described such PFI as effective measures to realize sustainable growth of Asian countries, and proposed its implementation.

Many of Asian countries have prepared legislative and political measures to promote PFI projects, and started implementation of such projects not only in the economic infrastructure areas but also in the water/wastewater and solid waste management areas. For accelerating sound PFI activities, establishment of a new system to implement proposed PFI projects—public-private partnership (PPP)—is indispensable. This paper has discussed optimum combination of risk sharing and profit sharing in UEI projects between the public and private sectors, which is necessary for establishing such PPP. Important issues for this purpose are enactment of necessary laws/regulations and decrees, establishment of implementation system, risk-avoiding measures, incentives in taxation, land use permission and the like, transparency of funding, and preparation of manuals of project processes. Establishment of PPP requires not only high-level administrative capabilities but also negotiation capabilities including selection and evaluation of private companies as well as risk management. Even the public sector of developed countries does not have such capabilities to a sufficient extent. The public sector of many Asian developing countries is still more lacking in know-how and experiences of UEI development, and will have to collect many examples of PFI projects from various countries, and clarify factors in their success. It will also be important to introduce and implement PFI techniques developed by third parties such as institutes and international organizations, accumulate their know-how, and transfer them, and it is indispensable to improve government capabilities of these countries in such a manner.

Notes

- 1) PFI (private finance initiatives): In developed countries, PFI is an idea to provide high-efficiency and high-quality public services by construction, maintenance, and operation of public facilities using private companies' fund, management capability, and technical capability. Background and project contents of PFI differ depending on the country; there are British-version PFI, French-version PFI, Japanese-version PFI, and so on. In many cases, developing countries' PFI is applied to new projects and used as means to introduce private funds.
- 2) BOT (build, operate, transfer): A type of contract requiring a private company to fund, design, construct, and operate a public facility, and transfer it to the public sector at the end of the contract period.
- 3) Market failure: When a cost to provide UEI service is lower than the price that can be paid by individuals and market mechanism does not work, the market is called an incomplete market, and such situation is regarded as market failure.

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Contractual Form for Privatization

Contractual Form	Outline
Contract for Services	<p>Private companies are entrusted to pursue management of partial portion of the activity in which the public sector is engaged, in a certain period. At the moment, management of sewerage treatment facilities is under this kind of contract.</p> <p>For instance: reduction of leaking rate of water supply system, billing and collection of water rate, entrustment of operation</p>
Contract for Management	<p>Private companies or consultants are given right of operation /management of partial or entire facility and are rewarded on a basis of actual result. The purpose is to improve the performance and reduce the cost to prepare for full-fledged privatization, and to improve the performance of public entities based on accumulation of operational experiences of the management and scheme.</p>
Contract for Leasing	<p>Operating systems in possession of public sector are leased to private companies, who take charge of management in every respect (generally limited to the operation except for capital investment). When undertaking the operation, the levels to be achieved are set up.</p>
Contract for Concession	<p>Responsibility of management for water and waste water systems (including capital investment) is transferred to private companies in a certain period (generally a contract is concluded with a consortium led by an operator of the public enterprise).</p> <p>Incentives and rules for penalty are developed and an independent regulatory committee is established to ensure that the entire facility will be operated and managed efficiently. Success of management and profitability depend on whether or not the systems can be operated in good conditions over a long period.</p>
Selling/ Full Privatization	<p>A public sector, including its assets, is transferred as a whole to a private company permanently, who becomes a new owner and takes over the operation of facilities with under control of regulatory agencies upon obtaining license.</p> <p>With higher efficiency and further improvement due to incentives such a private company is allowed to conduct design and finance for capital investment at its discretion. In many countries, however, selling of public sector is legally prohibited; consequently, there is not seen a lot of this case.</p>
Repair/Own/Operate(ROO)	<p>Private companies not only repair but own and also operate facilities, which are finally not transferred to public sector.</p>
Build/Operate/Transfer(BOT)	<p>Private companies undertake repair, own and operate facilities in a certain period; thereafter, the facilities are transferred to public sector.</p>
Build /Transfer(BT)	<p>Private companies undertake only construction of facilities, which are transferred to public sector after the construction.</p>
Build/Own/Operate(BOO)	<p>Private companies not only construct but also own and operate facilities, which are finally not transferred to public sector.</p>
Build/Lease/Transfer(BLT)	<p>Private companies transfer their ownership of facilities to financial institutions after the construction to operate the facilities having right to be leased for the facilities, and finally the facilities are transferred to public sector after a certain period.</p>
Build/Transfer/Operate(BTO)	<p>First after construction of facilities private companies transfer the facilities to public sector and in return obtain the right to use the facilities. They share revenue from operation with public sector.</p>
Build/Own/Sell(BOS)	<p>Private companies construct facilities with the fund raised by themselves and make the profit from sale a fund for redemption by selling the facilities to public sector immediately after completion of construction or after a certain period. After the sale private companies conclude a contract for leasing with public sector to be leased the facilities and operate them(without ownership of the facilities).</p>
Build/Maintain/Transfer(BMT)	<p>Private companies construct and own and maintain facilities in a certain period, which are finally transferred to public sector.</p>
Develop/Operate/Transfer(DOT)	<p>Private companies develop and own and operate facilities in a certain period,</p>

	which are finally transferred to public sector.
Public-Private Partnership (Joint Contract)	Full-fledged partnership such as establishment of joint venture between municipal government and private companies. Each entity concerned owns shares of a joint venture and provide services on a contract basis under the partnership.

(Reference: "Water and Waste Water Sectors' Movement towards Privatization" September 1999, Institute for Development Support, Overseas Economic Cooperation Fund.)