別紙様式２(Attached Form 2)

学位論文要旨 Summary of Thesis

所属専攻 Field:　環境共生工学　専攻(Field)
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論文題名

A Study on Mechanism Design for Incentive Subsidy Scheme of Bus Services

要　旨（注：2,000 字以内にまとめること。）
Summary（Keep the summary within 2,000 words）

External costs are incurred in urban areas which experience substantial levels of traffic congestion due to the increasing number of private cars. The existence of these external costs is reflected in governments' around the world seeking more sustainable means of meeting passenger transport requirements, including support for public transport because of its capacity to meet social obligations and to reduce the external costs of private car use. Therefore, transit subsidies are necessary, given substantial economies of scale, in order to permit services to be set at a level which will result in reasonably efficient use of the public transport. Also, it is regarded as important to provide service for those who are unable to drive, in addition to helping cities find some relief from urban congestion and reducing fuel consumption.

Although transit subsidies are necessary to lower the price of public transport and diminish discrimination, they have long been controversial. Puncher et al. (1983) noted that costs and subsidies are jointly determined, as higher costs elicit more subsidies, which in turn induce higher costs.

As a mechanism with a major objective of containing the cost to government of service provision, competitive tendering (CT) was proposed and applied. The competitive tendering contract attracted significant interest because of its attempt to apply responsibilities and incentives to contract operators to improve service level. Gargett &Wallis (1995), Radbone (1997) introduced the Adelaide competitive tendering and contracting (CTC) that was initiated by the government of South Australia in 1994. A fixed sum which was the basis of the tender price bid and a patronage-related amount which is calculated according to the change in patronage from the base year comprised the contract payment.

However, there are some criticisms of competitive tendering. Hensher and Stanley (2003) pointed out weakness of competitive tendering. Although competitive tendering has lead to some noticeable gains in cost efficiency, the sizable financial gains are once-off, and subsequent re-tendering has delivered fewer financial benefits. Another reason is that CT is focused on individual contracts with no mechanism to ensure that the incentive payment support sums to the optimal subsidy commitment across a broader geographic area. Consequently researchers have looked for alternative ways for the appeal of active

competition. Performance-based quality contracts align with this view through incentive payments and benchmarked best practice costs.

Hensher and Houghton (2003) consummated the concept of performance-based contracts (PBCs). They proposed that the PBC framework takes into account the commercial angle of operators and the obligations of government to ensure that subsidy support is spent in a way that maximizes the net benefits of society. A performance-based contracting (PBC) was proposed that combines payment for delivering a minimum level of service (MSL) and established the optimum subsidy based on system-wide maximization of social surplus(Hensher and Stanley,2008). The reward system can both meet government community service obligations and realize an incentive regime that rewards operators for passengers increases (above MSL patronage levels).

Nonetheless, the above competitive tendering mechanisms ignored the fact that the role of bus operators in lessening subsidies. Bus operators works as the participant of the public transport, and they should take responsibilities to cut deficits to lessen the financial burden on the government.

Therefore, identifying an appropriate incentive scheme to encourage bus operators to reduce deficits in order to maximize the social welfare is thus important. The scheme not only enables bus operators to obtain a premium for making efforts to reduce deficits but also the local government to reduce the total amount of subsidies. In this case, both bus operators and the local government can reach a win-win solution.

Chapter 2 proposes an incentive subsidy scheme based on the Laffont-Tirole model (Laffont &Tirole Jean, 1993), which has been widely applied in regulation of other industries (Gasmi,1997, Crew& Kleindorfer, 1996) but has rarely been studied in the field of public transport. The incentive scheme is proposed to examine whether it can motivate bus operators to reduce deficits and eventually lessen subsidies and it can play a role in reducing the public transport subsidies of Kumamoto through empirical analysis. Finally, the suggestion according to sensitivity analysis that line lengths should be shortened to avoid the effects of asymmetric information and cost waste is given.

Chapter 3 proposes an optimal incentive subsidy scheme with elastic model, and 5 solutions aiming at the decision-making power of the service level are discussed. Under this scheme, the bus operator is motivated not only to attract more passengers through improving service level, but also to reduce deficits to obtain the premium, a point which is ignored in existing performance-based contracts. Then, the situation of deficit and social welfare under 5 solutions are analyzed through investigation of the public transport of Arao in Japan as the research object. Finally, results and the feasibility of introducing the incentive scheme into public transport are discussed.

Chapter 4 proposes a dynamic incentive subsidy scheme under conditions of both complete and incomplete information. 3 equilibrium types under incomplete information aiming at the probability of choosing different contracts are considered. The situation of deficits and social welfare under complete information and incomplete information are analyzed through investigation of the public transport of Arao in Japan as the research object. Findings of our sensitivity analysis under incomplete information suggest that total subsidies are decreased when the government knows more information about the bus operator. And the effort and social welfare are both improved in the second period due to the incomplete information becoming more transparent after the first period. This dynamic process can

play a role in lessening public transport subsidies and improving social.

Chapter 5 summarizes general conclusions of this dissertation