

A Study of Royalty Negotiation Model for BOT Projects

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Abstract

The royalty of the BOT projects should be written in BOT concession contract through the concession negotiation according to the Act for Facilitation of Private Participation in Infrastructure Projects (AFPPIP) in Taiwan. In the past, there was few computing formula or negotiation model about royalty for BOT projects to provide public sector or private sectors to negotiate during the bidding phase for BOT process. Thus, the public sector cannot judge whether private sector proposed royalty is reasonable or not. The purpose of this study is to develop the royalty negotiation model of BOT projects for government and private sector.

This study not only develops royalty negotiation model for BOT projects, but also discusses behaviors of government and private sectors in concession negotiation phase. A bi-level programming model is used to formulate the negotiated royalty problems of BOT projects. The upper level is the government and the lower level is the private sector. Thus, the bi-level programming model is a leader-follower negotiation model. The objection function for the upper level is the maximum of government financial recover ratio (GFRR); and the objection function for the lower level is the maximum of profit index (PI). Also, we establish three models for royalty negotiation model: (1) lump-sum royalty; (2) revenue-based royalty; and (3) ridership-based royalty. In addition, the heuristic algorithm for the bi-level programming model in this study is

developed. The heuristic algorithm considers the learning factor, negotiation discount ratio, and negotiation cost about two parties.

To illustrate these three models, this study has conducted a case study of Taipei Port Container Logistic BOT Project to find the solution above three models through of the Lingo package and MATLAB programming. The results of this study show that the government and the private sector will get compromise solution about these models at sixth discussion during the contract negotiation. The results are (1) government can charge 40.9 (million) in royalty for lump-sum royalty model, the GFRR is 11.689, and PI is 1.0621. (2) Government can charge 1.2% of revenues in revenue-based royalty model, the GFRR is 11.8324, and PI is 1.0621. (3) Government can charge 0.0000386 of riderships in ridership-based model; and GFRR is 11.6567, PI is 1.0675.

Keywords : BOT project, Royalty, Bi-level programming

