ABSTRACT

In order to identify and negotiate the Optimal capital structure for Build–Operate–Transfer (BOT) hydropower projects, this study creates an open, data-driven framework. Using important financial metrics obtained from project cash-flow analysis, the model aims to strike a balance between the interests of lenders and project sponsors.

Across equity shares ranging from 20% to 60%, six financial indicators are assessed: Net Present Value (NPV), Internal Rate of Return (IRR), Times Interest Earned (TIE), Debt Service Coverage Ratio (DSCR), Return on Equity (ROE), and Return on Assets (ROA). Because of their linear trends, these indicators can be simplified using regression and incorporated into a linear programming model.

LINGO 21 was used to create the optimization model, which concurrently maximizes all financial indicators while abiding by stakeholder-defined constraints. A feasible range of 34.87% to 61.77% for equity shares is identified by the model's output, where all financial indicators either meet or surpass their corresponding minimum constraints.

In BOT project negotiations, the framework shows how stakeholders can openly align financial goals and constraints. This method encourages balanced risk sharing in project finance structures in addition to supporting evidence-based decision-making. In BOT project negotiations, the framework shows how stakeholders can openly align financial goals and constraints.

Keywords: BOT hydropower, optimal capital structure, linear programming, LINGO 21, negotiation range