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Solving Complex Challenges in Built and Natural Environments Through Systems Thinking

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Environmental project evaluation: IRR-based decision support with a Monte Carlo simulation algorithm

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Abstract

One of the most widely used methods for investment assessment is the internal rate of return (IRR) that is based on the discounted cash flow analysis. Furthermore, the quantitative risk analysis technique is commonly used during the project's initial stage, simply by weighting the financial performance with the incurred risks. Herein, we introduce a decision support algorithm for environmental project evaluation and we focus on its application to solid waste management projects. The proposed algorithm includes some basic steps that should be followed by decision-makers, in order to evaluate a project's options. Specifically, different probability distributions are assigned to all variables that influence the options' IRRs and Monte Carlo simulation is enforced

to compute their expected IRR values. The algorithm presented here can be a useful tool to risk-neutral decision-makers, as it helps them to evaluate an environmental project's options and to select the one with the greatest expected profits.

Keywords:

decision support

internal rate of return

solid waste management

option evaluation

quantitative risk analysis

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