The expectation-deviation net present value by fuzzy arithmetic for capital investments

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Abstract

Among the alternative measures of desirability in capital budgeting, net present value (NPV), which indicates a project’s net wealth contribution to a company, is always a trustworthy indicator. This work presents a series of pragmatic algorithms for calculating NPV of a capital investment in an environment which are subject to uncertainty from randomness of outcomes and vagueness of estimation. Linguistic terms are adopted to assess the economic prospects and possibilities, which describe the randomness. Fuzzy numbers, which depict the vagueness, are used to transform the linguistic assessments and estimate cash flows and costs of capital. Applying standard fuzzy arithmetic, the text shows the algorithms of the expected fuzzy NPV for an investment. By fuzzy arithmetic with requisite constraints, we present novel equations for computing the fuzzy variance and standard deviation. The choice of the target is based on the rule of high return (expected fuzzy NPV), low absolute risk (fuzzy standard deviation), and/or low relative risk (coefficient of variation).

Keywords and phrases: Capital budgeting, net present value, fuzzy standard deviation, fuzzy arithmetic with requisite constraints.

1. Introduction

Making capital investments plays an important role in maintaining competitiveness and keeping growth for a business. A capital investment is defined as an outlay that is expected to result in benefits in the future. Because capital investments are so important to the success of an