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Net present value approach: method for economic assessment of innovation projects

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Abstract

This paper is dedicated to the issue of innovative performance measurement. It focuses on techniques that can be employed for evaluation of single innovation project. The framework is based on detailed literature review and net present value (NPV) approach analysis. Furthermore, the paper investigates its pros and cons and discusses methods able to deal with NPV weaknesses. Used with care, these techniques can guide the management of innovation project by providing indications of its potential financial value.

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Keywords: Net present value; innovation projec; desk research.

1. Introduction

The scientific aim of the paper is to gain knowledge and analyse the present status of innovation projects and their performance measurement by net present value (NPV) approach as it pertains to the Czech and especially foreign professional literature. In addition, it is also important in terms of innovation management, which is a field of science, and also of related disciplines, specifically strategic management.

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If we want to assess the success of innovations, we need to choose a type of criteria to be used for the assessment. There are several ways to innovation project performance assessment, from identifying barriers that might threaten the process, pre-setting criteria for individual stages of the innovation project to economic evaluation (Muska et al., 2009). Hauschildt (2007) recommends the following three types of criteria to measure innovation success:

- technical,
- economical,
- others.

This paper is intended to assess the economic performance of the innovation projects of the company. Methods for economic analysis are currently the most diffused methods for evaluation of innovation projects (e.g. Ryan and Ryan, 2002). Although the existing methods largely differ in their implementation, they all share a common principle, that is, the capital budgeting approach for calculating the economic return of a project as a sequence of discounted cash flows (Chiesa and Frattini, 2009).

Probably the most popular and most sophisticated economic valuation technique is the NPV approach. It consists in discounting all future cash flows (both in- and out-flow) resulting from the innovation project with a given discount rate and then summing them together (see Equation 1). The merit of innovation is measured considering its contribution to the creation of economic value out of the investment needed. This technique offers many variations (see Copeland et al., 2010) but it basic principles and limitation will be discussed in this paper.

Equation 1. Net present value (Khan, 1999)

$$NPV = \sum_{t=0}^{n} \frac{NCF_t}{(1+r)^t}$$

Where NPV = net present value; NCFt = net cash flow generated by innovation project in year t;
r = discount rate.

The first principle of NPV approach is that a risky Euro tomorrow is less valuable then a certain Euro today. Hence future cash flows are discounted each year. The discount rate reflects the opportunity cost of the capital mobilized, which increases with the estimated riskiness of the innovation opportunity. Indeed, riskier projects are expected to provide higher returns. This means that such an approach is risk-adjusted, while other metrics such as ROI or IRR are not (Gaily, 2011).

In its basic application the discount rate is calculated looking at the "real" cost of capital employed in the innovation, that is, by calculating the weighted average cost of equity and debt used to finance the project. For small projects, where it is rather difficult to identify the quotas of equity and debt used for financing a single project, the cost of capital – also named WACC (Weighted Average Cost of Capital) – is usually assumed to equal the cost of capital of the whole company, that is, it is calculated using annual report data that take into account the firm's overall equity and liabilities (Chiesa and Frattini, 2009).

Typical discount rates used for corporate projects range from 10 percent to 15 percent, while investors in high-tech start-ups can use rates of up to 25 percent to 30 percent, as a result of the inherently risky nature of such ventures.

The second principle of the NPV approach is to take into account all the future net cash flows linked to the innovation opportunity. By contrast, metrics such as the pay-back period or upfront investments consider only the initial cash flow.

The NPV approach requires on the one hand the discounting and summing-up of all the future net cash flows for which reasonable assumptions can be made, and on the other hand to estimate and discount the final value of the remaining cash flows (the "final" value). The value of the innovation projects is then equal to the sum of the discounted cash flows considered plus the final value.

The final value can then be estimated either as zero (in the case of an innovation facing complete obsolescence), negative (in the case of an innovation involving rehabilitation or recycling costs, as, for example, in the energy sector) or as a proxy of future cash flow based on resale value, balance-sheet metrics or "perpetual" value.

There are three main sources of attractiveness of the NPV approach:

it associates a cash value with an opportunity, rather than a time period or a relative rate,