Selected aspects of the investment decision-making process in Polish corporations – a methodical approach

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Abstract

Both in theory and in practice, a number of methods and tools have been developed in order to evaluate a project in terms of its financial effectiveness. In Poland many of these methods find their applications in practice. Their applications differ for specific types of projects, i.e. different methods are used in evaluation of public projects or commercial projects. This paper aims at discussing the selected issues related to financial evaluation of commercial projects. In particular, the author focuses on the methodological aspect, i.e. the subject of the author's deliberations are three methods used by private investors in Poland, namely Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period (PP).

Key words

Capital budgeting, commercial projects, investment decisions, risk

1 Introduction

A decision to engage funds in any projects needs to be justified. Investment without any specific goal in mind is pointless. The reasons behind the investments carried out by public investors and the ones carried out by private investors will differ. This leads to a general division into public projects and private projects which, in turn, may be freely sub-divided according to any criterion. The most common and best-known division described in the literature of the subject is the division based on the criterion of time. According to this criterion, investments can be divided into short-, medium- and long-term ones. Such division is particularly applicable for investments on the financial market. In corporate practice, a final investment decision is usually preceded by a feasibility study, in which appropriate measures of effectiveness are calculated. In Poland, the most frequently used ones are Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PP), as well as Sensitive Analysis (SA) and Breakeven Point Analysis (BEP). A priority for a private investor is to generate return on investment, i.e. increase one's wealth, and these methods allow them to make the right investment decisions. (In case of public projects, however, the method recommended in Poland is Cost-Benefits Analysis - CBA).

The aim of this paper is to discuss the methods listed above. The author indicates dependencies between these methods. The deliberations are focused on NPV, IRR and PP methods. It should be noted that these problems are well-known worldwide and the methods have been used in investment activities for a few dozen years now, therefore this article is just an attempt at the synthetic approach to these issues. All the formulas given in this paper are derived from: [1], [2], [3], [4], [5], [6].

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2 The investment decision-making process – methodical aspects

The application of the methods for measuring of financial effectiveness of projects requires necessary knowledge of their own classification. In general, these methods can be divided into static methods and dynamic methods. This division results from the criterion which is the change in money (capital) value over time, as the value of money varies throughout a period of time. This is primarily due to inflation in an economy. Consequently, a bank's interest rate is a nominal rate. Therefore, future gains to be generated by an investment project have to be discounted over time. A discount rate is a parameter, which makes it possible to 'capture' the change of the money value in time. Discounting allows us to bring all these values (amounts) which will occur in the future into the same moment in time. The literature of the subject refers to the dynamic methods (NPV, IRR) as the discount methods, because the general structure of their formulas contain the so-called discount coefficient. The static (simple) methods, in turn, unlike the complex (discount) methods, don't take the change in the time value of money into account. An example of such method classification is presented in table 1.

Differentiation criterion	***Methods***	
	Discount (dynamic) methods	**Simple (static) methods**
Mathematical basis	Financial mathematics	None
Time factor	Change in time value of money is taken into account by a discount calculation	Change in time value of money is not taken into account
Financial elements included in calculations	Cash inflows and outflows – NCF (cash flow approach)	costs, income, expenditure – gains (accrual basis)
Valuation of elements	Valuation of distribution in time and values of individual cash inflows and outflows, most often in annual periods of time; separate discounting individual annual NCFs	Basic methods; - elements of the calculation in year one are automatically regarded as reference ones Improved methods: - valuation of individual elements and calculation of an average value, or determination of a reference year, for which return is calculated (concerns simple interest rate methods)
Decision-making criterion	Mostly objective	Mostly subjective

Table 1: Classification of simple methods and discount methods

Source: [7].

Both in theory and in practice, the dynamic methods are regarded as superior over the static methods. This is largely due to the changeability of time value of money (capital). However, the division presented in the table often comes up for criticism. There are arguments that the dynamic methods lack flexibility. Future predictions can not be perfectly accurate - hence, there is always a risk. Therefore, the traditional calculation of effectiveness (for some projects) doesn't account for risk in a sufficient way. This is mainly due to the fact that in this approach net cash flows for some projects are specified ex-ante, i.e. traditional discount methods don't take into account any future changes in this respect, and consequently they don't lead to effective risk limitation. That's why, at present the use of a financial instrument

called real options is recommended as they ensure the flexibility mentioned above. „A real option is the right (but not the obligation) to change a decision about a project if some new information becomes available"[9]. For many authors, an option stands for flexibility. Therefore, the literature of the subject increasingly divides the methods related to the cost-benefit analysis of investments into dynamic, discount and static ones. Following this approach, the NPV method (a traditional calculation), for instance, is only a discount method, but not a dynamic one. In Poland, however, practically, apart from a few exceptions, the formal (traditional) division into static methods and dynamic methods is still applicable, and the issue of risk in evaluation of investment effectiveness is dealt with by using some additional methods, i.e. based on the methodology of *project risk management*. For example, simultaneously with the NPV method, such methods as Sensitivity Analysis (SA), which is basically a simulation method, is used.

The compliance of the appraisal methods for evaluation of investment effectiveness with theoretical recommendations is presented in table 2.

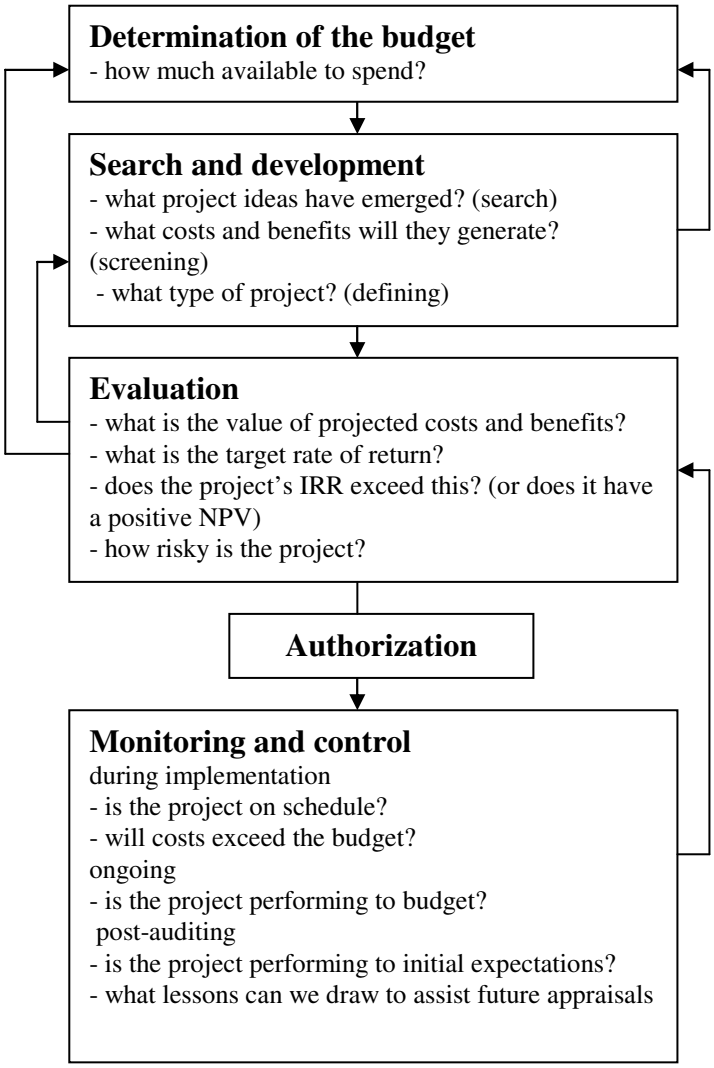
Feature / **Method**	***Takes into account entire project lifecycle***	***Takes into account changeable time value of money***	***Takes into account company's objectives***	***Takes into account project risk***	***Determines net gains as net cash flows***	***Possibility of constructing an objective decision-making criterion***
Simple rates of return	Yes	No	No	No	No	No
PP (simply)	No	No	No	Yes	No	No
ARR (Accounting Rate of Return)	Yes	No	No	No	No	No
PP (discounted)	No	Yes	No	Yes	Yes	No
NPV	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
IRR	Yes	Yes	No	Yes	Yes	Yes
PI	Yes	Yes	No	Yes	Yes	Yes

Table 2: Classification of simple and discount methods

Source: [8].

As you can see in table 2, NPV as the only one from among all the methods listed has only advantages. This is an argument for the application of this method on a large scale. Figure1, in turn, presents the flow of the capital budgeting process in a company.

Figure 1: A simple capital budgeting system



Source: [1].

In connection with figure 1, it should be noted that this is just an idea diagram of the capital budgeting process. It essentially presents a theoretical approach to the issues in question, as in practice the investment decision-making process may look quite differently. Nevertheless, the correct calculation of the cash flows generated by a project (in the future), based on the formula below, invariably makes a starting point for the financial analysis of the project:

$$CF_t = (1 - T)(S - C - D) + D$$

where:
S – sales revenue,
C – current costs (depreciation excluded),
T – income tax rate,
D – depreciation,
CF_t – net cash flows in year *t*,
t – individual years analysed.

This formula is essentially the following notation: net income + depreciation (for a project). Another critical stage for the correctness of entire future calculations is the

appropriate determination of a discount rate. Any errors made at this stage will result in incorrectness in any further calculations. The discount rate can be calculated in a number of ways. In particular, Weighted Average Cost of Capital (WACC) and Capital Asset Pricing Model (CAPM) approaches can be used. The calculation of the discount rate using the weighted average cost of capital is particularly applicable in practice, because of many different sources of financing the projects. (WACC, for instance, can be applied to an investment into the purchase of a real estate, where the project is funded by two sources, i.e. a bank credit and the investor's own resources). As L.J. Gitman points out „[...] the weighted average cost of capital may vary over time, depending on the volume of financing that the firm plans to rise"[11]. „Therefore, it's useful to calculate the Weighted Marginal Cost of Capital (WMCC), which is simply the firm's weighted average cost of capital (WACC) associated with its next dollar of total new financing"[11]. The CAMP model, in turn, finds is application in investment decisions made on the capital market. „The CAMP model introduces the measure of a relative market risk called beta β, which expresses the relationships between individual assets and the market risk"[2]. For example, if there's an inequality of β coefficient > 1, then the investment risk is higher than an average risk on the given market, and when $0 < \beta < 1$ the investment risk is much lower than the average risk on the market. In Polish corporate practice, we can also find other ways of calculating the discount rate. One of them is using the formula: a risk-free interest rate + a risk premium. Its practical application results primarily from the fact that projects are carried out in various sections of the economy. Therefore, they can carry a higher or lower risk. An investor 'makes up for this risk' by calculating a higher interest rate (the risk premium), to be added to the risk-free rate which, in turn, is represented by e.g. treasury bonds. These instruments are regarded as risk-free. (This approach is also followed by the author of the article in his business activities). Furthermore, one should always take into account the limitations to some projects, when establishing the maximum values for the discount rate, e.g. the projects implemented within the framework of Public Private Partnership (PPP). This is considered as quite controversial by many scientists, as the financial analysis sometimes indicates that the discount rate should be much higher than the value accepted because of some top-down decisions.

NPV is the most common method in Poland, with a variety of applications. Many authors believe that the method has no weaknesses. Its particular strength is that NPV evaluates a project, giving an absolute value, and provides an answer to the investor's question of how much they are going to earn on their investment. Financial analyses of projects also frequently use the Profitability Index (PI). „The profitability index is closely connected with the net current value as it is equally sensitive to the discount rate chosen"[10]. The interpretation of this indicator doesn't cause any major problems, i.e. if the investment is to be profitable, it has to meet the condition of $PI \geq 1$, where 1 stands for the unit value of investment expenditure incurred for the project. Based on the formulas given above, the very definition of the Internal Rate of Return (IRR) can be easily established, i.e. it's such a discount rate, which makes the left-hand and the right-hand sides of the equation equal, and then the NPV equals 0, which can be written in the mathematical form as:

$$\sum_{t=1}^{n} \frac{CF_t}{(1+IRR)^t} - CE_0 = 0 = NPV$$

where:

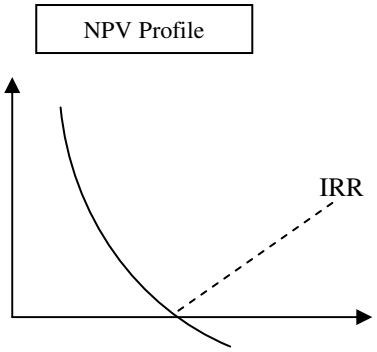
NPV – net present value,
CF_t - net cash flows in subsequent years analysed,
CE_0 – investment expenditure,

t – subsequent years of the period analysed,
r – discount rate.

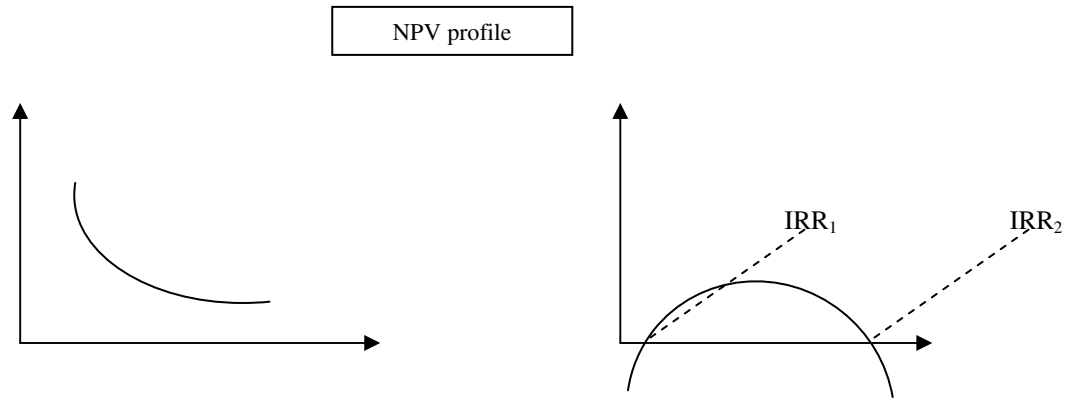
It should be kept in mind, however, that there are projects which don't have any IRR at all, there are projects which have a few IRRs, and for some projects the IRR may even be negative. The NPV profile for numerous projects is presented in figure 1.

Figure 1: Relationship between NPV and IRR of the project

✓ Typical projects → we first incur investment expenditure and then generate infinite earnings - - - / + + +



✓ Non-typical projects, for example: → - - - / + + + / - - - (have none or two IRRs)



Source: Developed on the basis of: [2], [6].

As can be seen in figure 1, every calculation of the IRR means determination of the zero values of the function. At the same time, the first profile (Fig. 1) shows another crucial dependence, i.e. the higher the discount rate, the lower the NPV of the project and vice versa. In practice, it's sometimes difficult to determine one IRR rate for the same project, i.e. in this respect, the method may not work for the investor, as the IRR method has some drawbacks as well (Tab. 1). Therefore, the investor has the whole range of other rates of return to choose from, i.e. simple rates of return, or they can use the Modified Internal Rate of Return (MIRR). To sum up, rates of return, in general, express the profitability rate of the evaluated projects. Apart from a variety of rates of return, also the discounted payback period (PP) is calculated. (Broadly speaking, PP is the time needed in order to make the earnings on the project equal the investment expenditure incurred for the project). There is one more dependence between

the payback period and the rate of return (in some cases) i.e. the higher rate of return of the project, the quicker pay back, that's:

$$Payback\ Period = \frac{1}{Rate\ of\ Return}$$

The PP method is particularly 'liked' by practitioners in Poland, as it's simple to use and its result is given in years and days, which makes it very easy to interpret.

3 Conclusions

Summing up, it should be clearly stated that if we want the financial methods used in appraisal of projects to be effective, a given project needs to be evaluated from a number of perspectives and in a much broader way than using just a financial analysis. Such a view is held e.g. by the United Nations Industrial Development Organization (UNIDO), where the methods described in this paper were placed at the tenth stage of the feasibility study conducted during a pre-investment phase. What matters most among practitioners, is financial results and therefore, when evaluating a project in a comprehensive and complementary way i.e. by using, at the same time, all the methods referred to in the paper, reliable information may be obtained about the financial effectiveness of the project. In practice, the project may either be rejected or implemented and carried out in a company.

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Summary

An appropriate appraisal of projects in big corporations in Poland requires prior analyses concerning viability (profitability) of investment. The pre-investment activities comprise feasibility studies, in which various methods are applied to measure the effectiveness of investment. The methods most frequently used in Poland are Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PP). (The methods are often supplemented with additional techniques, in order to quantify a risk of a project). These are the main issues dealt with in this article. The author focuses on the methodological aspect of measuring the financial effectiveness of projects, i.e. presents the mathematical formulas which serve as the basis for calculation of specific measures of effectiveness.