

## INTERNAL RATE OF RETURN AS AN ENHANCEMENT OF THE DECISION-MAKING PROCESS IN THE ASPECT OF CHOOSING THE INVESTMENT PROCESS

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*The functioning of the enterprise in a dynamically changing environment requires constant shaping of its effectiveness, development, investment activity. Investment activity is inscribed in every type of business. Evaluation of investment projects has to indicate the best solution from among the proposed ones. The result of investment project efficiency evaluation depends directly on the stream of net cash flows and the level of discount rate applied to its updating. The relevance and quality of investment decisions affects, among other things, the competitiveness of the entity, its market share, prospects for revenue generation. Internal Rate of Return (IRR) is the discount rate at which the net present value of an evaluated project is equal to zero. IRR shows the rate of profitability of a project, which is paid when its internal rate of return is higher than the cut-off rate, which is the lowest rate of profitability acceptable to the investor. This indicator is focused on a single project with regular capital flows, which can also be a disadvantage for some investments. With IRR it is possible to evaluate the cash flows associated with a project. IRR helps in making the right decision from the perspective of shareholders and other decision makers.*

**Key words:** investment process, decision-making process, internal rate of return (IRR).

**Introduction.** The functioning of an enterprise in a dynamically changing environment requires constant shaping of its effectiveness, development, investment activity. Investment activity is inscribed in every type of business. Obtaining future income requires expenditures. They require analysis before any resources are spent [1–2]. The evaluation of investment projects is to identify the best solution among those proposed (when all the financial variables needed to make a decision are not precisely known).

To evaluate the results of planned investments, the following are used: internal rate of return, payback period, project profitability, which characterize the relationship between the financial flows that this investment may bring [3].

W. Pluta and T. Jajuga define investments as expenses (negative value of cash flow in the initial period) incurred to increase company assets, which in the following years will generate benefits (positive value of cash flow) [4]. Successive stages of investment can be defined as follows: pre-investment phase, investment implementation, reaching the assumed production capacity, investment operation.

The result of evaluating the effectiveness of an investment project depends directly on the net cash flow stream and the level of the discount rate used to update it. Changes in prices, both of products and services and factors used in production process, shape cash flow streams. Inflation is very often ignored when evaluating capital projects. The constant value of a monetary unit is related to the moment when the project is evaluated (before the decision to implement it is made) [5].

The aim of the paper is to present leading assessments and resolutions of the information capacity of the IRR method as an enhancement of the investment project evaluation process.

**Literature review.** Increased risk, uncertainty caused by the COVID-19 pandemic, contributes to the increased importance of information (and its quality) in the decision-making process (e.g., in undertaking the investment process).

An investment project is a form of transforming the capital accumulated by entrepreneurs into productive assets for the purpose of multiplying their holdings [4]. Each physical investment has an individual investment life cycle, which is a complex and multifaceted process that takes into account economic, technical, social and environmental issues. It is generally accepted that each investment project consists of three integrated phases: pre-investment, investment and operation [6].

The capital budgeting process is a decision support tool for selecting the most effective investment projects. It includes investment and financing decisions. Thus, it concerns the selection of projects as well as the selection of sources of capital acquisition with the lowest costs enabling the launch of a given group of projects [7].

The accuracy and quality of investment decisions affect, among other things, the competitiveness of the entity, its market share, income generation prospects. Incorrect investment decisions can be a constraint on the liquidity and flexibility of an enterprise's operations [8]. External factors shaping the decision-making process are independent of the company. They result from the policy of state authorities and market mechanisms, or the condition and economic situation in the country, as well as the world economy. Internal factors are related to actions taken by the company. They are associated with its financial situation, owned resources, intellectual capital, organizational structure, adopted development strategy, management methods, innovation and quality of products and services [9]. Other factors on

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which investment efficiency depends include project characteristics, project management personnel, availability of resources, project environment (competitive, economic, political, legal, technological, natural and social, which further indicates the multidimensionality of the investment process) [10].

**Method and material.** Internal Rate of Return (IRR) is the discount rate at which the net present value of the evaluated project is equal to zero [11].

$$\frac{CIF_1}{(1+IRR)^1} + \dots + \frac{CIF_2}{(1+IRR)^N} = \sum_{i=1}^N \frac{CIF_i}{(1+IRR)^i} = COF_0;$$

IRR = stopa dyskontowa przy której NPV = 0;

$$\sum_{i=1}^N \frac{CIF_i - COF_0}{(1+IRR)^i} = 0,$$

where,  $CIF_i$  flows (cash inflows) in that period,  $COF$  flows (cash outflows) in that period  $N$  total number of periods.

IRR shows the rate of profitability of a project, which is paid off when its internal rate of return is higher than the cut-off rate, which is the lowest rate of profitability acceptable to the investor.

In the next step of the analysis, use NPVA (level based on rate A), NPVB (level based on rate B), discount rate level A (discount rate level przy which  $NPV > 0$ ) and B (interest rate for which  $NPV < 0$ ) to calculate the IRR [12], from the formula

$$IRR = A + \frac{NPV_A}{NPV_A - NPV_B} \times (B - A).$$

IRR measures the direct rate of return on investment, so the higher its value, the more effective the project is. An investment project should be accepted for implementation if its IRR is greater than the lowest discount rate acceptable to the investor or if its IRR is greater than the capital cost rate. Thanks to the implementation of the project, not only the cost of capital will be covered, but also an additional premium will be obtained, thanks to which the economic base of the company implementing the project may grow.

If the IRR of the project is less than the appropriate discount rate  $r$  (or cost of capital rate), then the project should be rejected [13], i.e.

- $IRR > r$ , project to be implemented, profitability higher than discount rate;
- $IRR = r$ , project neutral, profitability equal to discount rate;
- $IRR < r$ , do not pursue project, profitability lower than discount rate [14].

When analyzing a minimum of two projects, choose the project with the higher IRR, which is a function of both time and the amount of capital expenditure. The advantages of IRR include taking into account the entire life cycle of the investment, the changing value

Table 1

**IRR method for iwneetsy project evaluation**

quantity	n (period)	Cash flow	r (discount rate)	discount factor	discounted cash flow
initial invetigation	0	-150 000.00	5%	1.0000	-150 000.00
flow 1	1	50 000.00	5%	0.9524	47 619.05
flow 2	2	50 000.00	5%	0.9070	45 351.47
flow 3	3	50 000.00	5%	0.8638	43 191.88
flow 4	4	50 000.00	5%	0.8227	41 135.12
flow 5	5	50 000.00	5%	0.7835	39 176.31
				NPV=	66 473.83
				IRR=	19.86%
quantity	n (period)	Cash flow	r (discount rate)	discount factor	discounted cash flow
initial invetigation	0	-180 000.00	5%	1.0000	-180 000.00
flow 1	1	50 000.00	5%	0.9524	47 619.05
flow 2	2	50 000.00	5%	0.9070	45 351.47
flow 3	3	50 000.00	5%	0.8638	43 191.88
flow 4	4	50 000.00	5%	0.8227	41 135.12
flow 5	5	50 000.00	5%	0.7835	39 176.31
flow 6	6	70 000.00	5%	0.7462	52 235.08
flow 7	7	80 000.00	5%	0.7107	56 854.51
flow 8	8	50 000.00	5%	0.6768	33 841.97
flow 9	9	50 000.00	5%	0.6446	32 230.45
flow 10	10	50 000.00	5%	0.6139	30 695.66
				NPV=	242 331.49
				IRR=	26.75%

Source: own study

of money over time, and it can contain information about the risk margin. An investment is profitable for us if the IRR is greater than the limiting rate, which is considered the long-term lending rate (or discount rate) [15]. The greater the difference between the cost of raising capital and our IRR, the more money we make. One advantage of IRR is that it is a numerical value, which makes it easier to compare projects that differ only in size [1–17].

The main disadvantage of IRR is the assumption that the cash flows obtained in each year will be reinvested at the same rate as IRR (this is not practically feasible). IRR does not consider individual projects separately, but all potential combinations should be analyzed and the best one should be chosen from among them. This indicator is focused on a single project with regular capital flows, which can also be a disadvantage in case of some investments [18]. The IRR method is not applicable when the discount rates vary over time [19].

**Results.** With IRR, it is possible to evaluate the cash flows associated with a project. Thus, it can be assumed that IRR helps in making the right decision

from the point of view of shareholders and other decision makers.

There is also a need to account for inflation (i.e., to account for the real rate), which can be unstable. Taking inflation into account will result in a significant decrease in NPV and the need to consider a lower value of the discount rate.

**Conclusion.** Making an investment decision requires the decision maker to have comprehensive information related to a specific investment project.

The decision to implement or reject an investment project is made on the basis of information obtained after conducting an economic efficiency calculus of the investment (e.g. IRR).

Internal Rate of Return (IRR) is a popular criterion for evaluating the relative profitability of investment projects. It is used both in evaluating investment projects as well as financial decisions.

By assuming the fuzziness of the capital cost parameter and cash flows in subsequent periods of the investment, it is possible to more accurately determine the profitability of the project and analyze the choice of the most profitable project.

Table 2

**IRR method for evaluating an investment project (real rate, inflation rate 5, discount rate 10)**

quantity	n (period)	Cash flow	Real interest rate	discount factor	discounted cash flow
initial investigation	0	-100 000.00	4.76%	1.0000	-180 000.00
flow 1	1	50 000.00	4.76%	0.9545	66 818.18
flow 2	2	50 000.00	4.76%	0.9112	63 780.99
flow 3	3	50 000.00	4.76%	0.8697	69 579.26
flow 4	4	50 000.00	4.76%	0.8302	41 510.36
flow 5	5	50 000.00	4.76%	0.7925	39 623.52
				NPV=	101 312.32
				IRR=	24.60%
quantity	n (period)	Cash flow	Real interest rate	discount factor	discounted cash flow
initial investigation	0	-100 000.00	4.76%	1.0000	-180 000.00
flow 1	1	50 000.00	4.76%	0.9545	66 818.18
flow 2	2	50 000.00	4.76%	0.9112	63 780.99
flow 3	3	50 000.00	4.76%	0.8697	69 579.26
flow 4	4	50 000.00	4.76%	0.8302	41 510.36
flow 5	5	50 000.00	4.76%	0.7925	55 472.93
flow 6	6	70 000.00	4.76%	0.7564	52 951.43
flow 7	7	80 000.00	4.76%	0.7221	57 765.20
flow 8	8	50 000.00	4.76%	0.6892	34 462.19
flow 9	9	50 000.00	4.76%	0.6579	32 895.73
flow 10	10	50 000.00	4.76%	0.6280	31 400.47
				NPV=	326 636.75
				IRR=	36.21%

Source: own study

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