***Evaluation and selection of investments***

The contractor or the decision-maker generally relies in comparison and selection of projects or investments, or approving their implementation, on what is called the feasibility study or "business plan", beginning with the marketing plan, market study, forecasting the volume and value of sales, passing through the production plan and predicting the amount of production based on the marketing plan. Down to the financial plan, to anticipate the value of the investment and operational costs of the project, and depending on the business plan, the cash inflows or revenues that the institution or contractor expects to obtain during the years of the project are expected, as well as the cash outflows, i.e. costs, in order to estimate the net cash flows.

In this axis, we will try to demonstrate the application of financial mathematics in relation to the selection and evaluation of investments, by determining the method and the result that enables the contractor, at a certain rate, to choose or evaluate his project, by focusing on evaluation criteria that are based on the current value or discount, that is, taking into account time. Standards in: net present value standard, internal rate of return standard.

First: the standard net present value (VAN).

1- Definition of net present value: It is the value that is obtained from the difference between the discounted cash inflows and the discounted cash outflows, in each year of the life of the project, as it indicates:

- Cash inflows: are the expected revenues, such as sales revenues, subsidies and loans, revenues from the assignment of assets,...etc.

- Cash outflows: They include investment costs, i.e. the costs incurred by the establishment or the contractor to operate the project as well as the start of its operation in its first cycle, as well as operational costs, i.e. the costs necessary to carry out production during a certain period of time, i.e. the activity of the establishment during a certain period of time.

It is noted that the annual cash inflows or outflows are deducted to the zero point, i.e. the start of project implementation, where at this point (discount point) the cash inflows are subtracted from the cash outflows to obtain the net present value.

2- Calculate the net present value:

NPV is calculated by subtracting the present value of the cash inflow from the present value of the cash outflow.

In the event that the cash flows are regular or equal, the net present value is calculated through the following equation:

VAN=R[〖1-(1+t)〗^(-n)/i]- I0

where:

 VAN = net present value

 R = net annual equal cash flow

I0 = initial investment or investment costs

 t = discount rate

 n = the number of payments or the number of annual cash flows

Noting that in the case of comparison between projects according to this criterion, the project that achieves the largest net present value is chosen, but in the case of evaluating one project, if it achieves a positive net present value, the project is accepted, otherwise it is not accepted if it achieves a negative net present value.

Example: The cost of a project is estimated at 300,000 DZD, while the expected revenues from it are estimated at 40,000 DZD annually over 20 years of its estimated useful life. If you know that the interest rate is 10% annually, will the contractor accept the implementation of the project or not?

the solution:

 = R40,000 DZD annually

= I0 300000 DZD

 t = 10%

 n = 20 batches

Calculating the net present value:

I 1:

VAN=R[〖1-(1+t)〗^(-n)/t]- I0

VAN=40000[〖1-(1+0.1)〗^(-20)/0.1]- 300000

VAN=40000(8.513563)- 300000

VAN=40542.52DA

2nd floor:

NPV = Present value of cash inflow - present value of cash outflow

Present value of cash inflow =

R[〖1-(1+t)〗^(-n)/t]

40000[〖1-(1+0.1)〗^(-20)/0.1]

=40000(8.513563)

= 340542.52 DA

The present value of the cash outflow = 300,000 DZD

net present value =

VAN=340542.52- 300000

VAN=40542.52DA

Second: the internal rate of return (TRI).

1- Definition of the internal rate of return: The internal rate of return is the rate at which the cash inflows are equal to the value of the invested capital, and it is also known as the discount rate that gives a current value to the project equal to zero, that is, the project achieves a balance of neither profit nor loss, by covering the costs of the project investment and operational.

So, projects or investments are evaluated after determining the internal rate of return for each investment. If the rate is less than the prevailing interest rate in the market, the project is rejected, and the project or investment that achieves the highest rate of return is accepted.

 2- Calculating the internal rate of return:

The most important difficulty that can be encountered with the internal rate of return criterion is not knowing the value of the rate i, as to determine it, reliance is made on the method of guesswork or trial and error, where according to this method assumed discount rates are used. Possession equals zero, i.e.:

〖R(1+t)〗^(-n)- I0=0

Or, in the case of equal annual cash flows, we use the following relationship:

VAN=R[〖1-(1+t)〗^(-n)/t]- I0

This rate that achieves the condition or balance is the internal rate of return

And since it is difficult to obtain this rate except after doing several experiments, if we choose at the beginning a certain rate of 5%, for example, and we get a positive current value close to zero, then we must choose the next time a discount rate higher than 5% until we get On a current value that is negative and close to zero, which allows calculating the internal rate of return with more accurate results and vice versa, because the internal rate of return is confined between the discount rate that makes the current value negative at the smallest value and the discount rate that makes the current value positive at the smallest value, and then we calculate or We define the internal rate of return by the following relationship:

TRI=t+(〖(t2-t1)〗^VAN1)/(VAN1-VAN2)

where:

 VAN1 = net present value at the highest discount rate

VAN1 = NPV at the lowest discount rate

 t1 = discount rate a