

**UNIVERSIDADE NOVA DE LISBOA
FACULDADE DE CIÊNCIAS E TECNOLOGIA**

**2022/2023
1st Semester**

BUSINESS MANAGEMENT

PROBLEMS SET

Project Analysis

1. A farmer is currently considering a project to plant and exploit an orchard on his land. This land may alternatively be leased for 1000 monetary units (m.u.) per year. Planting the orchard will involve an initial investment of 50 000 m.u. and the cost of its annual maintenance will be around 4 000 (including picking the fruit, etc...). The annual production of the orchard will be sold at a price agreed with the local cooperative which is 100 m.u. per ton at the end of the first year and that will grow at the rate of 5% per year. The useful life of the orchard is 5 years, having no residual value, and the relevant interest rate for this farmer is 7%. How many tons should this orchard produce annually (admit that the annual production is constant) for the farmer to be interested in implementing this project instead of leasing the land? (Note: with the exception of the initial investment, consider that all other amounts refer to the end of each year.

2. A quarry has decided to implement a project that will have a three-year life. In the first year it will be necessary to excavate a land that the company has. Consequently the company will no longer be able to rent the land which would allow you to obtain an annual income of 300 m.u. paid at the end of each year. No initial investment will be required but excavation will cost (only at the end of the first year) about 700 m.u. The revenues generated by the project are only received at the end of the 2nd and 3rd years and, already net of exploitation costs, ascend to 3,000 m.u. annual. At the end of the last year environmental requirements require the place to be reforested, which implies an additional expense of 4,500 m.u. (At the end of the third year) the relevant interest rate to which the company can apply its capital is 10% (annual).
 - a) Calculate the IRR (s) of this project.
 - b) Calculate NPV from this project
 - c) What is your recommendation to this company?

3. A company is considering the possibility of attributing a car to one of its vendors. The necessary investment is EUR 10,000 following maintenance, safe and fuel costs of EUR 1,500 in each of the next 4 years. At the end of the 4th year the vehicle has a residual value of 500 euros. It is expected that the use of the vehicle will lead to an increase in the annual profit generated by the seller concerned from EUR 2,000 to EUR 7,000. Knowing that the cost of capital's opportunity is 20% (a year), should the company acquire the vehicle? Justify.

4. A software producer decided to launch a product developed abroad in our country. For this purpose, he has acquired the exclusive marketing rights by 750,000 m.u. Shortly after this irreversible investment had taken place, an unexpected increase in exploitation costs led him to review his estimates (all values in monetary units):
 - Initial Investments in Support Equipment for Sale of the Product: 1,200,000
 - number of years of sale of the product until its obsolescence: 5 years
 - Annual revenues from the sale of the product: 300 000 m.u.
 - Annual costs resulting from the sale of the product: 100 000 m.u.

- Residual value of equipment purchased: 450,000 m.u.

- Relevant interest rate: 5%

In your opinion, is it worth it or not to market this product? Explain, showing the calculations you had to resort to give your response.

5. Company "KST" is thinking of investing in the renewal of its image, and for this it is considering reinforcing marketing over the next two years. To this end, in addition to an initial investment worth 27,500 euros to redefine its image, it will increase its quarterly expenses on advertising in the amount of 10,000 euro, starting immediately, which are always paid at the beginning of each quarter. The monthly sales value goes from EUR 20,000 to 25,000 euros monthly, being received at the end of each month. The new marketing orientation leads to stopping the production of one of the old products, so the company will lose corresponding sales in the amount of 500 euros monthly (usually received at the end of each month). There is no residual value relative to the marketing effort performed. The annual interest rate is 2.5 percent over the next year and 3 percent in the remaining period.

a) Should company "KST" carry out this image renewal project?

(b) Concisely, define an alternative project evaluation criterion used to the one used in the previous paragraph.

6. A colleague of yours is thinking about opening a small business, and besides buying a small space, he also needs to immediately buy equipment worth 5,000 euros. It is estimated that the business has a 10-year life and should generate monthly revenues, at the end of each month, in the amount of 500 euros; Monthly costs amount to 250 euros. The relevant monthly interest rate is 0.25 percent during the first 5 years and 0.30 percent during the remaining period.

a) a first option to finance the purchase of the small space to develop the business came up after a visit to the usual bank, which makes the following proposal: acquisition through the loan "small credit", which will have to pay in 60 monthly, due at the beginning of each month and immediate start. The value associated with the sale of the small space, 10 years from now, is EUR 30,000.

What is the maximum value of the monthly benefit paying for the "small credit" loan so that the business is worth taking place?

(b) alternatively, a competing bank presents the "super soft credit": a loan, to purchase the small space, which can be paid in 120 monthly fees, due at the end of each month, in the amount of 75 euros each during the first 5 years, growing from there to the monthly rate of 7.0 percent. This loan offers the 5,000 euros required to purchase the equipment. Faced with this proposal, it was decided to examine the possibility of buying a store in its building, which will represent an increase in the condominium expenses of 25 euros / month for 35 euros / month. The said store has the sale value, at the cable of 10 years, from EUR 40,000.

Is it worth undertaking the project? Indicate what is the value of the store acquisition, that is, what is the amount of the loan "super soft credit"?

7. Suppose you should choose between two alternative equipment for a manufacturing unit. The first, involves an initial (immediate) investment of EUR 1 million, has a 6-year life, generates additional revenue for your company from 17,700 euros per month and has a monthly maintenance cost of 1,700 euros. The other, implies an initial investment of 2 million euros, generates additional revenue for your company from 17,700 euros per month, has a 12-year life, having no maintenance cost. Although analyzing other parameters that will appear in its descriptive report of this investment (to be delivered to the administration), its criterion of choice will only be exclusively that of the investment profitability. The residual value of these equipment is null and the relevant discount rate is 4% per year.
- Define "Capital Recovery Time". What is the time of capital recovery for each of these machines?
 - Define "Net present value". What is the NPV of each of these projects?
 - Define "equivalent annual value". What is the equivalent annual value of each of these projects?
 - If you have to opt for one of two, how would you compare the two solutions? I.E. What equipment would you choose to buy? Explain.
8. A company ponders to carry out two alternative projects. The first consists of the operation of a dam for hydroelectric ends for 40 years, predicting an initial investment in the amount of 3 000 m.u.. and a reinforcement of the investment in the amount of 2 000 m.u. At the end of the second year. It is estimated that this project generates an increase in quarterly revenue in the amount of 550 m.u., starting only at the end of the first year. On the other hand, annual costs should increase in 900 m.u. And there will be no costs in the last year of the project. The value of the project at the end of the useful life is 1 500 m.u. alternatively to the project described, there is the project to explore a new road track for 20 years. The initial investment associated with this project is 4 000 m.u. The residual value of the project is 500 m.u. .. The monthly revenues generated are 100 m.u. By the end of the first 10 years of the project and 150 euros in the next 10 years. Quarterly costs are constant throughout the life of the project, with a value of 300 m.u., and always paid at the end of the 2nd month of each quarter. The annual interest rate that carries in the next 40 years is 2 percent.
- Indicate how each project is evaluated using the NPV criterion (net present value).
 - To decide which of the projects is the most profitable, define and use the criterion of the annual equivalent value.
 - In addition, explain how to calculate the profitability index of the projects ($Val / (\text{updated value of investment expenses})$) and state under which circumstances this should be used.
 - An alternative criterion for comparison of projects is the time to capital. Define it (but do not calculate it!) And indicate two disadvantages of this measure.