**EVALUATION OF ALTERNATIVES: PRESENT WORTH, FUTURE WORTH AND CAPITALISED COST METHOD**

1. Tiger Machine tool company is considering a new metal-cutting machine. The required initial investment is $76,000 and the projected cash benefits over the projects 4year life are as follows.

|  |  |
| --- | --- |
| Period (n) | Net Cash Flow ($) |
| 1 | 35,560 |
| 2 | 37,360 |
| 3 | 31,850 |
| 4 | 34,400 |

You have been asked by the president of the company to evaluate the economic merit of the acquisition. The firms

MARR is known to be 12%.

1. Two devices are available to perform a necessary function for 3 years. The initial cost for each device at time 0 and subsequent annual savings, both in dollars, are shown in the following table. The required interest rate is 8 percent. Use PW method to advice on the better choice.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | 0 | 1 | 2 | 3 |
| Device A | 9,000 | 4,500 | 4,500 | 4,500 |
| Device B | 14,500 | 6,000 | 6,000 | 8,000 |

1. Assets A1 and A2 have the capability of the satisfactorily performing a required function. Asset A2 has an initial cost of $3200 and an expected salvage value of $400 at the end of its 4-year service life. Asset A1 costs $900 less initially, with an economic life of 1 year shorter than that of A2; but A1 has no salvage value, and its annual operating costs exceed of A2 by $250. When the required rate of return is 15 percent, state which alternative is preferred when comparison is by:
2. The LCM Method
3. A 2-year study period (assuming the assets are needed for only 2 years)
4. National Homebuilders, Inc., plans to purchase new cut-and-finish equipment. Two manufacturers offered the estimates below.



(a) Determine which vendor should be selected on the basis of a present worth comparison, if the MARR is 15%/ year.

(b) National Homebuilders has a standard practice of evaluating all options over a 5-year period. If a study period of 5

years is used and the salvage values are not expected to change, which vendor should be selected?

**PW method- Study Period Method**

1. A new rock pit will be operated for a construction project that will last 5 years. Rock can be loaded from an elevated box loader served by a conveyor from the pit or by mobile shovel loaders. The box loader and conveyor have an initial cost of Rs.2,64,000 and will have no salvage value at the end of the project.

Two shovel loaders each priced Rs.42,000 can provide the same capacity, but their operating costs together will be

Rs.36,000 per year more than the box loader. Normal service life for a shovel loader is 3 years with zero salvage

value, but a 2 year old machine can likely be sold for Rs.10,000. Which alternative is preferred when the interest

rate is 13%?

1. A British food distribution conglomerate purchased a Canadian food store chain for £75 million 3 years ago. There

was a net loss of £10 million at the end of year 1 of ownership. Net cash flow is increasing with an arithmetic gradient of £5 million per year starting the second year, and this pattern is expected to continue for the foreseeable future. This means that breakeven net cash flow was achieved this year. Because of the heavy debt financing used to purchase the Canadian chain, the international board of directors expects a MARR of 25% per year from any sale.

1. The British conglomerate has just been offered £159.5 million by a French company wishing to get a foothold in Canada. Use FW analysis to determine if the MARR will be realized at this selling price.
2. If the British conglomerate continues to own the chain, what selling price must be obtained at the end of 5 years of ownership to just make the MARR? **(FUTURE WORTH METHOD)**
3. Waste Management Company (WMC) has won a contract that requires the firm to remove radioactive material from government-owned property and transport it to a designated dumping site. This task requires a specially made ripper-bulldozer to dig and load the material onto a transportation vehicle. Approximately 400,000 tons of waste must be moved in a period of two years.
4. Model A costs $150,000 and has a life of 6,000 hours before it requires any major overhaul. Two units of Model A would be required to remove the material within two years, and the operating cost for each unit would run to $40,000/year for 2,000 hours of operation. At this operational rate, the model would be operable for three years, at the end of which time it is estimated that salvage value will be $25,000 for each machine.
5. A more efficient model B costs $240,000 each, has a life of 12,000 hours without any major overhaul, and costs $22,500 to operate for 2,000 hours per year to complete the job within two years. The estimated value of model B at the end of six years is $30,000. Once again, two units of model B would be required to remove the material within two years.

Assuming the firm's MARR is 15% which option would be acceptable?

1. The Smith Novelty Company, a mail-order firm, wants to install an automatic mailing system to handle product announcements and invoices. The firm has a choice between two different types of machines. The two machines are designed separately, but have identical capabilities and do exactly the same job. The $12,500 semiautomatic model A will last three years, while the fully automatic model B will cost $15,000 and last four years. The expected cash flows for the two machines, including maintenance, salvage value and tax effects, are as follows.

As business grows to a certain level, neither of the models may be able to handle the expanded volume at the end of year 5. If that happens, a fully computerized mail-order system will need to be installed to handle the increased business volume. In the scenario presented, which model should the firm select at MARR = 15%

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *n* | Model A |  | Model B |  |
| 1 | -5,000 |  | -4,000 |  |
| 2 | -5,000 |  | -4,000 |  |
| 3 | -5,000 | **+2,000** | -4,000 |  |
| 4 |  |  | -4,000 | **+1,500** |
| 5 Analysis period | | | | |

1. The family-operated Foothill Ranching Company (FRC) owns the mineral rights to land used for growing grain and grazing cattle. Recently oil was discovered in this property. The family has decided to extract oil, sell the land, and retire. The company can lease necessary equipment and extract and sell the oil itself, or it can lease the land to an oil-drilling company.

* Drill option: If the company chooses to drill, it would require $300,000 leasing expenses up front, but the net annual cash flow after taxes from drilling operations will be $600,000 at the end of each year for next five years. The company can sell the land for a net cash flow of $1,000,000 in five years, when the oil is depleted.
* Lease option: If the company chooses to lease, the drilling company can extract all the oil in only three years and FRC can sell the land for a net cash flow of $800,000 at that time. (the difference in resale value of land is due to the increasing rate of land appreciation anticipated for this property.) The net cash flow from the lease payments to FRC will be $630,000 at the *beginning* of each of the next three years.

Which option should the firm select at *i* = 15%

1. A food beverage company is planning expansion of its cold storage facility. Three alternative site design proposals are being considered that uses an interest rate of 10%. Plan A and B require an expenditure of Rs.35,00,000 for land and which will retain its value in 10 years, while plan C requires Rs.45,00,000 for land, which will also retain its value in 10 years. The estimated income increase due to facility available is annualized at Rs.24,80,000 per year. The company requires that a life of 10 years be used for analysis. Data pertaining to the project are given below,

|  |  |  |  |
| --- | --- | --- | --- |
| **In Rs.** | **Proposal A** | **Proposal B** | **Proposal C** |
| Building and installation | 60,00,000 | 70,00,000 | 40,00,000 |
| Compressor | 10,00,000 | 13,50,000 | 8,50,000 |
| Expected energy cost 1 year | 6,50,000 | 4,80,000 | 6,50,000 |
| Energy cost increase for each additional year | 30,000 | 20,000 | 35,000 |
| Annual maintenance cost | 2,00,000 | 1,50,000 | 5,00,000 |
| Estimated salvage value | 3,50,000 | 4,30,000 | 1,80,000 |

1. Two types of power converter Alpha and Beta are under consideration for a particular application. An economic comparison is to be made at an interest rate of 10%. Following cost estimation has been obtained. Determine the annual equivalent costs of the two systems.

|  |  |  |
| --- | --- | --- |
| **Cost Particular (in Rs.)** | **Alpha** | **Beta** |
| Purchase price | 10,000 | 25,000 |
| Estimated service life | 5 years | 9 years |
| Salvage value | 3,000 | 5,000 |
| Annual operating costs | 2,500 | 1,200 |

1. A consulting firm proposes to provide “self-inspection” training for clerks who work with insurance claims. The program lasts one year, costs Rs. 20,000 per month, and professes to improve quality while reducing clerical time. A potential user of the program estimates that savings in the first month should amount to Rs. 8000 and should increase by Rs. 4000 per month for the rest of the year. However. Operational confusion and work interference are expected to boost clerical costs by Rs.12,000 the first month but this amount should subsequently decline in equal increments at the rate of Rs.1000 per month. If the required rate of return on money is 12% compounded monthly and there is a stipulation that the program must pay for itself within 1 year, should the consultant be hired.
2. A company engaging is selling of laboratory equipment estimates that profit from sales should increase by Rs.2,00,000 per year if a mobile demonstration unit is built. A large unit with sleeping accommodation for the driver will cost Rs. 9,70,000 while a smaller unit without sleeping cabin will be Rs. 6,30,000. Salvage values for the large and small units after 5 years will be, Rs.97,000 and Rs.35000 respectively. Lodging costs saved by the larger unit should amount Rs. 1,10,000 annually, but its transportation costs will exceed those of the smaller unit by 31,000. With the money at 9% should a mobile demonstration unit be built? And if so which size is preferable?
3. Conventional agricultural equipment has a service life of 6 years. Newly designed equipment is 50% costlier than the conventional one but has more advantages. The operating costs of both this equipment are almost same and salvage value is negligible. What will be the service life of the new equipment that makes its costs comparable to that of the conventional one at i=10%?
4. Two machines model A and B perform the same function. Type A machine has a low initial cost of Rs. 95000, relatively high operating cost of Rs.19,000 per year more than those of type B machine, and a short life of 4 years. Type B machine costs Rs. 2,51,000 and can be used for 8 years. The scarp value from either machine at the end of the life will barely cover its removal cost. Which is preferred when the minimum attractive rate of return is 8%?
5. Suppose in same numerical, If machine A will produce refinements within 4 years with the availability of a modified one at a cost of Rs. 1,15,000 but reducing the operating costs to Rs.4000, then find the annual worth?

Note: If the future conditions can be estimated in confidence, excluding inflation then alternative has to be compared

considering these.

**CAPITALIZED COST METHOD:**

1. How much money should the college collect in donation in order to pay annual student scholarships worth $5 million perpetually? i = 4%
2. A $500,000 gift was received by a city for the construction and continued upkeep of a music shell. Annual maintenance for the shell is estimated at $15,000. In addition, $25000 will be needed every 10 years for painting and major repairs. How much will be left for the initial construction costs, after funds are allocated for perpetual upkeep? i=6%
3. A city has developed a plan to provide for future water needs. 2 alternatives are being considered. The first proposes to build a full capacity tunnel now for $556,000. The second proposes to build a half capacity tunnel now at $402,000 which is adequate for 20 years and then build a second parallel half capacity tunnel at the same cost. The maintenance for the full capacity tunnel is $40,000 every 10 years and each half capacity tunnel is $32000 every 10 years. The estimated additional costs in single half capacity tunnel (due to friction losses) is $2000 per year. Based on capitalized cost and a 7% interest rate, which alternative should be selected.
4. The Haverty County Transportation Authority (HCTA) has just installed new software to charge and track toll fees. The director wants to know the total equivalent cost of all future costs incurred to purchase the software system. If the new system will be used for the indefinite future. The system has an installed cost of $150,000 and an additional cost of $50,000 after 10 years. The annual software maintenance contract cost is $5000 for the first 4 years and $8000 thereafter. In addition, there is expected to be a recurring major upgrade cost of $15,000 every 13 years. Assume that *i* =5% per year for county funds. Find: (a*)* Capitalized cost and (b*)* for each year hereafter, an AW value.

**Additional:**

1. The property appraisal district for Marin County has just installed new software to track residential market values for property tax computations. The manager wants to know the total equivalent cost of all future costs incurred when the three county judges agreed to purchase the software system. If the new system will be used for indefinite future, find the equivalent value *(a)* now and *(b)* for each year hereafter. The system has an installed cost of $150,000 and an additional cost of $50,000 after 10 years. The annual software maintenance contract cost is $5000 for the first 4 years and $8000 thereafter. In addition, there is expected to be a recurring major upgrade cost of $15,000 every 13 years. Assume that i = 5% per year for county funds.