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| Lesson 2  Index  Cost of item in year n =Cost of item in year k(Index for year n/Index for year k)  Power Sizing Technique  Cost of A = Cost of B(Size of A/Size of B)^Cost-Capacity factor  Top-down (target costing) approach  Target cost of product = Price / (1 + m)  Where m = profit margin  Bottom-up (cost-based) approach  Selling price = Total unit product cost + Profit Margin  Learning Curve Model  Ku^log s / log 2  K=quantity needed to produce first unit  u=unit number  s= learning curve parameter in decimal |
| Lesson 3  Simple interest  Total Interest = ( P ) ( N ) ( i )  Total Amount accumulated = P(1+Ni)  P = principal amount lent or borrowed  N = number of interest periods ( e.g. years, months, etc.)  i = interest rate per interest period  Compound Interest  Interest for the year = i\*P(1+i)^N-1  Total Amount Accumulated = P(1+i)^N  F = Total amount of money accumulated  P = principal amount lent or borrowed  N = number of interest periods ( e.g. years , months, etc.)  i = interest rate per interest period |
| Lesson 4  Ieff = (1+r/M)^M-1  i eff = effective annual interest rate  r = nominal interest rate per year  M = number of compounding periods per year  r/M = interest rate per interest period  Interest Factor Formulas  P= F(1/(1+i)^N)  F= P(1+i)^N  P=A((1+i)^N-1/i(1+i)^N)  Present Value at Year 0  = 1\*(P/F, i%,N)  Future Value at Year 1  =1\*(F/P, i%, N) |
| Lesson 5  Return on Investment = (Gain from Investment – Cost of Investment)/ Cost of Investment  Capital Recovery(i%) = I(A/P,i%,N)-S(A/F,i%, N)  I = Initial investment for the project  S = Salvage (market) value at the end of the study period  i= MARR  Present Worth Method:  PW(15%) = - $12K+ $3K[P/A,15%,5] + $1.5K[P/F,15%,5]  = -$1198 < 0 Reject the project  Future Worth Method:  FW(15%) = - $12K[F/P,15%,5]+ $3K[F/A,15%,5] + $1.5K  = -$2409 < 0 Reject the project  Annual Worth Method:  AW (15%) = - $12K[A/P,15%,5]+ $3K+ $1.5K[A/F,15%,5]  = -$357 < 0 Reject the project |
| Lesson 6  If i’ > MARR, the alternative is acceptable  If i’ = MARR, Indifference towards the alternative  If i’< MARR, the alternative is not acceptable  IRR Linear Interpolation  NPW(18%) = -9,000 + 3000 (P/A, 18%, 4) + 2000 (P/F, 18%, 4) = 101.76  NPW(19%) = -9,000 + 3000 (P/A, 19%, 4) + 2000 (P/F, 19%, 4) = -86.91  (0-101.76)/(IRR%-18%)= (101.76-(-86.91))/(18%-19%)  IRR%= (0-101.76)/ (101.76-(-86.91))/(18%-19%) +18%  ERR    Equivalent Present Worth of All Net Expenditure or net cash outflow  = 620,000 + 40,000(P/F,16%,5)  Equivalent Future Worth of All Net Revenue or net cash inflow  = 370,000(F/P,16%,6) + 370,000(F/P,16%,5)  690(F/P, i’%, 7) = 2728  690\*(1+i’)7 = 2728  I= SQRT^7((2728/690))-1  Since the rate of return, ERR (21.68%) is more than MARR (18%), the project is economically  feasible to invest in. |
| Lesson 7:  Payback Period  Based on shorter payback criterion, UltraZ will be better.  Equivalent Worth  Based on net present worth criterion, FormX will be better.  Present Worth of Cash flow @ i = 0%  Year 0 =  Year 1=  Year 2  Present Worth of Cash flow @ i = 2%  Year 0 = 1700  Year 1 = 1700(P/F, i%, N)  Year 2 =  Cumulative Present Worth @ i=2%  Year 1 =  Year 2 =  Year 3 = |
| Lesson 8:  The study period is. Should use the co-terminated assumption. The study period(years) is more or less than alternatives’ lives(years).  The study period is. Should use the repeatability assumption. The study period(years) period must be infinite or a common multiple of all the alternatives’ lives(years). |
| Lesson 9:  PW(Benefit)=$3.6M (P/A,3.5%,60) = $89.8 million  PW(Disbenefit)=$  PW(Capital)=$72 million  PW(Operation Cost)=$0.35M (P/A,3.5%,60) = $8.73 million  Conventional B/C Ratio:  [PW(Benefit)-PW(Disbenefit)]/[PW(Capital)+PW(Operation Cost)]  Modified B/C Ratio:  [PW(Benefit)-PW(Disbenefit) -PW(Operation Cost)]]/[PW(Capital)]  Incremental B/C Ratio  Calculate costs (millions)  o PW(Costs, Project A) = $72M + 0.35M(P/A,3.5%,60) = $80.73M  o PW(Costs, Project B) = $99M + 0.51M(P/A,3.5%,60) = $111.72M  (Since.. is the Least cost project, it is chosen as the baseline )  Calculate benefit (millions)  o PW(Benefit, Project A) = $3.6M(P/A,3.5%,60) = $89.8M  o PW(Benefit, Project B) = $5.2M(P/A,3.5%,60) = $129.71M  Check if .. as Baseline is feasible  Conventional B/C Ratio:  [PW(Benefit)-PW(Disbenefit)]/[PW(Capital)+PW(Operation Cost)] = > 1. It is economically viable.  Rank the Alternatives by Increasing nEquivalence Worth of Cost (PW)  Lowest Cost to Highest Cost  • Project D, Project A, Project B, Project C  . Compare Project A with Project D(baseline)  [PW(A’s Benefit) - PW(D’s Benefit)]/ [PW(A’s Cost) - PW(D’s Cost)]  = <1 Reject Project A, keep Project D as baseline.= >1 Accept Project D as new baseline. |
| Lesson 10:  Straight Line Depreciation  Annual depreciation amount  = [(Cost Basis or Initial Investment – Estimated Salvage Value)/ Useful Life]  Book value at the end of year N  = Cost Basis or Initial Investment – (N\* Annual depreciation amount)  Declining Balance Depreciation  R =DB Percentage(Given)/Useful Life  Depreciation amount for year N  = R\* Cost Basis or Initial Investment\*(1-R)^(N-1)  Book value at the end year of N  = Cost Basis or Initial Investment\*(1-R)^(N)    Lesson 11:  After-Tax MARR = Before-Tax MARR/(1- Income Tax Rate)  (A) Expenses :  – Year 0: Patent cost + Equipment/Machine cost  – Year 1-6: No. of Motorcycles \* Manufacturing Cost per motorcycle  (B) Gross Income : No. of Motorcycles\* Sales Price per motorcycle  (C) Before Tax Cash Flow (BTCF) : Gross Income – Expenses  (D) Write Down Allowance, (See Below)  (E) Taxable Income : BTCF – Write Down Allowances  (F) Income Tax : Taxable Income \* Income Tax Rate (17%)  (G) ATCF : BTCF – Income Tax  (H) Present Worth (PW): ATCF\*(P/F, After-tax MARR, N)    Write-down allowance for intellectual property rights  (Singapore Income Tax Act Section 19B)  = 20% each year for a period of 5 years(intellectual property rights expense at year 0)  = $1,000,000 \* 20%  = $200,000    Write-down allowances over 3 years for machinery and plant  (Singapore Income Tax Act Section 19A)  1  • Year 1 : 1/3 \* 30,000,000 = $10,000,000  • Year 2 : 1/3 \* 30,000,000 = $10,000,000  • Year 3 : 1/3 \* 30,000,000 = $10,000,000 |
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