

## TIM 105/205, LECTURE #17 (11/21/13)

Agenda:

1. Review of Product strategy
  - Product platform strategy
  - Product line strategy(emulate INTEL as "best practice")
2. Financial modeling for product development
  - Discounted cash flows (DCFs)
  - Present Value, Net Present Value (NPV)
3. PROJECT
  - All major parts of the project must be completed by Tuesday, 11/26
  - end-game
4. HW#8 (final homework for the course)
5. Return graded HW#6 to you
6. Collect HW #7

## Financial modeling for product development projects :

1. Create a base-case (nominal) financial model (in EXCEL)

(a) Estimate the timing and magnitude of all relevant cash flows:

- Development (concept, prototyping, ...)
- Manufacturing (Production)
- Ramp-up costs (from dev to manuf.)
- Marketing and support costs
- Sales Revenue

(b) For each quarter, determine the net cash-flow

Example: Year 3, quarter 1

Marketing: - \$250,000

Production: - \$2,000,000

Sales Revenue: + \$4,000,000

Net cash flow } = \$1,750,000  
for YR3, Qtr1

(2x4+1) → Qtr 9

(c) Compute the present value of the net cash flow for each quarter

$d \triangleq$  annual discount factor (%)  
Typically  $10\% < d < 15\%$

Quarterly discount factor =  $\frac{d}{4}$  (%)

(1)  $\leftarrow$  Present value of a future cash flow,  $P_1 = \frac{F_n}{\left(1 + \frac{d}{4}\right)^{n-1}}$

↑  
present

$F_n \triangleq$  future cash flow in Quarter  $n$

$P_1 \triangleq$  the present value of  $F_n$

$d =$  annual discount factor

All cash flows in eqn. (1) are on a quarterly basis

Net cash flow  
for R.3, Qtr 1 ( $\equiv$  Qtr 9) = \$1,750,000

Using eqn(1), the  
present value of this  
cash flow } =  $\frac{\$1,750,000}{(1+0.025)^{9-1}}$

$$d \triangleq 10\% = 0.10$$

$$\frac{d}{4} = 2.5\% = 0.025$$

$$= \frac{\$1,750,000}{(1.025)^8}$$

$$= \$1,436,000$$

(d) Add up the present value for  
each quarter to obtain the net  
present value (NPV)

- Cash flow analysis is typically  
performed for a time-horizon of  
3-5 years  $\Rightarrow$  12-20 quarters

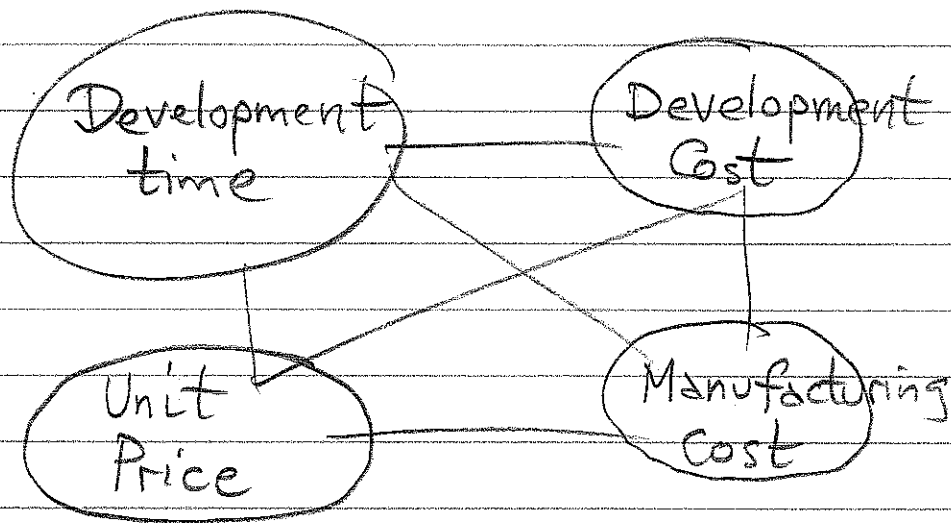
- Net Present Value = Present Value (Qtr 1)  
+ PV(Qtr 2) +  
..... PV(Qtr n)

$$NPV = \sum_{i=1}^n \text{Present Value (Qtr } i)$$

$\uparrow$   
present

Net Present Value is the expected profit over the time-horizon (n quarters) of the financial analysis

2. Perform a sensitivity analysis on the nominal (base case) model (in step 1) to understand the effect of changing the input parameters in the financial model :



3. Use the sensitivity analysis (in step 2) to understand & quantify the trade-offs between development time, dev and manf costs, and price
4. Consider the effect of changing more qualitative factors in the micro-economy (changing the discount factor)

## Basic Reference:

Chapter on "Product Development Economics"  
in the text, U&E, PD&D

Case Study: product development & commercialization of a Polaroid photo printer

Prescription for your project (by Tuesday)  
11/26

- Create the spread-sheets to perform the Polaroid product financial model [base-case]

→ do all calculations in EXCEL

- Check your base-case results against the result in the text

Key step { - Create a process for obtaining the relevant cash flows (TEAM Problem Solving)

- Perform the cash flow analysis for your project