

Profit Models

1

Outline

- Basic Profit Model
- Influence Diagram
- Simon's Pie Case
- Spreadsheet Modeling

2

Basic Profit Model

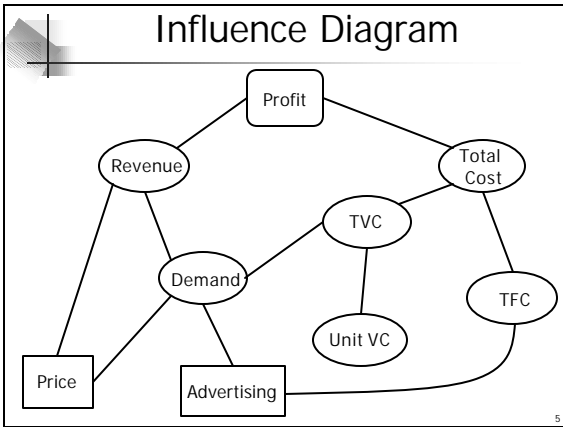
<ul style="list-style-type: none"> ■ Selling Price (SP) ■ Quantity (Q) <ul style="list-style-type: none"> ■ Sales volume ■ Production volume ■ Demand (D) ■ Revenue ■ Profit 	<ul style="list-style-type: none"> ■ Cost <ul style="list-style-type: none"> ■ Overhead cost ■ Sunk cost ■ Fixed cost (FC) ■ Variable cost (VC) ■ Total cost (TC) ■ Breakeven point ■ Crossover point
--	--

3

Basic Profit Model

- Profit Model
 - Profit = Revenue – Total Cost
 - Profit = SP*Q – (FC + VC*Q)
- Break-even point
 - Revenue = Total Cost
 - $Q = FC / (SP - VC)$
- Crossover Point
 - Total Cost of process A = Total Cost of Process B
 - $Q = (FC_A - FC_B) / (VC_B - VC_A)$

4



Simon's Pie Case

Step 1 : Study Environment

- Two ingredients combined to make apple pies: fruit and frozen dough
- The pies are then processed and sold to a local grocery in order to generate profit
- Diagnose problem and organize facts:
 - Need for immediate profit on apple pies
 - Apple pie characteristics: size, ingredients, quality, and the wholesale price
- Frame management situation
 - Critical decision: setting the "right" wholesale pie price in order to generate maximum profit
 - Setting the "best" pie price together with the cost structure will determine profit

6

Simon's Pie Case

Step 2: Model Formulation

- Create a selective representation of reality
 - Revenue based on
 - Apple pie wholesale price
 - Demand by local grocery stores
 - Costs based on
 - Ingredients (material) costs
 - Processing (labor) costs
 - Rent, utilities, loan payments, etc..
- Simplifying assumptions
 - Demand independent of wholesale pie price

Simon's Pie Case

Step 2: Model Formulation

- Identify decisions and objectives
 - Decision variable: price of the apple pies
 - Objective: maximize profit
 - Parameters: unit processing cost, unit ingredient costs, and fixed costs
- Conceptually formulate the model

Pie Price =====

Unit Cost, Filling =====

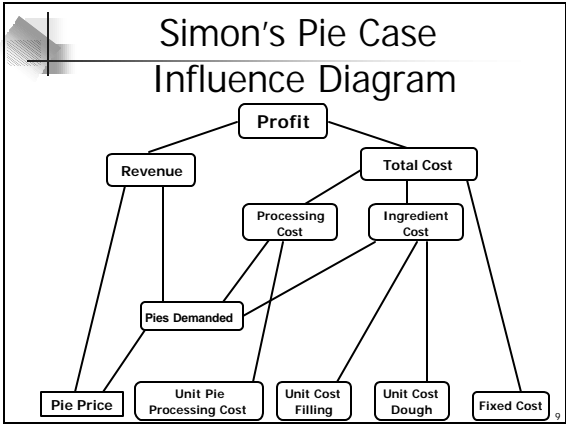
Unit Cost, Dough =====

Unit Pie Processing Cost =====

Fixed Cost =====

Model

Profit ----->



Simon's Pie Case

Step 3: Model Construction

- Construct a symbolic model
 - Profit = Revenue – Total Cost
 - Revenue = Pie Price * Pies Demanded
 - Total Cost = Processing Cost + Ingredients Cost + Fixed Cost
 - Processing Cost = Pies Demanded * Unit Pie Processing Cost
 - Ingredients Cost = Pies Demanded * (Unit Filling Cost + Unit Dough Cost)

Spreadsheet Modeling

- Simon's Pie case base model
 - Independent demand
 - Dependent demand
 - How much can Simon realistically increase the pie price?
 - For each additional dollar Simon charges per pie, he estimates losing some demand
 - At some pie price, grocery stores would not buy from Simon at all (no demand)
 - Sensitivity ("what-if") analysis
 - How do "small" changes in apple pie price affect demand and profit?
 - Excel's Data Table function

Spreadsheet Modeling

- Simon's Pie base model validation
 - Model validation on processing cost
- Simon's Pie expanded model
 - Four different types of pies
 - Set the apple pie price
 - All the other pie prices directly related to apple
 - Product contribution margin and combined overhead cost
 - Model validation on processing capacity and overtime
 - Sensitivity ("what-if") analysis
 - How do "small" changes in apple pie price and capacity affect the profit?
