

Costs in Aggregate Planning

Usually all these costs are assumed to be linear.

1. Smoothing Costs. Mainly cost of changing size of the work force

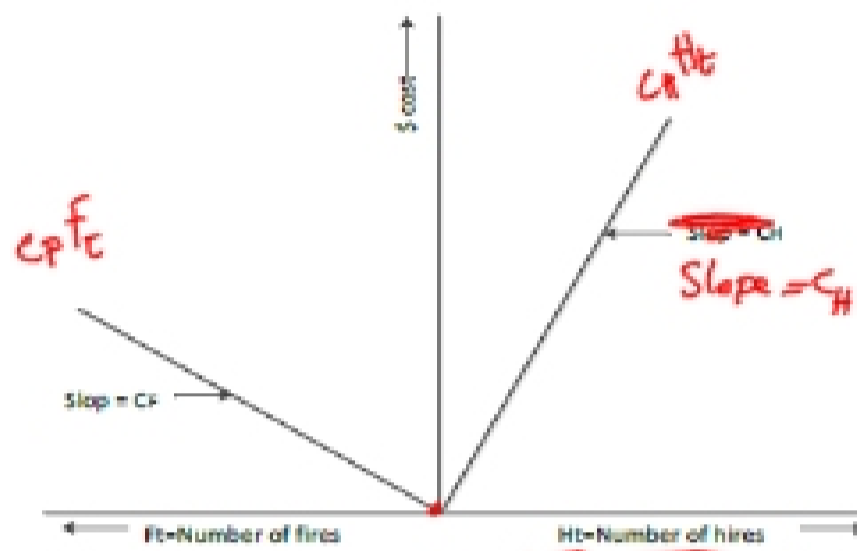


FIGURE 3.1 Cost of changing the size of the workforce

$$\frac{w_1}{C_H H_t}$$

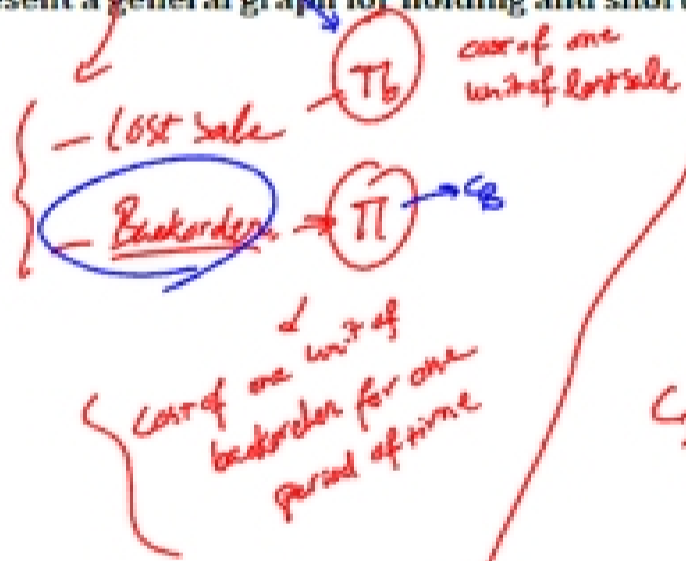
$$\frac{w_1}{C_H H_t} \frac{w_2}{w_2}$$

$$\frac{w_1}{C_H H_t} \frac{w_2}{w_2}$$

2. Holding Costs. Primary component: opportunity cost of the tied up capital

3. Shortage Costs. Cost of demand exceeding available products.

Present a general graph for holding and shortage cost

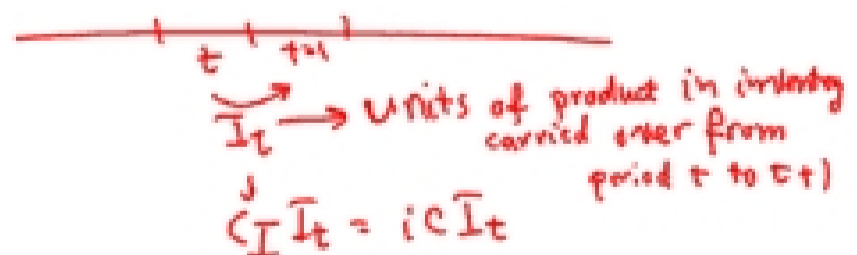


\$ C = 10
i = 20%
C_I = iC = \$2

value ↑
C = cost of one unit of product
C_I = C = cost of holding one unit of product in inventory for one unit of time
holding cost percentage

- (lost interest that could be earned on capital)
- opportunity cost
- Warehousing
- Loss of product
- Breakage/theft/obsolescence
- insurance

inventory cost = $C_I \bar{I}_t$



- 4. ^{worked} Regular time cost
- 5. Overtime and subcontracting cost.
- 6. Idle time costs → may be taken care of indirectly by paying permanent employees while no production is happening

Aggregate Planning Example

"Find Production and Workforce Levels for Each Month"



- The hard disc drive plant
- Forecasted demands for Jan-Jun: D_1, D_2, \dots, D_6 1280, 640, 900, 1200, 2000, 1400.
- Starting inventory at the end of December is 500. Starting workforce is 300.
- The firm would like to have 600 units on hand at the end of June.
- Cost of hiring one worker = \$500 $\rightarrow C_H$
- Cost of firing one worker = \$1000 $\rightarrow C_F$
- Cost of holding one unit of inventory for one month = \$80 $\rightarrow C_I$

Forecast

Total Demand is a fixed number and the cost of production is simply $C \sum_{t=1}^6 d_t$
unit production cost

K = number of aggregate units produced by one worker in one day

In the past over 22 working days with workforce level of 76 workers, 245 hard discs have been produced. What is K ?

$$K = \frac{245}{(76)(22)} = \dots$$