# **Aggregate Planning Methods**

## Graphical & charting techniques

- Popular & easy-to-understand
- Trial & error approach

### Mathematical approaches

- Transportation method
- Linear decision rule
- Management coefficients model
- Linear Programming
- Simulation

## The Graphical Approach to Aggregate Planning

- Forecast the demand for each period
- Determine the capacity for regular time, overtime, and subcontracting, for each period
- Determine the labor costs, hiring and firing costs, and inventory holding costs
- Consider company policies which may apply to the workers or to stock levels
- Develop alternative plans, and examine their total costs

Data for a 6-month production planning problem is given below:

Month	Working Days	Demand per day
Jan	22	41
Feb	18	40
Mar	21	39
Apr	21	57
May	22	68
Jun	20	54

Suppose, *"chase strategy"* is to be adopted. Two workers are required to produce one unit. Propose a feasible plan. Is the plan acceptable?



Employ an exact number of workers so that number of units produced per month is equal to number of units demanded

### Work Force Requirements & Changes/Month

Month	Days/ month	Demand/ day	Units/ month	Workers/ month	Change/ month
Jan	22	41	902	1804	0
Feb	18	40	720	1440	-364
Mar	21	39	819	1638	198
Apr	21	57	1197	2394	756
Мау	22	68	1496	2992	598
Jun	20	54	1080	2160	-832



### Beginning Work Force Level = 1700 workers



Abrupt Employment (hiring) and Layoff from job (firing) at mass-scale is not acceptable (why)?

### Consider 6-month production planning problem once again.

Month	Working Days	Demand per day
Jan	22	41
Feb	18	40
Mar	21	39
Apr	21	57
May	22	68
Jun	20	54

Suppose, *"level strategy"* is to be adopted. Find a constant production rate so that no shortage occurs



To find daily production rate so that no shortage occurs;

Divide total demand by total number of days.

Production rate = 6214/124 = 50 units (app)

## **Forecast and Average Forecast Demand**





### Inventory is accumulated

Because Demand < Production during Jan, Feb, Mar.

Month	Working Days	Demand per day	Production per day	Inventory (+/-)	Cumm Inventory
Jan	22	41	50	198	198
Feb	18	40	50	180	378
Mar	21	39	50	231	609
Apr	21	57	50	-147	462
May	22	68	50	-396	66
Jun	20	54	50	-80	-14



### Shortage Created

Because

demand> Production

in Apr, May and Jun

Month	Working Days	Demand per day	Production per day	Inventory (+/-)	Cumm Inventory
Jan	22	41	50	198	198
Feb	18	40	50	180	378
Mar	21	39	50	231	609
Apr	21	57	50	<b>-147</b>	462
May	22	68	50	-396	66
Jun	20	54	50	-80	-14



### **Cumulative Inventory**

This inventory shows the overall total inventory at the end of each period

	Month	Working Days	Demand per day	Production per day	Inventory (+/-)	Cumm Inventory
	Jan	22	41	50	198	198
ĺ	Feb	18	40	50	180	378
ĺ	Mar	21	39	50	231	609
	Apr	21	57	50	-147	462
	May	22	68	50	-396	66
	Jun	20	54	50	-80	-14

## **Cumulative Production & Demand Graph**

The region between production line and demand line shows inventory.



# **Cumulative Demand Graph for Plan 1**

