

FE 422 FOOD PRODUCTION MANAGEMENT

Aggregate Planning



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Aggregate Planning

- Aggregate planning is an operational activity that does an aggregate plan for the production process, in advance of 2 to 18 months, to give an idea to management as to what quantity of materials and other resources are to be procured and when, so that the total cost of operations of the organization is kept to the minimum over that period..
- The quantity of outsourcing, subcontracting of items, overtime of labour, numbers to be hired and fired in each period and the amount of inventory to be held in stock and to be backlogged for each period are decided. All of these activities are done within the framework of the company ethics, policies, and long term commitment to the society, community and the country of operation.

Operations Planning Overview

- Long-range planning
 - Greater than one year planning horizon
 - Usually with yearly increments
- Intermediate-range planning
 - Six to eighteen months
 - Usually with monthly or quarterly increments
- Short-range planning
 - One day to less than six months
 - Usually with weekly increments

Exhibit 12.1

Long-range

Strategic Planning

Sales Planning

Intermediate-range

Aggregate Planning

Manufacturing

Master Production Scheduling

Material Requirements Planning

Order Scheduling

Services

Weekly Workforce & Customer Scheduling

Daily Workforce & Customer Scheduling

Short-range

Aggregate Planning

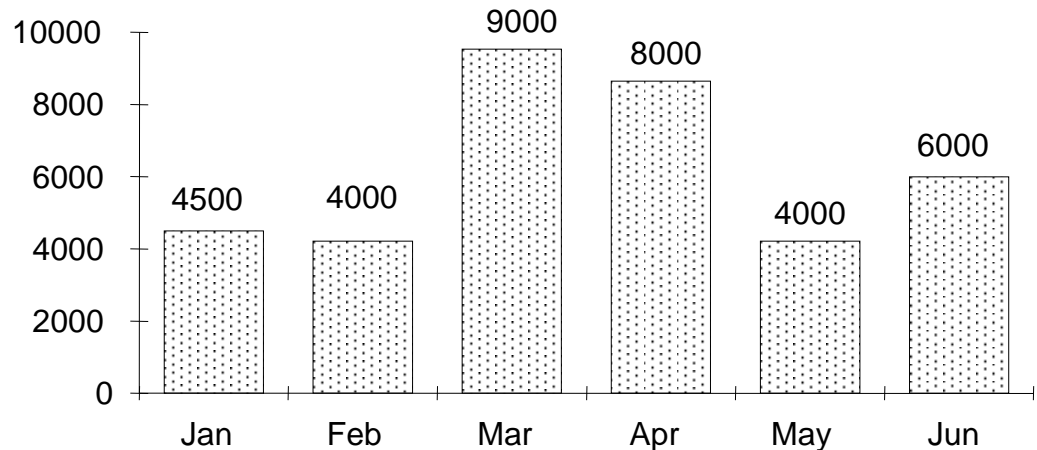
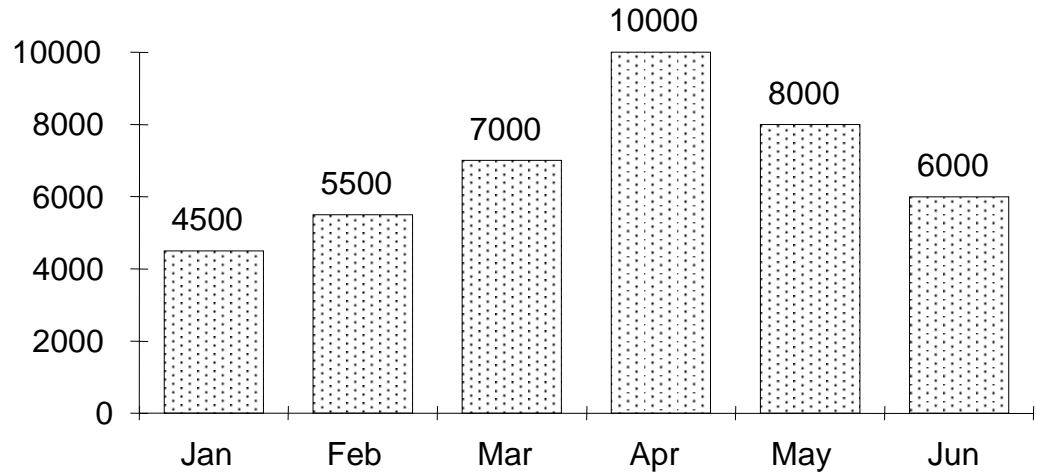
- Goal: Specify the optimal combination of
 - production rate (units completed per unit of time)
 - workforce level (number of workers)
 - inventory on hand (inventory carried from previous period)
- Product group or broad category (Aggregation)
- Intermediate-range planning period: 6-18 months

Balancing Aggregate Demand and Aggregate Production Capacity

Suppose the figure to the right represents forecast demand in units.

Now suppose this lower figure represents the aggregate capacity of the company to meet demand.

What we want to do is balance out the production rate, workforce levels, and inventory to make these figures match up.



Aggregate Planning Examples: Unit Demand and Cost Data

Suppose we have the following unit demand and cost information:

Demand/mo	Jan	Feb	Mar	Apr	May	Jun
	4500	5500	7000	10000	8000	6000

Materials					\$5/unit	
Holding costs					\$1/unit per mo.	
Marginal cost of stockout					\$1.25/unit per mo.	
Hiring and training cost					\$200/worker	
Layoff costs					\$250/worker	
Labor hours required					15 hrs/unit	
Straight time labor cost					\$8/hour	
Beginning inventory					250 units	
Productive hours/worker/day					7.25	
Paid straight hrs/day					8	

Cut-and-Try Example: Determining Straight Labor Costs and Output

Given the demand and cost information below, what are the aggregate hours/worker/month, units/worker, and dollars/worker?

Demand/mo	Jan	Feb	Mar	Apr	May	Jun	7.25x22
	4500	5500	7000	10000	8000	6000	

Productive hours/worker/day 7.25

Paid straight hrs/day 8

$7.25 \times 0.15 = 48.33$ &
 $84.33 \times 22 = 1063.33$

$22 \times 8 \text{ hrs} \times \$8 = \$1408$

	Jan	Feb	Mar	Apr	May	Jun
Days/mo	22	19	21	21	22	20
Hrs/worker/mo	159.5	137.75	152.25	152.25	159.5	145
Units/worker	1063.33	918.33	1015	1015	1063.33	966.67
\$/worker	\$1,408	1,216	1,344	1,344	1,408	1,280

Chase Strategy (Hiring & Firing to meet demand)

	Jan
Days/mo	22
Hrs/worker/mo	159.5
Units/worker	1,063.33
\$/worker	\$1,408
	Jan
Demand	4,500
Beg. inv.	250
Net req.	4,250
Req. workers	3.997
Hired	
Fired	3
Workforce	4
Ending inventory	0

Lets assume our current workforce is 7 workers.

First, calculate net requirements for production, or $4500 - 250 = 4250$ units

Then, calculate number of workers needed to produce the net requirements, or $4250 / 1063.33 = 3.997$ or 4 workers

Finally, determine the number of workers to hire/fire. In this case we only need 4 workers, we have 7, so 3 can be fired.

Below are the complete calculations for the remaining months in the six month planning horizon.

	Jan	Feb	Mar	Apr	May	Jun
Days/mo	22	19	21	21	22	20
Hrs/worker/mo	159.5	137.75	152.25	152.25	159.5	145
Units/worker	1,063	918	1,015	1,015	1,063	967
\$/worker	\$1,408	1,216	1,344	1,344	1,408	1,280
	Jan	Feb	Mar	Apr	May	Jun
Demand	4,500	5,500	7,000	10,000	8,000	6,000
Beg. inv.	250					
Net req.	4,250	5,500	7,000	10,000	8,000	6,000
Req. workers	3.997	5.989	6.897	9.852	7.524	6.207
Hired		2	1	3		
Fired	3				2	1
Workforce	4	6	7	10	8	7
Ending inventory	0	0	0	0	0	0

Level Workforce Strategy (Surplus and Shortage Allowed)

Lets take the same problem as before but this time use the Level Workforce strategy.

This time we will seek to use a workforce level of 6 workers.

	Jan
Demand	4,500
Beg. inv.	250
Net req.	4,250
Workers	6
Production	6,380
Ending inventory	2,130
Surplus	2,130
Shortage	

Below are the complete calculations for the remaining months in the six month planning horizon.

	Jan	Feb	Mar	Apr	May	Jun
Demand	4,500	5,500	7,000	10,000	8,000	6,000
Beg. inv.	250	2,130	2,140	1,230	-2,680	-1,300
Net req.	4,250	3,370	4,860	8,770	10,680	7,300
Workers	6	6	6	6	6	6
Production	6,380	5,510	6,090	6,090	6,380	5,800
Ending inventory	2,130	2,140	1,230	-2,680	-1,300	-1,500
Surplus	2,130	2,140	1,230			
Shortage				2,680	1,300	1,500

Note, if we recalculate this sheet with 7 workers we would have a surplus.

Below are the complete calculations for the remaining months in the six month planning horizon with the other costs included.

Jan	Feb	Mar	Apr	May	Jun		
4,500	5,500	7,000	10,000	8,000	6,000		
250	2,130	10	-910	-3,910	-1,620		
4,250	3,370	4,860	8,770	10,680	7,300		
6	6	6	6	6	6		
6,380	5,510	6,090	6,090	6,380	5,800		
2,130	2,140	1,230	-2,680	-1,300	-1,500		
2,130	2,140	1,230					
			2,680	1,300	1,500		
Jan	Feb	Mar	Apr	May	Jun		Labor
\$8,448	\$7,296	\$8,064	\$8,064	\$8,448	\$7,680	\$48,000.00	Material
31,900	27,550	30,450	30,450	31,900	29,000	181,250.00	Storage
2,130	2,140	1,230				5,500.00	Stockout
			3,350	1,625	1,875	6,850.00	
						\$241,600.00	

Note, the total costs under this strategy are less than under Chase.