Aggregate Planning

Supply Chain Decisions

- Strategic Level
  - Long Term
    - Corporate objectives
    - Capacity/Facilities
    - Markets to operate
    - Location
    - Resources
  - Medium Term
    - Aggregate planning
    - Resource allocation
    - Capacity allocation
    - Distribution
    - Inventory management
  - Near Term
    - Shop floor scheduling
    - Delivery scheduling
    - Truck routing

- Tactical

- Operational
AGGREGATE PLANNING

- Deciding on the level of capacity (e.g., physical capacity or labor) of a firm and on how to readjust that capacity to respond to changing demand conditions.
- A way of translating demand forecasts into a blueprint for staffing/capacity and production levels for the firm over a predetermined planning period.

Aggregation

**Product families**
- Have similar markets and manufacturing processes
- Share in common relevant units of measurement: units, barrels, tons, dollars, standard hours

**Labor**
- Aggregation depends on flexibility of work force
- May be considered a single aggregate group if work force is flexible or entire work force produces every product family

**Time**
- Updated monthly or quarterly
- Planning periods are usually months or quarters, not days
Input for an aggregate plan

- **Operations**
  - Current machine capacities
  - Plans for future capacities
  - Work-force capacities
  - Current staffing level

- **Materials**
  - Supplier capabilities
  - Storage capacity
  - Materials availability

- **Marketing**
  - Customer needs
  - Demand forecasts
  - Competition behavior

- **Finance**
  - Cost data
  - Financial condition of firm

- **Engineering**
  - New products
  - Product design changes
  - Machine standards

- **Human resources**
  - Labor-market conditions
  - Training capacity

**Typical Objectives**

- Minimize costs, maximize profits
- Respond quickly to the changes in demand or market conditions
- Maximize customer service
- Minimize inventory investment
- Minimize changes in production rates
- Minimize changes in workforce levels
- Maximize utilization of plant/equipment
# Reactive and Proactive Alternatives

<table>
<thead>
<tr>
<th>Reactive Alternatives</th>
<th>Proactive Alternatives</th>
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<tbody>
<tr>
<td>- Work force adjustment</td>
<td>- Complementary products</td>
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<td>- Overtime and undertime</td>
<td>- Creative pricing</td>
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<td>- Inventory</td>
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<td>- Subcontractors</td>
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<td>- Backlogs, backorders, and stockouts</td>
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## Aggregate Planning for Service

### Level strategy
Determine a stable workforce level that minimizes undertime by using the maximum amount of overtime in the peak period. If undertime is not paid for, which is often true with part-time workers, calculate the *equivalent staff size* for each period. It is the number of part-time workers, working the maximum allowable time, that would be needed to meet demand without any undertime. Use this size to calculate regular-time costs.

### Chase strategy
Adjust workforce levels as needed to achieve requirements without using overtime, undertime, or subcontractors. The *equivalent staff row* is identical to the requirements row, and there is no overtime in any period.
Application – Distribution Center

Work-force requirements are shown as the number of part-time employees required for each accounting period. Each employee works a maximum of 20 hours per week on regular time, but can work less. Employees are paid only for time worked (no undertime is paid).

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<th>Accounting Period</th>
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Ten part-time clerks are currently employed. Overtime cannot exceed 25 percent of the regular-time capacity in any period. That is, the maximum a part-time can work is 25 hours per week. Backorders are not permitted on a planned basis.

Level Strategy at Distribution Center

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Number of part-time employees at 25 hours maximum/week

\[1.25w = 20 \text{ employees (period 6)}\]

\[w = \frac{20}{1.25} = 16 \text{ employees}\]
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### Graph

- **Period**: 0, 2, 4, 6, 8, 10, 12, 14
- **Employees**: 4, 8, 12, 16, 20

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*Requirement* indicates the required staff level for each period.
## Chase Strategy at Distribution Center

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**Chase Strategy at Distribution Center**

### Graph

- **Y-axis:** Employees
- **X-axis:** Period
- **Graph Title:** Requirements satisfied

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8
Total Cost of Plan

Regular-time wage rate
$500 per accounting period at 20 hours per week

Overtime wages
150 percent of the regular-time rate

Hires
$600 per person

Layoffs
$100 per person

Cost - Level Strategy

Regular time 162 worker periods @ $500 = $81,000
Overtime 5 worker periods @ $750 = 3,750
Hire 6 workers @ $600 = 3,600
Layoff 0 workers @ $100 = 0
Total $88,350

Cost - Chase Strategy

Regular time 167 worker periods @ $500 = $83,500
Overtime 0 worker periods @ $750 = 0
Hire 21 workers @ $600 = 12,600
Layoff 19 workers @ $100 = 1,900
Total $98,000