MANUFACTURING MANAGEMENT

CAPACITY MANAGEMENT

What is

Capacity management

The management of the limits of an organization's resources, such as its labor force, manufacturing and office space, technology and equipment, raw materials, and inventory.

Capacity constraints

Capacity planning

Long term
Medium term
Short term

THE OBJECTIVES OF CAPACITY PLANNING AND CONTROL

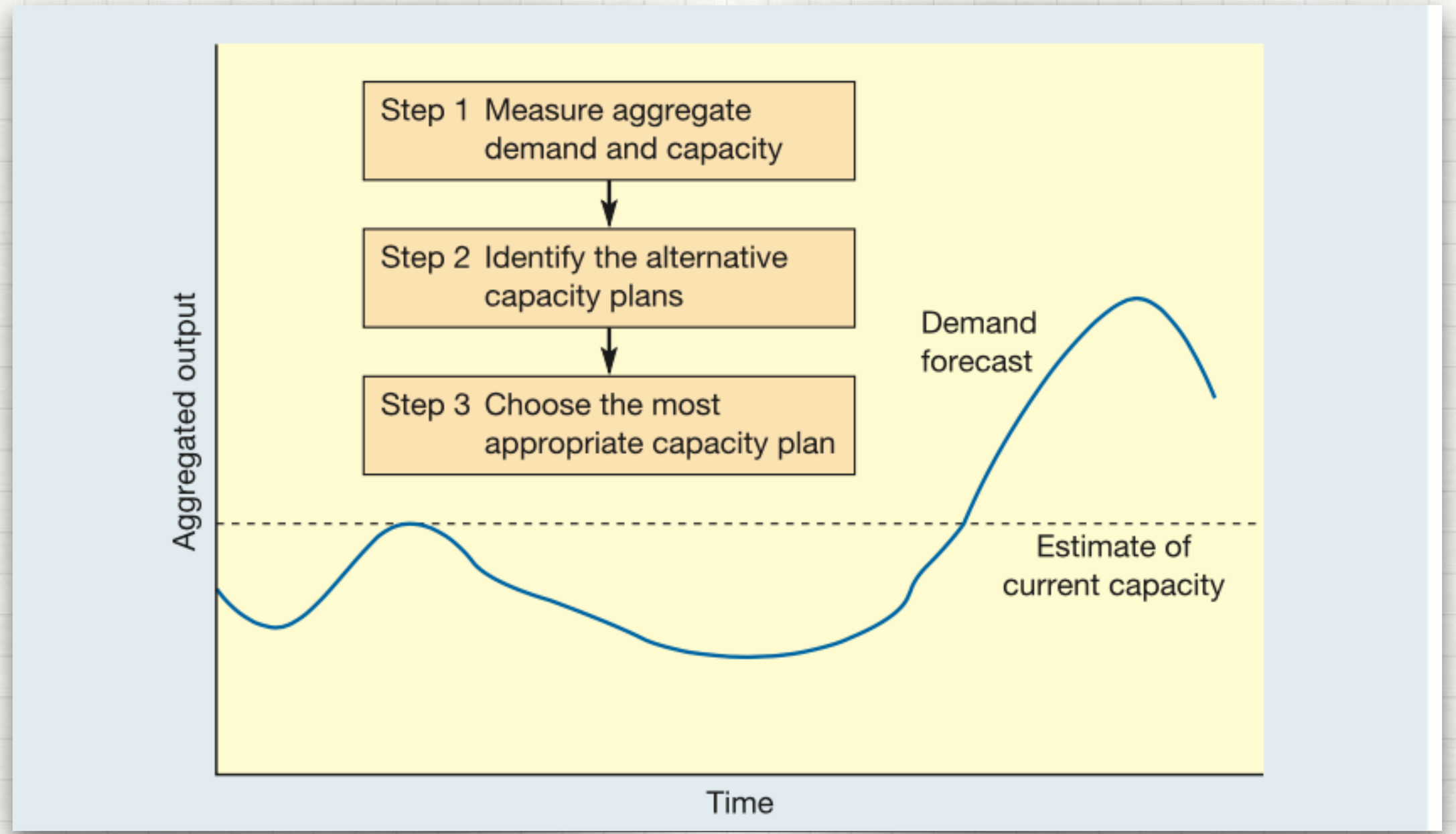
- Cost
- Revenues
- Working capital
- Quality
- Speed
- Dependability
- Flexibility

CLASSIFICATION OF CAPACITY PLANNING

- Long term capacity planning
- Short term capacity planning

- Finite capacity planning
- Infinite capacity planning

THE STEPS IN CAPACITY PLANNING AND CONTROL

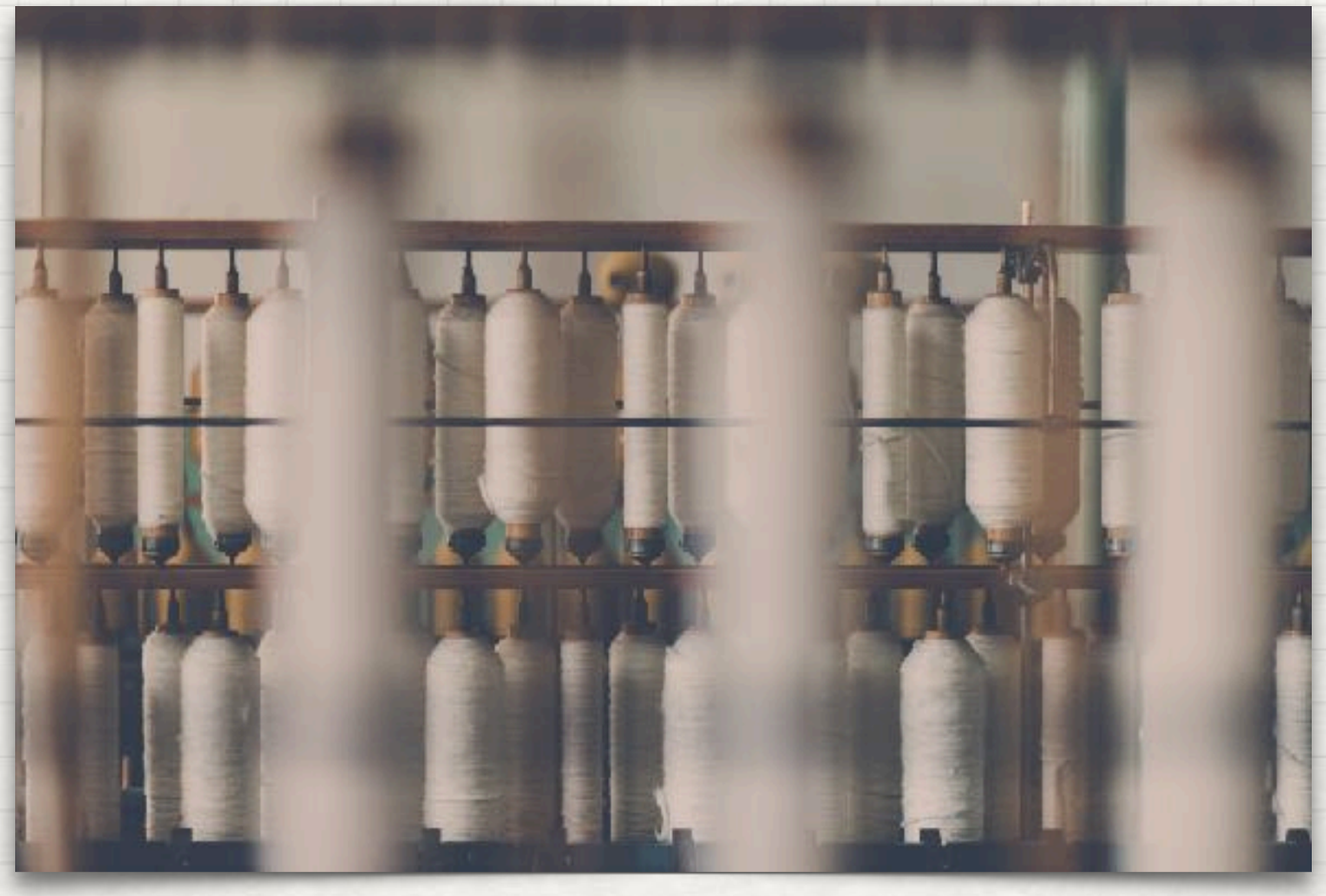


Source: Operations Management / Nigel Slack, Stuart Chambers, Robert Johnston. – 6Th Ed. Prentice Hall

FORECASTING IS A KEY INPUT TO CAPACITY PLANNING AND CONTROL

REQUIREMENTS FROM A DEMAND FORECAST FOR CAPACITY CONTROL

- It is expressed in terms which are useful for capacity planning and control
- It is as accurate as possible
- It gives an indication of relative uncertainty



SEASONALITY OF DEMAND

Source: "Operations Management" Nigel Slack, Stuart Chambers, Robert Johnston

MEASURING CAPACITY

Operation	*Input measure of capacity*	*Output measure of capacity*
Air-conditioner plant	Machine hours available	**Number of units per week**
Hospital	**Beds available**	Number of patients treated per week
Theatre	**Number of seats**	Number of customers entertained per week
University	**Number of students**	Students graduated per year
Retail store	**Sales floor area**	Number of items sold per day
Airline	**Number of seats available on the sector**	Number of passengers per week
Electricity company	Generator size	**Megawatts of electricity generated**
Brewery	Volume of fermentation tanks	**Litres per week**

Note: The most commonly used measure is shown in bold.

EFFECTIVE CAPACITY CAN BE INFLUENCED BY:

- technical abilities in the pre-operations stages
- organizational skills in the planning stages
- purchasing skills
- sub-contracting skills
- maintenance policies
- versatility of work force
- efficiency of work force

UTILIZATION AND EFFICIENCY OF THE PLANT

$$\text{Utilization} = \frac{\text{actual output}}{\text{design capacity}}$$

$$\text{Efficiency} = \frac{\text{actual output}}{\text{effective capacity}}$$

example

Suppose the photographic paper manufacturer has a coating line with a design capacity of 200 square metres per minute, and the line is operated on a 24-hour day, 7 days per week (168 hours per week) basis.

Design capacity is 200 × 60 × 24 × 7 = 2.016 million square metres per week. The records for a week's production show the following lost production time:

LOSS PRODUCTION TIME FOR A WEEK

1	Production changeovers	20 hours	20+16+8+8+7 =59 hours	Unavoidable
2	Regular preventative	16 hours		
3	No work scheduled	8 hours		
4	Quality sampling checks	8 hours		
5	Shift change items	7 hours		
6	Maintenance breakdown	18 hours	18+20+8+6+6 =58 hours	Unplanned
7	Quality failure investigation	20 hours		
8	Coating material stockout	8 hours		
9	Labour shortages	6 hours		
10	Waiting for paper rolls	6 hours		

during this week the actual output was only 582, 000 square meters.

example solution

Design capacity = 168 hours per week

Effective capacity = 168 - 59 = 109 hours

Actual output = 168 - 59 - 58 = 51 hours

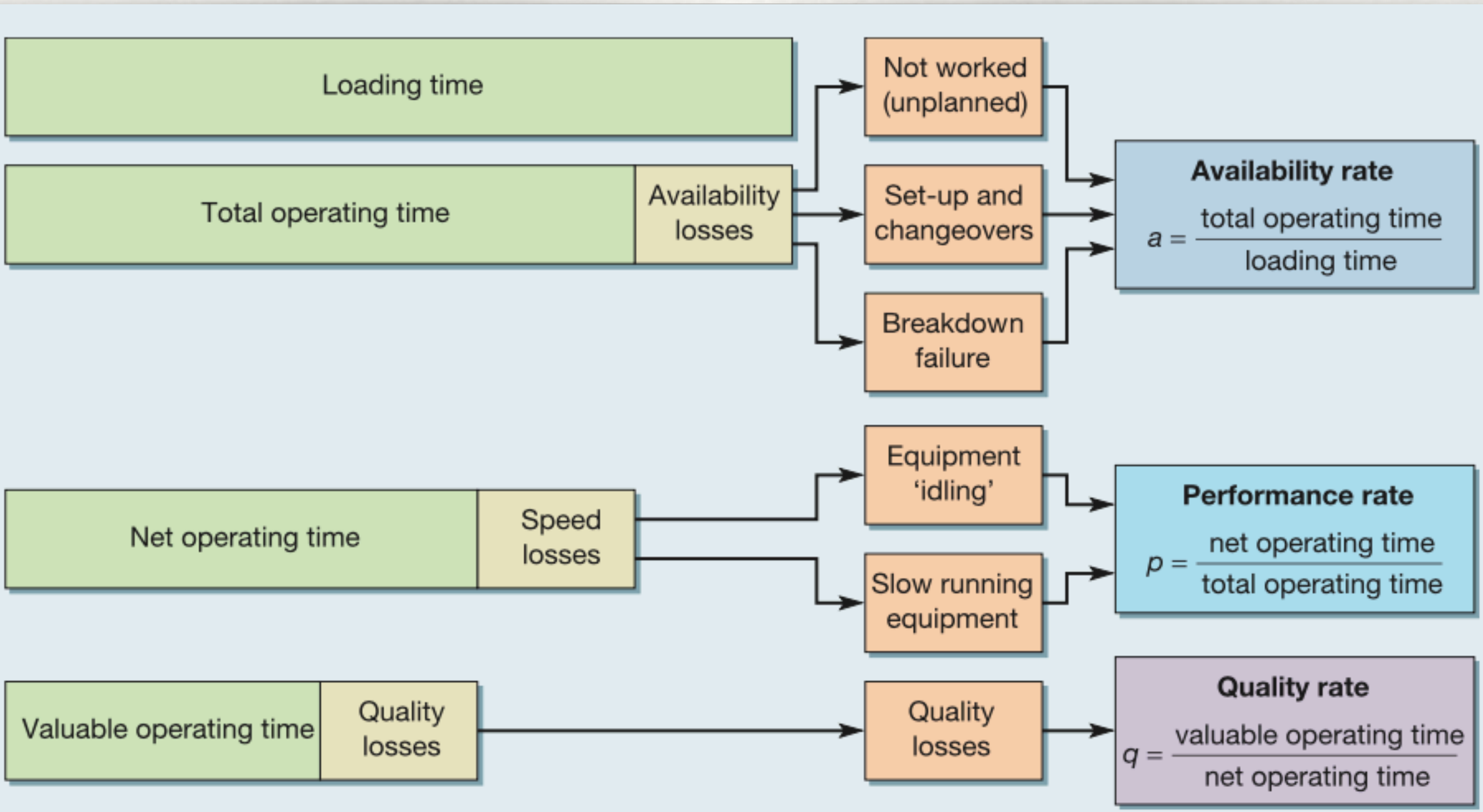
$$\text{Utilization} = \frac{\text{actual output}}{\text{design capacity}} = \frac{51 \text{ hours}}{168 \text{ hours}} = 0{,}304\ (30\%)$$

$$\text{Efficiency} = \frac{\text{actual output}}{\text{effective capacity}} = \frac{51 \text{ hours}}{109 \text{ hours}} = 0{,}468\ (47\%)$$

OVERALL EQUIPMENT EFFECTIVENESS

- Time
- Quality
- Speed

OVERALL EQUIPMENT EFFECTIVENESS



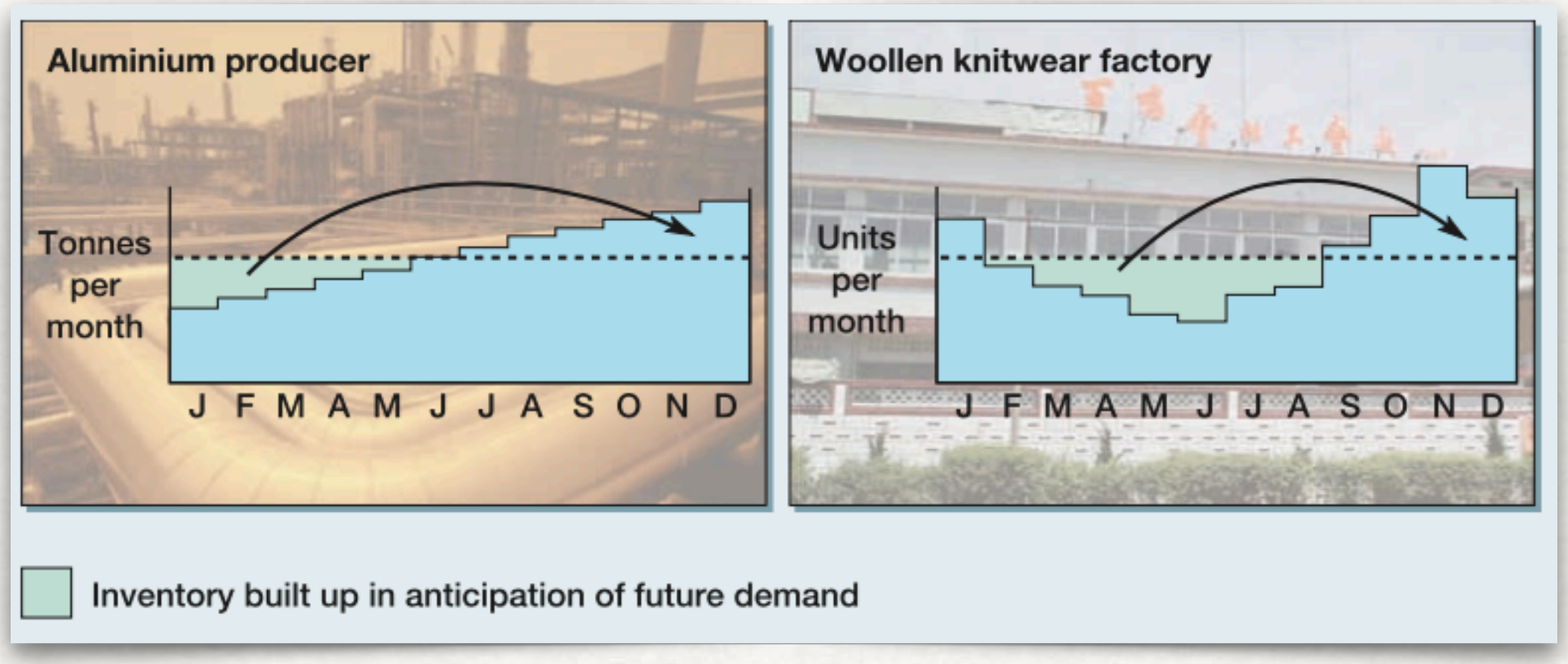
$$\text{OEE} = a \times p \times q$$

Source: Operations Management / Nigel Slack, Stuart Chambers, Robert Johnston. – 6Th Ed. Prentice Hall

ALTERNATIVE CAPACITY PLANS

- level capacity plan
- chase demand plan
- demand management

LEVEL CAPACITY PLAN



- Level capacity plans which use anticipation inventory to supply future demand

CHASE DEMAND PLAN

- Chase demand capacity plans with changes in capacity which reflect changes in demand

Source: Operations Management / Nigel Slack, Stuart Chambers, Robert Johnston. – 6Th Ed. Prentice Hall

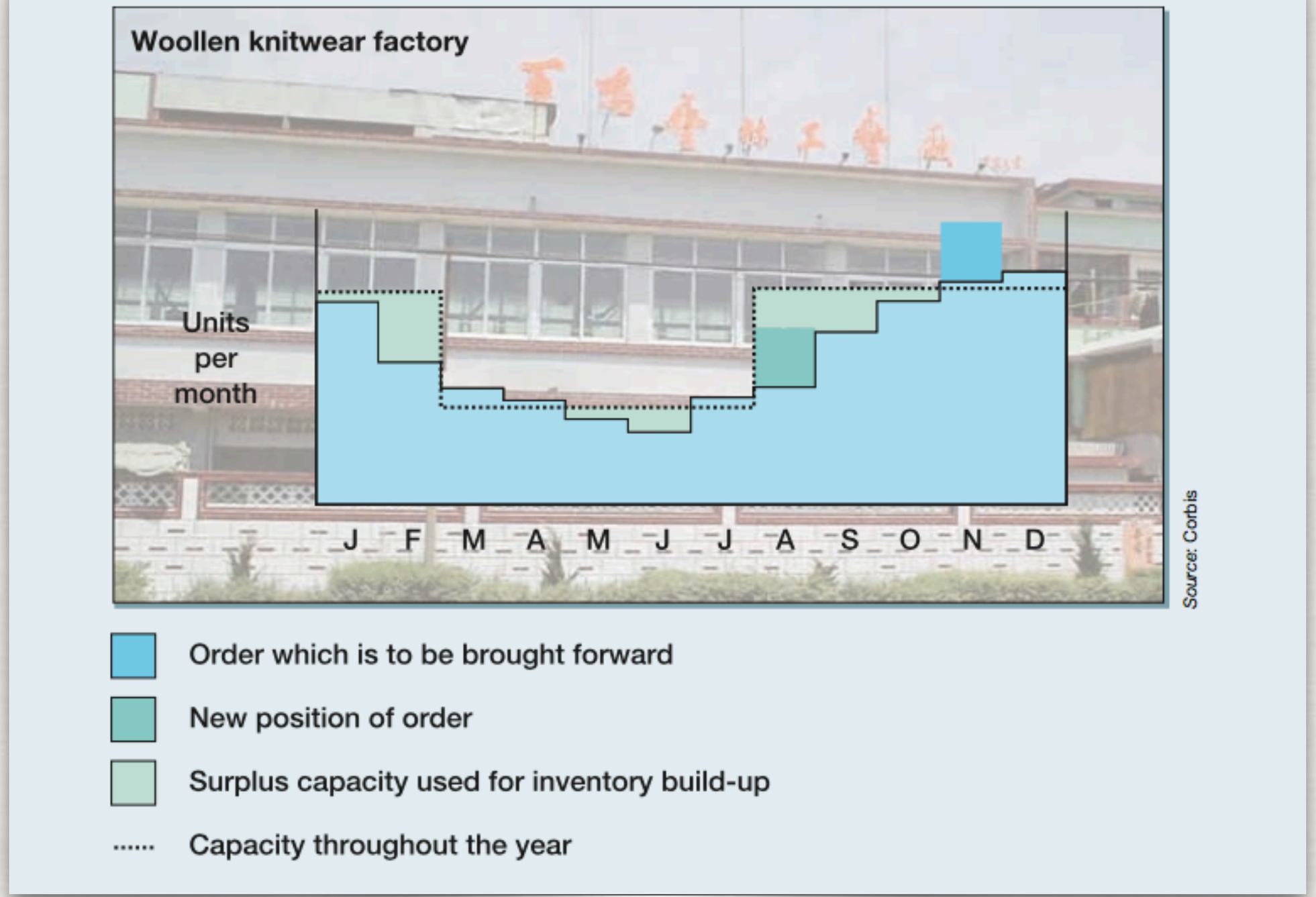
ADJUSTING CAPACITY METHODS

- Overtime and idle time
- Varying the size of the workforce
- Using part-time staff
- Subcontracting

DEMAND MANAGEMENT

- Change demand
- Alternative products

MIXED PLANS



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- A mixed capacity plan for the woollen knitwear factory

YIELD MANAGEMENT

- Capacity is relatively fixed
- The market can be fairly clearly segmented
- The service cannot be stored in any way
- The services are sold in advance
- The marginal cost of making a sale is relatively low

THE END