

Chapter 1. Introduction to Operations Management

Basic references:

- Heizer, J. & Render, B. (2009): Operations Management. New Jersey: Pearson Prentice Hall

Chapter 1. Introduction to Operations Management

- 1.1. Production and operations management
- 1.2. Operations management background
- 1.3. Different focuses on the study of operations management
- 1.4. Operations management in services

1.1. Production and operations management

Production is the creation of goods and services

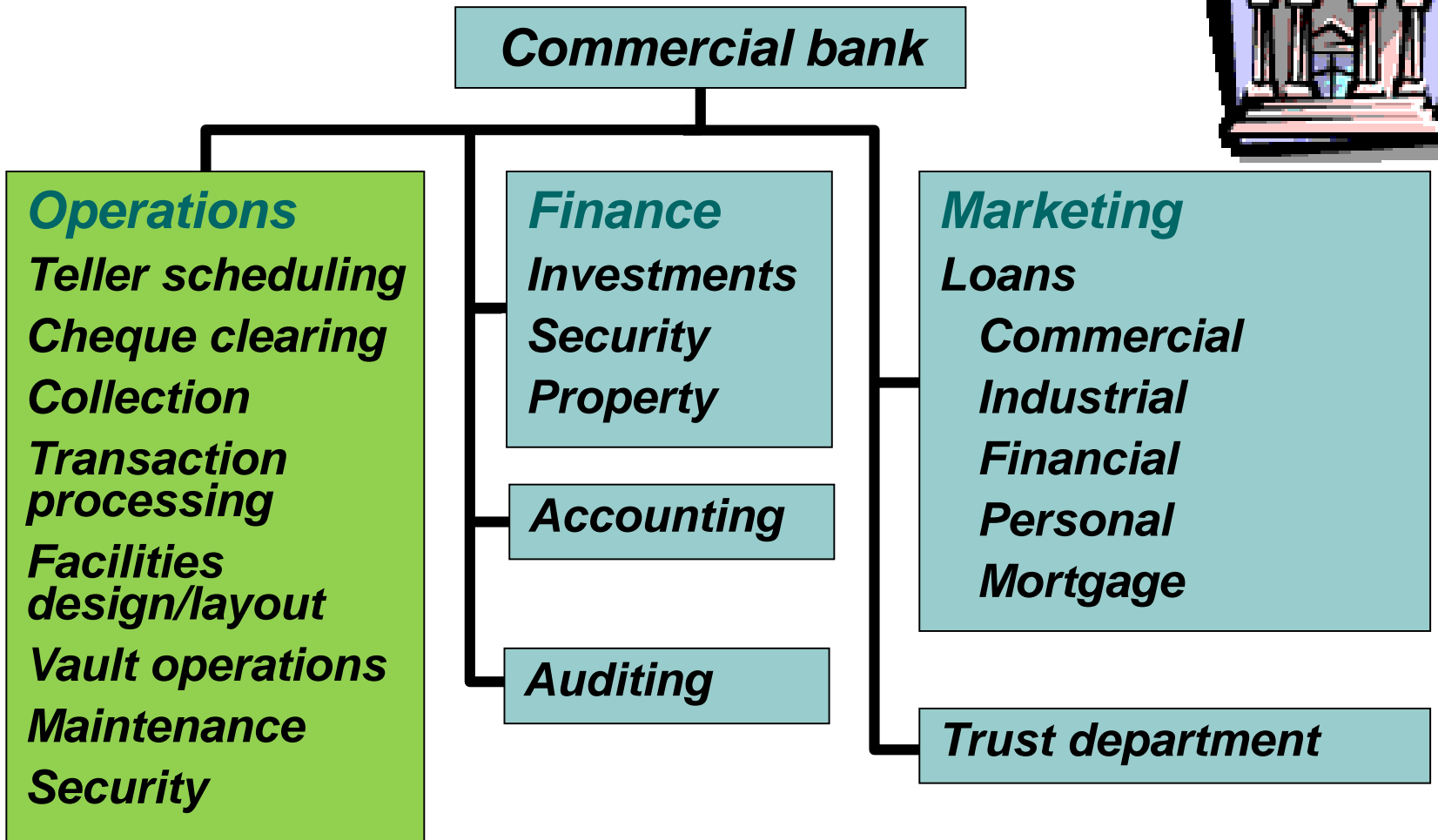
Operations management (OM) is the set of activities that creates value in the form of goods and services by transforming inputs into outputs

Organising to produce goods and services

- ☑ Essential functions:
 - ☑ Marketing – generates demand
 - ☑ Production/operations – creates the product
 - ☑ Finance/accounting – tracks how well the organisation is doing, pays bills, collects the money

1. Production and operations management

Organisational charts



1. Production and operations management

Organisational charts

Airline

Operations
Ground support equipment
Maintenance
Ground operations
Facility maintenance
Catering
Flight operations
Crew scheduling
Flying
Communications
Dispatching
Management science

Finance/ accounting
Accounting
Payables
Receivables
General ledger
Finance
Cash control
International exchange

Marketing
Traffic administration
Reservations
Schedules
Tariffs (pricing)
Sales
Advertising



Organisational Charts

Manufacturing

Operations

Facilities

construction; maintenance

Production and inventory control

scheduling; materials control

Quality assurance and control

Supply chain management

Manufacturing

tooling; fabrication; assembly

Design

*product development and design
detailed product specifications*

Industrial engineering

*efficient use of machines, space,
and personnel*

Process analysis

*development and installation of
production tools and equipment*

Finance/ accounting

Disbursements/ credits

Receivables

Payables

General ledger

Funds management

Money market

*International
exchange*

Capital requirements

Stock issue

*Bond issue
and recall*

Marketing

Sales

promotion

Advertising

Sales

*Market
research*



Why study OM?

- ☑ OM is one of three major functions (marketing, finance, and operations) of any organisation
- ☑ We want (and need) to know how goods and services are produced
- ☑ We want to understand what operations managers do
- ☑ OM is a costly part of an organisation

What operations managers do

Basic management functions

- ☑ Planning
- ☑ Organising
- ☑ Staffing
- ☑ Leading
- ☑ Controlling



The critical decisions

- ☑ Design of goods and services
 - ☑ What goods or services should we offer?
 - ☑ How should we design these products and services?
- ☑ Managing quality
 - ☑ How do we define quality?
 - ☑ Who is responsible for quality?

The critical decisions

- ☑ Process and capacity design
 - ☑ What process and what capacity will these products require?
 - ☑ What equipment and technology is necessary for these processes?
- ☑ Location strategy
 - ☑ Where should we put the facility?
 - ☑ On what criteria should we base the location decision?

The critical decisions

- ☑ Layout strategy
 - ☑ How should we arrange the facility?
 - ☑ How large must the facility be to meet our plan?
- ☑ Human resources and job design
 - ☑ How do we provide a reasonable work environment?
 - ☑ How much can we expect our employees to produce?

The critical decisions

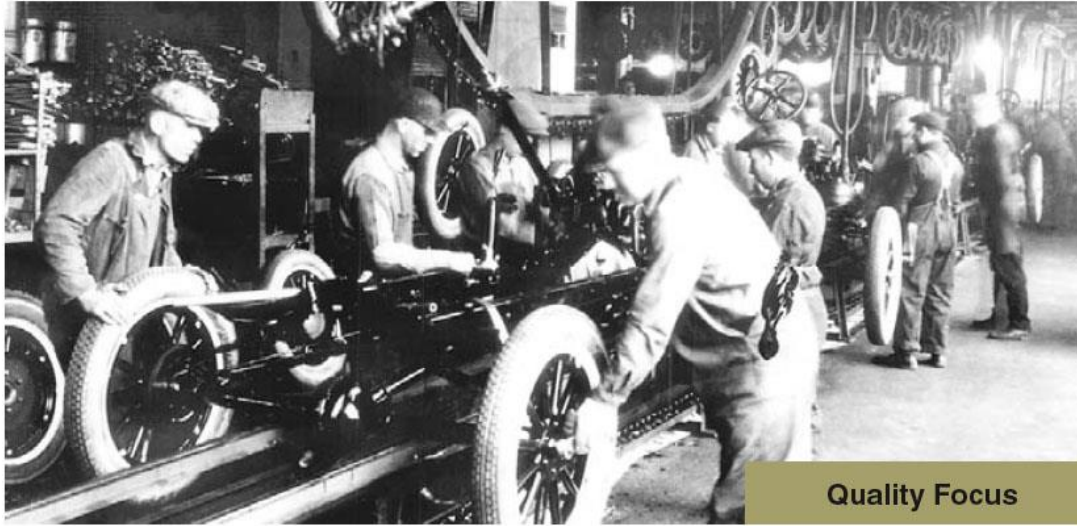
- ☑ Supply chain management
 - ☑ Should we make or buy this component?
 - ☑ Who are our suppliers and who can integrate into our e-commerce program?
- ☑ Inventory, material requirements planning, and JIT
 - ☑ How much inventory of each item should we have?
 - ☑ When do we re-order?

The critical decisions

- ☑ Intermediate and short-term scheduling
 - ☑ Are we better off keeping people on the payroll during slowdowns?
 - ☑ Which jobs do we perform next?
- ☑ Maintenance
 - ☑ Who is responsible for maintenance?
 - ☑ When do we do maintenance?

1.2. Operations management background

Significant events in OM



Customization Focus

Mass Customization Era

1995–2010

Globalization
Internet/E-Commerce
Enterprise Resource Planning
Learning Organization
International Quality Standards
Finite Scheduling
Supply Chain Management
Mass Customization
Build-to-Order

Quality Focus

Cost Focus

Early Concepts

1776–1880

Labor Specialization
(Smith, Babbage)
Standardized Parts (Whitney)

Scientific Management Era

1880–1910

Gantt Charts (Gantt)
Motion & Time Studies
(Gilbreth)
Process Analysis (Taylor)
Queuing Theory (Erlang)

Mass Production Era

1910–1980

Moving Assembly Line
(Ford/Sorensen)
Statistical Sampling
(Shewhart)
Economic Order
Quantity (Harris)
Linear Programming
PERT/CPM (DuPont)
Material Requirements
Planning

Lean Production Era

1980–1995

Just-in-Time
Computer-Aided Design
Electronic Data Interchange
Total Quality Management
Baldrige Award
Empowerment
Kanbans

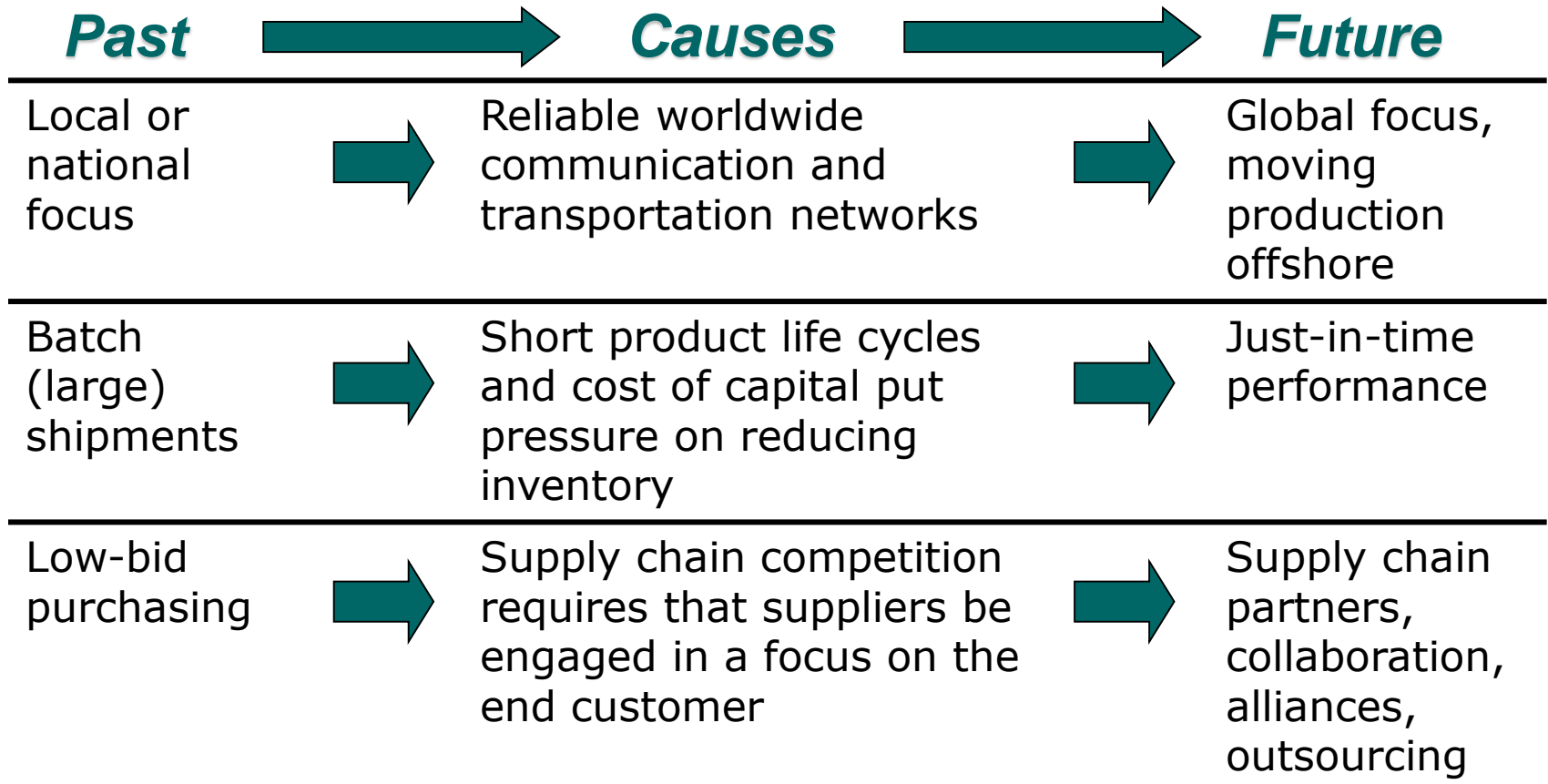
The heritage of OM

- ☑ Division of labour (Adam Smith 1776; Charles Babbage 1852)
- ☑ Standardised parts (Whitney 1800)
- ☑ Scientific management (Taylor 1881)
- ☑ Coordinated assembly line (Ford/ Sorenson 1913)
- ☑ Gantt charts (Gantt 1916)
- ☑ Motion study (Frank and Lillian Gilbreth 1922)
- ☑ Quality control (Shewhart 1924; Deming 1950)

The heritage of OM

- ✓ Computers (Atanasoff 1938)
- ✓ CPM/PERT (DuPont 1957)
- ✓ Material requirements planning (Orlicky 1960)
- ✓ Computer aided design (CAD 1970)
- ✓ Flexible manufacturing system (FMS 1975)
- ✓ Baldrige quality awards (1980)
- ✓ Computer integrated manufacturing (1990)
- ✓ Globalisation (1992)
- ✓ Internet (1995)

New trends in OM



New trends in OM

Past

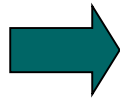


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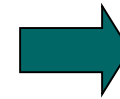


Future

Lengthy product development

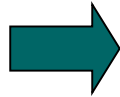


Shorter life cycles, internet, rapid international communication, computer-aided design, and international collaboration

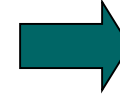


Rapid product development, alliances, collaborative designs

Standardised products

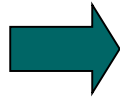


Affluence and worldwide markets; increasingly flexible production processes

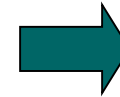


Mass customisation with added emphasis on quality

Job specialisation



Changing socioculture milieu; increasingly a knowledge and information based society



Empowered employees, teams, and lean production

New trends in OM

Past

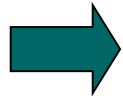


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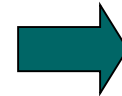


Future

Low-cost focus

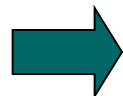


Environmental issues, ISO 14000, increasing disposal costs



Environmentally sensitive production, green manufacturing, recycled materials, remanufacturing

Ethics not at forefront



Businesses operate more openly; public and global review of ethics; opposition to child labour, bribery, pollution



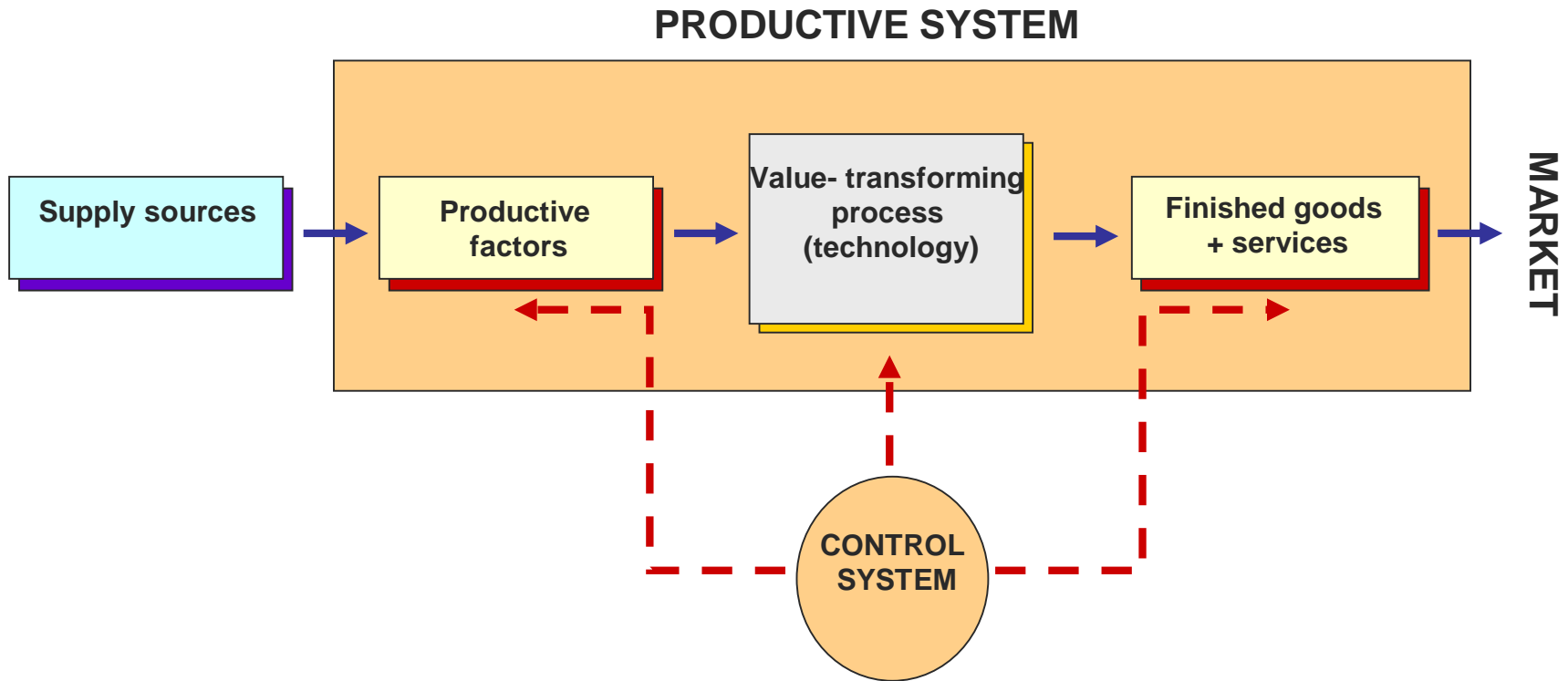
High ethical standards and social responsibility expected

New trends in OM

- ☑ Global focus
- ☑ Just-in-time performance
- ☑ Supply chain partnering
- ☑ Rapid product development
- ☑ Mass customisation
- ☑ Empowered employees
- ☑ Environmentally sensitive production
- ☑ Ethics

1.3. Different focuses on the study of operations management

Systemic focus



1.3. Different focuses on the study of operations management

Strategic focus

STRATEGIC DECISIONS: Little structured, with long-term effects on firms. They cannot be changed short term at zero cost, due to the huge quantity of resources committed to implementation. Due to its relevance, strategic decisions should be taken with the help of other company functions (sales, marketing, finance, etc.)

TACTICAL DECISIONS: More structured, routine, and repetitive. The objective is to plan the production to satisfy the market demand and, hence, maximise profits. Includes the control-type decisions.

Beware: an area can hold strategic decisions (decide the quality management system) and tactical (quality inspections, corrective actions, etc.)

1.3. Different focuses on the study of operations management

Strategic focus

Type of decisions	Actual Operations Management Decisions
Strategic	Design of goods and services
	Design of productive process
	Design of productive technology
	Set the optimal capacity of facilities
	Determine the optimal location of facilities
	Determine the optimal layout of facilities
	Manage human resources and design job contents
	Manage the quality of goods and services
	Set the inventory policy of the firm
	Determine the supplies policy of the firm
	Design the maintenance plan for the facilities

1.3. Different focuses on the study of operations management

Strategic focus

Type of decisions	Actual Operations Management Decisions
Tactical	Capacity planning on the mid and short term
	Management of the supply chain
	Project management
	Maintenance and repair management
	Inventory management

1.4. Operations management in services

SERVICE	PRODUCT
Intangible	Tangible
Production and consumption are simultaneous	It can be put in a warehouse. Production decoupled from consumption
Unique	Easy to standardise. Similar products
High interaction with customer	Customer has a limited involvement in production
Definition of a service can and does vary (haircut)	Standardised product
Often based on knowledge. Difficult to automate	Easy to automate
Services are normally performed where customer is located	Product is normally made in a fixed factory
Difficult to measure quality level	It is easy to evaluate the quality level
Re-sale is unusual	Product normally has a residual value

1.4. Operations management in services

- Management of processes, people, and resources with the objective to deliver services with the right quality level and as cheaply as possible.
- Service pack:
 - Result of the service
 - What the customer gets after service is performed.
 - Service experience
 - Relationship of the customer with the service supplier and the organisational facilities.

AN EXAMPLE IN OM

- ✓ Fisher Technologies is a small firm that must double its dollar contribution to fixed costs and profit in order to be profitable enough to purchase the next generation of production equipment.
- ✓ Management has determined that if the firm fails to increase contribution, its bank will not make the loan and the equipment cannot be purchased.
- ✓ If the firm cannot purchase the equipment, the limitations of the old equipment will force Fisher to go out of business and so put its employees out of work and discontinue producing goods and services for its customers.

		MARKETING Option	FINANCE/ ACCOUNTING Option	OM Option
	Current	Increase revenue by 50%	Reduce finance costs by 50%	Reduce production costs by 20%
Sales	100,000	150,000	100,000	100,000
Cost of goods	-80,000	-120,000	-80,000	-64,000
Gross margin	20,000	30,000	20,000	36,000
Finance costs	-6,000	-6,000	-3,000	-6,000
Subtotal	14,000	24,000	17,000	30,000
Taxes at 25%	-3,500	-6,000	-4,250	-7,500
Contribution	10,500	18,000	12,750	22,500

- ✓The table shows a simple profit-and-loss statement and three strategic options (marketing, finance/accounting, and operations) for the firm.
- ✓The first option is a marketing option. Where good marketing management may increase sales by 50%. By increasing sales by 50% the contribution will, in turn, increase by 71%. But increasing sales 50% may be difficult; it may even be impossible.
- ✓The second option is a finance/accounting option, where finance costs are cut in half through good financial management. But even a reduction of 50% is still inadequate to generate the necessary increase in contribution. Contribution is increased by only 21%.
- ✓The third option is an OM option, where management reduces production costs by 20% and increases contribution by 114%.

- ✓ Om option yields more contribution, and may well be the only feasible option.
- ✓ Increasing sales by a 50% or reducing finance cost by 50% may prove virtually impossible.
- ✓ Reducing operations cost by a 20% may be difficult but feasible.