CHAPTER 11
OPERATIONS MANAGEMENT
Chapter content

• Introduction
• An operations-management model
• The classification of process types for manufacturers and service providers
• Operations design
• Operations planning and control
• Operations improvement
• Summary
Introduction

• Importance of operations management
  – Reduce the costs
  – Increase the revenue
  – Reduce the amount of investment
  – Provide the impetus for new innovation

• Concerned with management of the transformation process

• Defining terms used in operations management
  – Operations function
  – Operations managers
  – Operations management
An operations-management model

Figure 11.1: A general model of operations management
Operations-management strategies and performance objectives

• Focus on customers’ needs and continually formulate strategies and objectives to maintain, strengthen and expand competitive position and customer base

• Six customer/client needs:
  – Higher quality
  – Lower costs
  – Shorter lead time
  – Greater adaptability
  – Lower variability
  – High level of service.
Positive results obtained by operations management guidelines

<table>
<thead>
<tr>
<th>Operations-management guideline</th>
<th>Positive result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doing things right the first time</td>
<td>Higher quality</td>
</tr>
<tr>
<td>Doing things cost effectively</td>
<td>Lower cost</td>
</tr>
<tr>
<td>Doing things fast</td>
<td>Shorter lead time</td>
</tr>
<tr>
<td>Changing things quickly</td>
<td>Greater adaptability</td>
</tr>
<tr>
<td>Doing things right every time</td>
<td>Lower variability</td>
</tr>
<tr>
<td>Doing things better</td>
<td>Better service</td>
</tr>
</tbody>
</table>

**Figure 11.2:** Positive results obtained by the application of operations-management guidelines
The transformation model

- Operations function is primarily concerned with the application of resources by means of a transformation process to provide outputs.
- Model could apply to both manufacturers and service providers.
- Model comprises three main components:
  - Inputs
  - Transformation process itself
  - Outputs.
A basic transformation model

**Figure 11.3: A basic transformation model**
Inputs

• Resources to be transformed include:
  – Material
  – Customers
  – Information.

• Resources required to make transformation possible:
  – Human resources
  – Equipment and facilities
  – Technology.
The transformation process

• Inputs are converted into outputs in the transformation process

• Three main types of resource inputs are addressed:
  – Transformation of materials
  – Transformation of information
  – Transformation of customers/clients.
Outputs

• Ultimate goal of transformation process is to convert or process inputs into outputs

• Characteristics of products manufactured and services provided differ

• Important to note the difference because they have specific implications for the management of the various operations processes
Characteristics of products and services

Table 11.1: Characteristics of products and services

<table>
<thead>
<tr>
<th>Products produced by manufacturer</th>
<th>Services produced by service provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Physically tangible and durable</td>
<td>• Intangible and perishable</td>
</tr>
<tr>
<td>• Output kept in stock</td>
<td>• Output not kept in stock</td>
</tr>
<tr>
<td>• Little customer contact</td>
<td>• Plenty of client contact</td>
</tr>
<tr>
<td>• Manufactured before use</td>
<td>• Provision and consumption simultaneous</td>
</tr>
<tr>
<td>• Long response time</td>
<td>• Short response time</td>
</tr>
<tr>
<td>• Local and international markets</td>
<td>• Mainly local markets</td>
</tr>
<tr>
<td>• Large production facilities</td>
<td>• Small service-provision facility</td>
</tr>
<tr>
<td>• Capital-intensive production</td>
<td>• Labour intensive</td>
</tr>
<tr>
<td>• Quality easily measurable</td>
<td>• Quality difficult to measure</td>
</tr>
</tbody>
</table>
Different operations have different characteristics

• Four distinctive characteristics (four Vs):
  – Volume of output
  – Variety of output
  – Variation of output
  – Visibility of output.

• The implications of these four characteristics can be significant in terms of the cost of creating products and services
The classification of process types for manufacturers

- Five main categories are identified:
  - Project processes
  - Jobbing processes
  - Batch processes (job lots)
  - Mass processes
  - Continuous or repetitive systems.
The classification of manufacturers’ operational processes

Figure 11.4: The classification of manufacturers’ operational processes
The classification of process types for service providers

• Three main categories are identified:
  – Professional services
  – Service shops
  – Mass services.
The classification of service providers’ operational processes

**Figure 11.5: The classification of service providers’ operational processes**

- **Professional services**
  - Dentists, doctors
  - Attorneys, auditors
  - Management consultants

- **Service shops**
  - Banks
  - Hotels
  - Retail shops

- **Mass services**
  - Post and telecommunications services
  - Air- and rail-transport services
  - Television-broadcast services
The nature of operations design

Figure 11.6: The nature of operations design
The design of products and services

- Operations managers are not solely responsible for the design of a product or service
- Indirectly responsible for providing the information and advice on which the ultimate success of the development and manufacture of the product or service depends
The competitive advantage of good design

• Design of a product or service begins and ends with the customer
• Through the design and production of a good quality product, the business’s competitive position is reinforced in the marketplace
The components of products and services

- Product or service is broadly defined as anything that can be offered to a customer in order to satisfy his or her needs
- Products and services consist of three interdependent components:
  - Concept (idea)
  - Package composition of products and services
  - Process for creating the package.
The stages in the design of products and services

- Ultimate result of the design of products and services is the full detailed specification of the product or service.
- To obtain a full detailed specification a number of steps must be followed:
  - Concept generation
  - The screening process
  - Preliminary design
  - Evaluation and improvement
  - Prototype and final design.
The design of operations processes

• Design of operational processes to manufacture products or provide services is just as important as the design of the products or services themselves.

• When designing a particular operational process, it is important for the entire supply network to be taken into consideration.

• Helps to determine precisely what the inputs for the specific operational processes are, as well as the customer/client needs that have to be satisfied.
The design of supply networks

- Operations processes do not exist in isolation – part of integrated supply network
- Includes suppliers of materials or services, intermediaries and customers/clients
- In design, entire supply network needs to be taken into consideration
- Helps determine inputs, as well as competitive position
The layout and flow of manufacturing and service-provision facilities

• Layout of a manufacturing/service facility entails three steps:
  – Selecting the process type
  – Selecting the basic layout type (four basic types):
    • Fixed-position layout
    • Process layout (flexible-flow layout)
    • Product layout (line-flow layout)
    • Cellular layout (hybrid layout).
  – Detailed design of the layout
Four basic layout types

Applying the concept: Four basic layout types

Fixed-position layout

- Construction site
- Building
- Crane
- Bricklayers

Process layout or flexible-flow layout

Sawing section

- Product A
  - 1
- Product B
  - 2

Planing section

Turning section

Joining section

Product processing:

- Product A: 1 → 2 → 3
- Product B: 1 → 2 → 3 → 4

Product layout or line-flow layout

- Assembly line
  - Car: Alfa
  - Chassis → Bodywork → Paint
  - Engine assembly → Engine finishing → Car: Alfa

- Assembly line
  - Car: Betta
  - Chassis → Bodywork → Paint
  - Engine assembly → Engine finishing → Car: Betta

Cellular layout or hybrid layout

Department-store floor plan

- Self-help cafeteria
- Men's section
  - Shoes
  - Product layout
  - Cell II
- Women's section
  - Blouses
  - Dresses
  - Product layout
  - Underwear
  - Cell III
- Shoes

Starters → Main dishes → Deserts

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The application of process technology

- ‘Process technology’ refers to the machines, equipment and apparatus used in transformation process to transform materials, information and clients so that products can be manufactured or services provided
- The operations manager has to be continuously involved in the management of all facets of process technology
The application of process technology

- To perform this task effectively, it is necessary to:
  - Foresee how technology can improve a specific operational process
  - Decide which technology or technologies to use
  - Integrate the new technology with existing operations activities
  - Continually monitor the performance of the technology
  - Upgrade or replace the technology when necessary.
Job design and work organisation

• Operations management also focuses on people’s involvement in the operations activity itself
• Job design determines how workers perform tasks
• Work study – scientific approach used in job design and work organisation to study factors influencing people in work environment to improve efficiency and effectiveness
Job design and work organisation

• Two work-study techniques:
  – Method study – systematic recording and critical investigation of present and proposed work methods to develop and apply easier and more effective methods in to reduce costs
  – Work measurement – application of techniques designed to determine how long it takes a trained and qualified worker to do a specific job at a fixed level of performance.
Components of work study

**Figure 11.7: Components of work study**

- **Method study**
  The development and application of easier and more effective methods to perform tasks and in so doing reduce costs …

- **Work measurement**
  Determining how long it takes a trained and qualified worker to perform a specific task at a fixed level of performance …

… with a view to improving productivity
Operations planning and control

• Reconciling supply of products/services with demand by means of planning and control activities occurs in terms of three dimensions:
  – Volume
  – Timing
  – Quality.
Operations planning and control

- To reconcile the volume and timing dimensions with each other, three different integrated activities are performed:
  - Loading of tasks
  - Sequencing of tasks
  - Scheduling of tasks.
The nature of operations planning and control

**Figure 11.8: The nature of operations planning and control**

- **Supply of products and services by the operations process of the business**
- **Planning and control of the operational process**
  - Activities to reconcile supply and demand in terms of volume, timing and quality
- **Demand for products and services by the customers/clients of the business**
Capacity planning and control

- Capacity planning and control focus on the provision of manufacturing and/or service capacity of a particular operations process.
- Capacity is the maximum level of value-added activity over a period of time that the process can achieve under normal operating circumstances.
The nature of capacity planning and control

• Quantitative data on expected demand, and the required capacity to satisfy demand must be obtained as follows:
  – Determine the total demand and required capacity
  – Identify alternative capacity plans
    • A level-capacity plan
    • A chase-demand plan
    • A demand-management plan
  – Choice of a particular capacity planning and control approach
Quality planning and control

• Quality is one of the main methods of adding value to products and/or services.
• From an operations management perspective, quality is defined as consistent conformity to customers/client expectations.
• The difference between expected quality and perceived quality is known as the quality gap.
• Operations management, in conjunction with other functional areas, should endeavour to eliminate any quality gaps.
The nature of quality planning and control

Figure 11.9: Extending the product/service design cycle for quality planning and control
The steps in quality planning and control

Step 1: Defining the quality characteristics of the product or service

Step 2: Measuring the quality characteristics of the product or service

Step 3: Setting standards for each quality characteristic of the product or service

Step 4: Controlling quality against set standards

Step 5: Identifying and rectifying the causes of poor quality

Step 6: Continuously improving quality
The nature of operations improvement

Figure 11.10: The nature of operations improvement
Different types of performance standards

• Four types of performance standards:
  – Historical performance standards
  – Target performance standards
  – Competitors' performance standards
  – Absolute performance standards.
Priorities for improvement

• Not all areas earmarked for improvement are equally important
• Priorities for improvement need to be determined
• Two divergent approaches to improvement can be followed:
  – Breakthrough improvement
  – Continuous improvement.
Failure prevention and recovery

• There is always the chance of breakdown or failure occurring
• Types of failures include:
  – Design failures
  – Facility failures
  – Staff failures
  – Supplier failures
  – Customer/client failures.
Failure detection and analysis

• Operations managers should have mechanisms in place to detect failures
• Procedures should be put into operation to determine the causes of the failure
• Once causes and consequences of failure have been established, operations managers should try to prevent them in the first place
• Recovery procedures and contingency plans should already have been devised and put in place to minimise the potential detrimental effects on customers
Total quality management (TQM)

• TQM is a management philosophy, with the primary aim of satisfying needs and expectations of customers/clients by means of high-quality products or services
• Focal point of TQM is the underlying processes that occur at each customer and supplier interface
Defining TQM

- Meeting the needs and expectations of customers
- Covering all parts of the business regardless of how small they are
- Making every employee in the business quality conscious
- Identifying and accounting for all costs of quality
Defining TQM

• Doing things right the first time
• Developing and implementing systems and procedures for quality
• Establishing a continuous process for improvement
Total-quality-management model
The ISO 9000 quality management system standard

- ISO 9000 series – International quality management system
- ISO 9000 document includes guidelines under five headings:
  - Documentation requirements
  - Management responsibility
  - Resource management
  - Product realisation
  - Measurement, analysis and improvement.
The implementation of TQM

• Factors that should be taken into account include the following:
  – Integration of TQM in the overall business strategy
  – Top management’s and employees’ support and involvement
  – Teamwork in the improvement initiatives
  – Feedback on quality successes that have been achieved
  – Creation of a quality awareness culture
  – Training of employees in quality techniques and methods.
Summary

• Three activities of operations managers
  – Design
  – Planning and control
  – Improvement.

• Classification of different process types for manufacturers and service providers

• Satisfy needs of customers/clients and design operations process to manufacture or provide
Summary (continued)

• Improving the reliability of the entire operations process on a continuous basis
• Improving the entire business by applying TQM