

BUSINESS STUDIES

Role of Operations Management

- **Strategic role of operations management**

Operations management is an essential key business function that overlaps with the other business functions. Each of these functions have a strategic component.

The strategic role of operations management is allocating resources so that the business meets customer's needs.

Costs that are a feature of the operations function:

- Input
- Labour
- Processing
- Inventory
- Quality management

Strategies include:

Cost Leadership

This involves aiming to have the lowest costs or to be the most price-competitive in the market. It focuses on high volume of output as cheaply as possible and suits mass production. One aspect of cost leadership arises from a business creating economies of scale.

Economies of Scale: refers to cost advantages that can be created as a result of an increase in scale of business operations - lower cost per unit of input.

Good/Service Differentiation

This focuses on more costly operations due to design, innovations and features that make the good or service different. Product differentiation distinguishes products in some way from its competitors.

For both goods and services, differentiation can be created from cross-branding or strategic alliances.

- **Goods and/or services in different industries**

Primary (production):

Raw materials, natural resources

- Mining, farming, fishing, foresting
- BHP

Secondary (manufacturing):

Covert inputs into semi-finished and finished products

- Steel, auto, chemical and computer manufacturers
- APPLE

Tertiary (services):

Services and distribution

- Banks, lawyers, airlines, retailers
- St GEORGE BANK

Quaternary (information services):

Transfer and process information

- Telecommunications, education, property, computing, finance
- NOKIA

Quinary (traditional services):

Services that replace domestic tasks

- Hospitality, tourism, childcare

Summary:

- Goods and services are produced differently
- Goods may be standardised (mass produced or an assembly line) or customised (varied according to the needs of customers)
- Goods may be perishable or non-perishable
- The character of the goods will shape the nature of the operations processes
- Intermediate goods have gone through one set of operational processes then become inputs into further processing
- Services vary according to whether they are highly specialised or more customised
- **Interdependence with other key business functions**

Marketing:

- Design new products
- Change existing products
- After-sales service requirements

Finance:

- Set financial controls for each part of operations
- Monitor progress

Human Resources:

- Identify staffing needs
- Training
- Organise staff during operations to meet objectives

There will be constant flow of information between operations and the other key business functions: marketing, human resources and finance. Each function relies on the other so that the business can achieve its goals.

In **marketing**, research identifies the nature of goods that consumers desire and marketing strategies encourage purchases. Operations must supply a product that has the features and quality customers demand as well as reliably distributing this product to the market. The **finance** manager will create budgets and make funds available to purchase inputs, equipment, repairs and

maintenance. Production costs will be minimised in order to maximise profit margins. **Human resources** will ensure that enough employees with appropriate skills are available for the operations function. The human resources manager will use their leadership style and rewards to ensure the employees in the operations function perform quality work. In this, it is clear that marketing, finance and human resources all have an important relationship with operations as they determine exactly how it will function.

INFLUENCES

- **Globalisation, technology, quality expectations cost-based competition, government policies, legal regulation, environmental sustainability**

Globalisation is characterised by an increasing integration between national economies and a high degree of transfer of capital, labour, intellectual capital and ideas, financial resources and technology.

- Flow of goods, services, finance, labour and IT between nations
- It refers to the removal of barriers of trade between nations

Globalisation affects organisational design and the supply chain; business needs a very predictable and reliable supply chain that is highly responsive to changes. The supply chain is affected by whether the nation (part of its global web) is innovative or whether it is a follower

Technology is the design, construction and/or application of innovative devices, methods and machinery upon operations processes. It plays an important role in operations management - from administration, through to all operations processes.

- Software changes, communications, changes to products and production techniques

Quality Expectations are a specific reference to how well designed, made and functional goods are, and the degree of competence with which services are organised and delivered.

- Customers require world-class standards in products, service and after-sales support

Managing quality expectations in both the manufacturing of products and the delivery of services is an essential role and goal of operations management.

Quality expectations differ between goods and services:

GOODS:

- Fitness for purpose
- Quality of design
- Durability

SERVICES:

- level of customisation
- reliability of the service provider
- professionalism of the service provider

Cost-based Competition is derived from determining breakeven point and then applying strategies to create cost advantages over competitors. In highly competitive markets, it can shape the operations function in competing businesses.

- Cheaper labour and resources used in other nations means cheaper goods
- Businesses can apply cost leadership to reduce both fixed and variable costs

Businesses that reduce costs:

- Eliminate waste
- Bulk buy
- Achieve economies of scale
- Produce high volume output
- Produce standardised products for larger markets
- Use automated production systems

Government Policies

- Free trade, taxation, interest rates, government spending, environmental incentives

All businesses operate in a political–legal environment. Political decisions affect the business rules and regulations, which, in turn, directly affect the management of various key business functions.

Government policies often impact on business. Policies such as taxation rates, required materials handling practices, Occupational Health and Safety (OH&S) standards, training and rules, public health policies, environmental policies, employment relations, trade and industry policies all impact on business operations. Since policies can inform law making, and also lead to business opportunities, operations managers need to be fully aware of the contemporary government policies and what they comprise.

Legal Regulation

- Workplace health and safety, anti-discrimination, EEO, local zoning, GST collection

All aspects of business must abide by the laws of business. Operations management has particular laws that influence how practices and processes are conducted. The operations function involves transformation and value adding. The relevant laws will relate to labour and labour management, as well as the environment and public health including the following:

- WH&S
- Training and development
- Environmental protection
- Apply rules related to public health

Laws:

Fair Work Australia Act 2009 (Cth)

Work Health Safety Act 2012 (Cth)

Environmental Sustainability (ecological sustainability) means that business operations should be shaped around practices that consume resources today without compromising access to those resources for future generations.

Use of alternative resources, organic growing, recycling and packaging, cater for future generations.

The operations management function is significantly affected by the rise in climate change awareness and the need to integrate a long-term sustainable view of resource management into business planning and practice. This can be seen in the move by businesses to reduce and minimise waste – recycle water, glass, paper and metals, and reduce their carbon footprint.

- **Corporate Social Responsibility**

CSR refers to open and accountable business actions based on respect for people, community, society and the broader environment. It involves businesses doing more than just complying with the laws and regulations. CSR places value on financial returns as well as social responsibility and environmental sustainability.

The difference between legal compliance and ethical responsibility

Legal Compliance refers to the need for operations to obey local and international laws. For example:

- Local content in products
- Minimum wages and conditions
- Maternity leave
- Equal Employment Opportunity (EEO) and anti-discrimination

Ethical Responsibility encompasses a much broader integration of social, community and environmental concerns. It refers to the need for operations to meet community expectations and moral standards. For example:

- Not exploiting cheap labour overseas
- Sustainable use of natural resources
- Providing local employment training

Environmental sustainability and social responsibility

Environmental Sustainability refers to business practices that do minimal harm to the environment. For example:

- Practicing sustainable development
- Recycling
- Including environmental impacts in costs

Social Responsibility refers to business practices that consider community interests. For example:

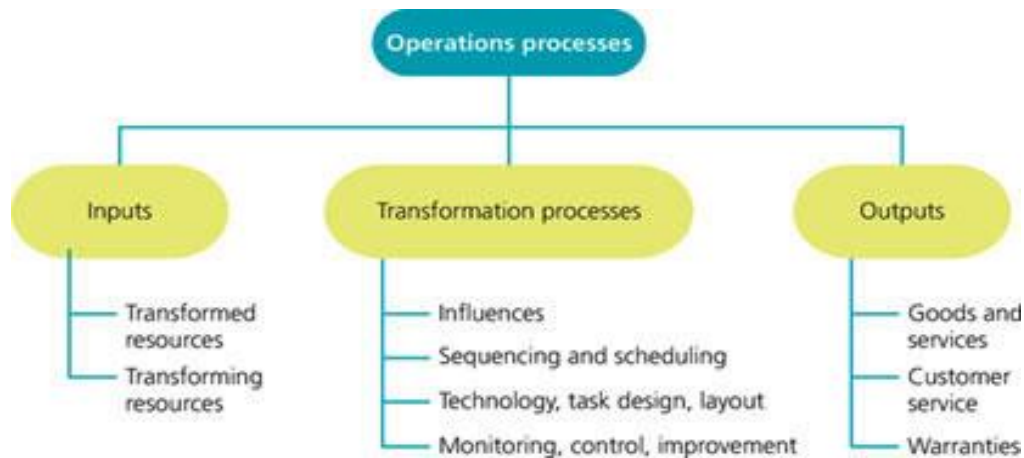
- Making a family-friendly workplace
- Keeping the community informed of decisions affecting them- using local employees whenever possible

OPERATIONS PROCESSES

Operations processes are those processes involved directly with transformation. The processes may be broadly classified according to their role in transformation:

- Inputs
- Actual transformation
- Outputs

Operations processes are at the heart of the success of all businesses. Production involves the skilful bringing together of a number of inputs, such as finance, equipment, management, technology, raw materials and people, to create the finished goods or services through a series of operations processes.



• Inputs

Inputs are the resources used in the transformation process and can be classified as either transformed resources or transforming resources.

Although there are many different types of inputs used in the transformation process, generally there are four common direct inputs, including:

- **Labour:** human effort, both mental and physical, is a necessary input into operations processes
- **Energy:** energy, in the form of electricity or fuels, which can be converted into heat, movement, light, sound or other forms of energy, is an essential input into transformation
- **Raw materials:** essential input, physical components to make the product
- **Machinery and technology:** necessary to enable transformation

Transformed Resources (materials, information, customers)

Transformed resources are input resources that will be converted into goods and services.

Materials are the basic elements used in the production process and consist of raw materials and intermediate goods.

Information is the knowledge gained from research, investigation and instruction, which results in an increase in understanding. The value of information lies mainly in its ability to influence behaviour or decision-making.

External information comes from market reports, statistics from industry observers and industry bodies, official government statistics from the ABS, media reports, academic papers and commentary, management journals, and comparative studies.

Internal information comes from within the business and is gathered from internal sources such as financial reports, quality reports, and internal key performance indicators such as lead times, inventory turnover rates and production data.

Customers become transformed resources when their choices shape inputs. Consumer orientation is essential to business. A consumer orientation takes the preferences and interests of consumers as the starting point to production processes. In this way, the customer acts as an input and their desires and preferences act as a transformed resource.

To better understand the desires and preferences of customers, businesses can implement a Customer Relationship Management (CRM) program. CRM refers to the systems that businesses use to maintain customer contact. CRM software can be used to improve customer service, increase competitiveness, and identify changes in consumer tastes.

SUMMARY:

Transformed resources are those inputs that are changed or converted in the operations process and include:

- **Materials:** the basic elements used in the production process and consist of raw materials and intermediate goods
- **Information:** the knowledge gained from research, investigation and instruction, which results in an increase in understanding
- **Customers:** their desires and preferences are the starting point to production processes.

Transforming Resources (human resources, facilities)

The other collections of inputs to any operations processes are transforming resources, which are those inputs that carry out the transformation process. They enable the change and value adding to occur.

Human Resources include staff, management and organisational structure. The manners in which people work will dramatically impact how inputs are converted.

Staff that are well qualified, hard working and disciplined can bring great productivity and efficiency to business operations. The effectiveness with which human resources carry out their work duties and responsibilities can determine the success with which transformation and value adding occurs. This is because it is employees who coordinate and combine other resources such as machinery and technology, raw materials, and finance to produce goods and services. In this sense, employees are the most crucial of all inputs.

Facilities include those things that assist people to convert inputs. These help create a quality work environment, e.g. office space, meeting rooms.

Facilities refer to the plant (factory or office) and machinery used in the operations processes. Major decisions include the design layout of the facilities, the number of facilities to be used, their location and their capacity.

The plant and machinery can make a very significant difference to a business and its capacity to transform. Clearly the facilities can determine the nature of the operations environment. Modern facilities, which integrate modern technologies, are well lit, well-designed and labour friendly, will be highly conducive to productive operations.

SUMMARY:

Transforming resources are those inputs that carry out the transformation process and include:

- **Human resources:** they coordinate and combine other resources to produce goods and services
- **Facilities:** the plant (office or factory) and machinery used in the operations process

- **Transformation Processes**

The main concept of operations processes is transformation, which is the conversion of inputs (resources) into outputs (goods or services).

A manufacturer transforms inputs into tangible products (goods that can be touched). A service organisation transforms inputs into intangible products (services that cannot be touched).

The influence of volume, variety, variation in demand and visibility (customer contact)

Volume refers to how much of a product is made.

Volume flexibility refers to how quickly the transformation process can adjust to increases or decreases in demand. This responsiveness to the required changes in volume is essential to effectively managing lead times. Lead-time is the time it takes for an order to be fulfilled from the moment it is made.

Variety refers to the range or mix of products made, or services delivered through the transformations process. This is sometimes called mix flexibility. Mix flexibility is known by consumers as product range or variety of choice. The influence of variety on transformation processes is: the greater the variety made, the more the operations process needs to allow for variation.

Variation in demand can impact significantly on transformation resources. An increase in demand will require increased inputs from suppliers, increased human resources, increased energy use and increased use of machinery and technology. However, increased demand may be hard to meet if:

- Suppliers cannot supply quickly enough
- Labour is not flexible enough, skilled or available
- The adopted machinery cannot adjust to increased capacity quickly, either because it is not designed to or because it breaks down
- Increased energy and power cannot be readily sourced.

A decrease in demand will also require operational flexibility as staff may need to have their hours reduced, production may need to slow to avoid inventory build up and suppliers may put on pressure due to contractual agreements.

Influences:

- Changes over time
- Seasons
- Trends
- Innovations
- Economic cycles

Visibility (customer contact) or 'feedback' can directly affect transformation processes. This is because customers and their preferences can shape what businesses make.

Direct contact takes the form of customer feedback given through surveys, interviews, warranty claims, letters, wikis and blogs and verbal contact.

Indirect feedback comes through a review of sales data that gives an indication of customer preferences and market share data, through an observation of peoples' decision-making processes and through consumer reviews.

Because businesses seek to maximise sales, customer contact is essential and ultimately shapes the transformation processes.

SUMMARY:

Transformation is the conversion of inputs (resources) into outputs (goods or services). Transformation differs between manufacturing businesses and service businesses. A manufacturer transforms inputs into tangible products. A service organisation transforms inputs into intangible products. Transformation processes also involve value adding. Transformation processes are influenced by:

- Volume: how much of a product is made
- Variety: the range of products made
- Variation in demand: the amount of a product desired by consumers
- Visibility: the nature and amount of customer contact (feedback)

Sequencing and Scheduling

Sequencing and scheduling are two very important aspects that assist with structuring and ordering the transformation processes.

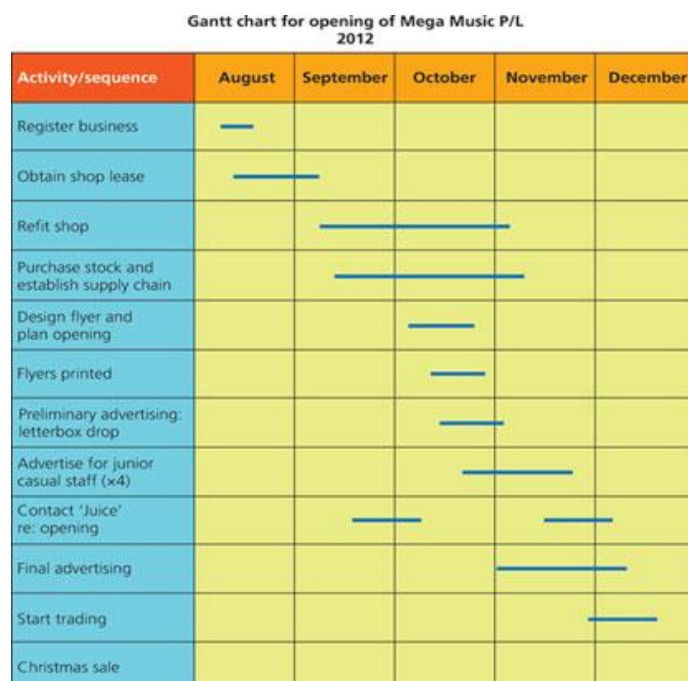
Sequencing refers to the order in which activities in the operations process occur. **Scheduling** refers to the length of time activities take within the operations process.

Two common planning tools used are:

- Gantt charts
- Critical Path Analysis (CPA)

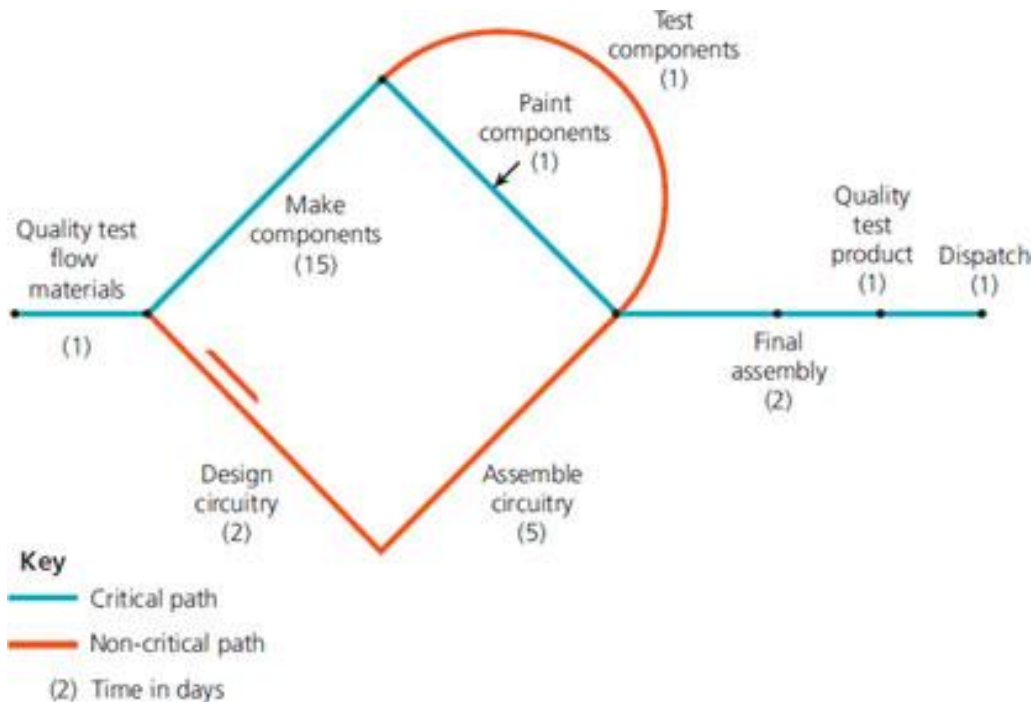
Gantt Charts

The Gantt chart outlines the activities that need to be performed, the order in which they should be performed and how long each activity is expected to take. Gantt charts are used for any process that has several steps and involves a number of different activities that need to be performed.



Critical Path Analysis

The Critical Path Analysis (CPA) is a scheduling method or technique that shows what tasks need to be done, how long they take and what order is necessary to complete those tasks.



The critical path is the *shortest* length of time it takes to complete *all tasks* necessary to complete the process or project.

SUMMARY:

- Gantt charts: a type of bar chart that shows both the scheduled and completed work over a period of time
- Critical Path Analysis: a scheduling method that shows what tasks need to be done, how long they will take and what order is necessary to complete the tasks

Technology, task design and process layout

Technology is the application of science or knowledge that enables people to do new things or perform established tasks in new and better ways.

- Impacts speed, quality and costs
- Affects business competitiveness
- Examples include machinery and robotics, computer software, handsets

Lo-tech: scissors, pens

Hi-Tech: machinery, robotics

The capital cost of technology is relatively high, so businesses need to decide whether to purchase technology or to lease it. Leasing is more common because it is cheaper (lease payments are tax deductible), which allows money saved to be spent elsewhere.

Office Technology

- Computers
- Keyboard
- Modem
- Telephones
- PDA
- Printer
- Eftpos machines

Developments of the above types of technology have created the opportunity for people to do more work in less time, which means a greater range of tasks can be completed in their working time.

Manufacturing Technology

Key manufacturing technologies are robotics, computer-aided design (CAD) and computer-aided manufacturing (CAM).

Robotics applies to highly specialised forms of technology, capable of complex tasks. Robots are used in engineering and specialised areas of research, as well as on assembly lines where a programmable machine capable of doing several different tasks is required. Robotics can shape transformation processes so that they are very high quality, of a consistently high standard, efficient and minimise waste.

Computer-aided design (CAD) is a computerised design tool that allows businesses to create product possibilities from a series of input parameters. It is used in a range of business sizes and types. It is a computerised graphical design tool that generates three-dimensional diagrams from a set of given input data (parameters). Once the design has been created, it can be viewed from multiple angles. This assists both the designer and the end user to visualise what will be produced. This technology is very useful to transformation processes.

Computer-aided manufacturing (CAM) is software used to allow the manufacturing process to become computer controlled. The CAD software can be linked to the CAM software to allow the instantaneous manufacturing of designs that are accepted by clients. CAM can also be used more broadly to calculate how much of each input resource would be required. The CAM software can store historic purchasing records to assist with present purchasing decisions.

Task Design involves classifying job activities in ways that make it easy for an employee to successfully perform and complete the task.

- Deciding how each employee and each resource will be used in the operating process

Attracting the right candidate for the task or job is the final part of a process that starts with task design and ends with selection, that is:

Task design → Job description → Person specification → Recruitment → Selection

Step	Example
Define what needs to be done in a general statement	— a skilled competent electrician
Analyse the general job into specific duties	<ul style="list-style-type: none"> — understand electrical circuits — ability to work carefully and independently to prescribed electrical standards — capacity to correctly install electrical devices and adjust capacity as required — capacity to source correct parts and use in prescribed ways — follow directions — communicate clearly with builders and site managers
Allocate a degree of difficulty and a time element	— supervision: difficulty: 8/10; 10 minutes supervision per hour
Match tasks to existing state/federal awards (base)	— \$26/hour first year licensed electrician
Articulate the task via job descriptors and a pay scale to allow for a range of experiences in a range of work settings. (This indicates the types of skills/ experience and qualifications needed to successfully complete the task.)	— Licensed electrician \$65 000 pa. Duties: to plan and install a range of electrical items and associated circuitry into a range of building types (residential, commercial and educational).

FIGURE 3.14 The steps involved in the task design process

Process Layout

- The way to organise the workflow for best results

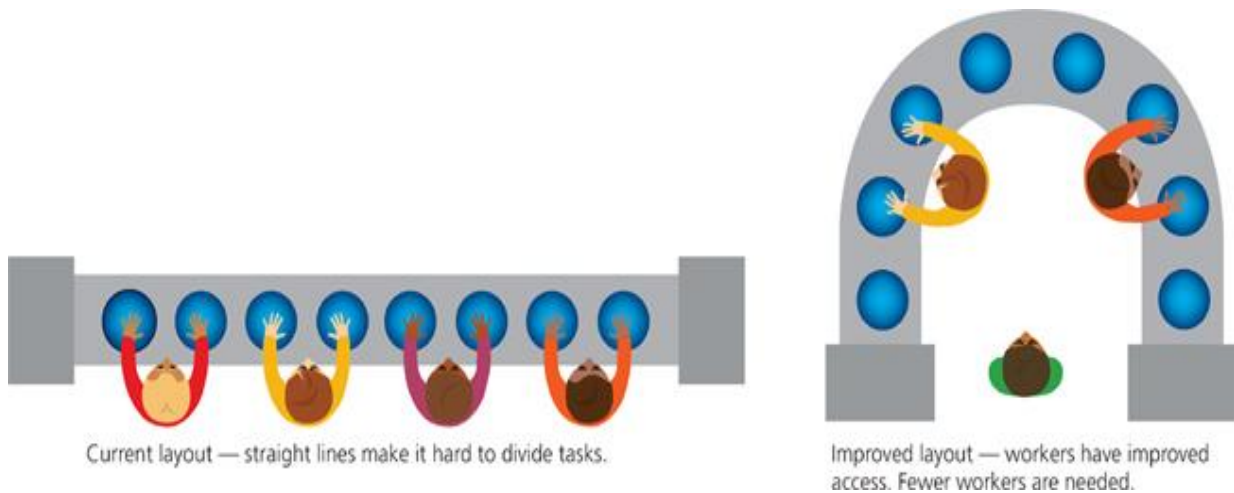
Plant layout is the arrangement of equipment, machinery and staff within the facility (either a factory or an office). The design and layout of this work area has an impact on the efficiency of the operations function.

There are a number of different ways to organise the physical layout of a plant. The method adopted by managers will depend on the type of manufacturing operations conducted by the business. The way in which machinery and technology is orientated and arranged in the operations plant will strongly shape the operations processes. There are alternative ways to lay out machinery, depending what is being made and what volume of production is required. The alternative layout options are the:

- Process layout
- Product layout
- Fixed position layout

Process Layout

The arrangement of machines, such that the machines and equipment are grouped together by the function (or process) they perform. Process production deals with high-variety, low-volume production. In this process, each product has a different sequence of production and the production is intermittent, moving from one department to another.



Product Layout

Product production (mass production) is characterised by the manufacturing of a high volume of constant quality goods. An assembly line is the most common layout for this type of production because it aims to achieve the best possible combination of personnel and machine use — 'assembly line balancing'.

Workstations are arranged to match the sequence of operations, and work flows from station to station. Operations managers must set times for the assembly task, which requires an understanding of not only the nature of the task but also the tools and skills required.

Fixed Position Layout

Project production deals with layout requirements for large-scale, bulky activities such as the construction of bridges, ships, aircraft or buildings. With project production, it is more efficient to bring materials to the site; workers and equipment come to the one work area.

Office Layout

The focus of an office layout is to enable the work to be performed efficiently (with minimal unnecessary disruption and time wastage) in a safe office environment. Typically an office space is organised around discrete workstations. This may be seen as the approach applied to a service-based business.

Office layout is tailored to meet the needs of the business. In a manufacturing business the office layout is often informal. It may even overlook the factory floor so that managers can supervise from their desk.

An office needs to be designed in a way that allows for smooth workflow; it should also provide a space (lunch room, games room) that enables employees to take a break from the work environment if required.

Monitoring, control and improvement

All operations processes should be monitored for their effectiveness. The main transformational processes should be subject to control. This requires effective monitoring and a focus on continuous improvement. Monitoring and control lead to improvements when there is a focus on quality and standards.

Monitoring is the process of measuring actual performance against planned performance. It involves the measuring of all aspects of operations, from supply chain management and the use of inputs, through to transformation processes and outputs.

Monitoring typically is arranged around the needs to measure Key Performance Indicators (KPIs). KPIs are predetermined variables that are measured so that appropriate controls to operations processes can be made. Typical KPIs include:

- Lead times/wait times/idle times
- Inventory turnover rates/stock-out rates
- Defect rates, repair rates and warranty claims
- Process flow rates
- Capacity and volume rates/capacity utilisation rates
- IT and maintenance costs
- Direct and indirect cost analysis

Monitoring of the KPIs gives operations managers a chance to measure how the business is going and to assess performance against targeted levels of performance.

Control occurs when KPIs are assessed against predetermined targets and corrective action is taken if required. This means controlling compares what was intended to happen with what has actually occurred. If there is a discrepancy between performance and goals, changes and improvements can be made. The regular performance review is crucial because it should indicate any issues and, where possible, intervention or corrective action may need to be taken.

Control requires operations managers to take corrective action. That is, the operations manager will make changes to the transformation process such as redesigning the facilities layout or adjusting the level of technology in order to correct the problem.

Improvement refers to systematic reduction of inefficiencies and wastage, poor work processes and the elimination of any bottlenecks. A bottleneck is an aspect of the transformation process that slows down the overall processing speed or creates an impediment leading to a backlog of incompletely processed products. Improvement typically is sought in the areas:

- **Time:** through the minimisation of bottlenecks, assessments of the necessity in all transformations processes and wait times
- **Process flows:** and smoothness of transitions between transforming processes
- **Quality:** through the pursuit of quality goals, measurement of product standards and quality and an assessment of returns and warranty claims
- **Cost:** through an assessment of per unit costs of production, a review of expenses (fixed and variable) and an assessment of per unit costs of delivery
- **Efficiency:** through the reduction of waste and the creation of greater output per unit input

Continuous improvement involves an ongoing commitment to achieving perfection. Although the goal of perfection will never be reached, the 'striving' is important to the business culture. The process becomes one of setting higher and higher standards in the continual pursuit of improvement.

SUMMARY:

- All operations should be monitored against KPIs for their effectiveness.
- Control occurs when corrective action is taken if there is a discrepancy between performance and goals.
- Improvements lead to reduction in inefficiencies such as bottlenecks.
- Continuous improvement involves ongoing commitment to achieving perfection.

- **Outputs**

Outputs are the result of a business's efforts – the final good or service that is delivered or provided to the consumer.

The most obvious output of the operations process is the goods made or services provided. However, there are other, more subtle outputs. Combined, customer service and warranties imply that the inputs and transformations processes are subject to scrutiny, as the outputs will be assessed by consumers.

Customer Service

Customer service refers to how well a business meets and exceeds the expectations of customers in all aspects of its operations. If a customer expresses dissatisfaction with a product on account of it being defective, not meeting quality expectations, finds wait times/lead times too long or returns the product or makes a warranty claim, then the operations processes need review.

Customer service can no longer be regarded as merely explaining the refund policy or providing a complaints department. Rather, it is an attitude that should be adopted by all departments and employees within the business. Exceeding customers' expectations is likely to be the key in developing long-term customer relationships. Of course, such services must be able to be delivered. Failure to do so will drive customers away.

Recent market research has shown that businesses that provide superior customer service can:

- Charge an average of 10 per cent more for the same goods and services
- Grow twice as fast as their competitors
- Increase their market share and profits

SOME STATS:

- 91% of unhappy customers will never purchase services from you again
- For every customer who bothers to complain, there are 26 who remain silent
- Almost 70% of the identifiable reasons why customers left typical companies had nothing to do with the product. The prevailing reason for switching was poor quality of service.

Warranties

Warranties are businesses' promises to correct any defects in their products or in the services they deliver.

A good way to assess the effectiveness of operations processes is to measure the number of warranty claims. Warranty claims are made against goods that have defects arising from an issue in transformation. Although a small proportion of warranty claims are false, the number of claims made against a business on a particular product line or product range will give an indication of problems in the processing.

EXAMPLE: the Mazda 3 — a highly popular, medium-sized car. A small defect was detected in the central LED panel, which attracts moisture. The company, in 2011, replaced the component and rectified the fault. However, the rectification costs money. Operations managers need to trace the source of the fault in manufacturing and rectify it. In this way, the warranty claims lead the business to improve transformation processes.

SUMMARY:

The outputs of transformations processes include:

- The goods made or services provided
- Customer service
- Warranties

Customer service refers to how well a business meets or exceeds the expectations of consumers.

Exceeding customers' expectations is likely to be the key in developing long-term customer relationships.

Warranties are an agreement to fix defects in products. An assessment of warranty claims can help a business to adjust transformations processes so that they become more effective.

OPERATIONS STRATEGIES

- **Performance Objectives**

Operations strategies are based around the need to achieve performance objectives.

Performance objectives are goals that relate to particular aspects of the transformation function and can be allocated to particular key performance indicators (KPIs) in the areas of the following...

Quality, speed, dependability, flexibility, customisation, cost

Quality

Quality is often determined by consumer expectations, which are used to inform the production standards applied by the business. Quality performance objectives include:

- Quality of design
- Quality of conformance
- Quality of service

Quality of Design: How well a product is made or a service is delivered

Quality of Conformance: How well the product meets the standard of a prescribed design with a certain specifications

Quality of Service: How reliable, suitable and timely the service delivery is

Speed

Speed refers to the time it takes for the production and the operations processes to respond to changes in market demand. Speed requires that changes in input levels and processing times can be made in response to demand.

As a performance objective, speed aims to satisfy customer demands as quickly as possible.

Therefore, goals for speed include:

- Reduced wait times
- Shorter lead times
- Faster processing times

Dependability

Dependability, or reliability, refers to how consistent and reliable a business's products are.

Dependability, in respect of goods, refers to how long the products are useful before they fail. One measure of dependability is measured by warranty claims. A highly durable product is a dependable product. Perishable products can also be dependable if they are of consistent and predictable standard.

In respect of services, dependability refers to consistency of service standards and reliability. A measure for service dependability is the number of complaints received; the fewer the complaints the more dependable the service.

Flexibility

Also called adaptability, flexibility refers to how quickly operations processes can adjust to changes in the market.

Flexibility can be best achieved by increasing the capacity of production. This can be done by using plant and machinery better or purchasing new technologies. Another option is changing the product design thus creating a broader variety. These options enable the business to better meet a broader range of consumer desires.

With services, flexibility can be achieved through increasing the number of service providers, increasing the provider's skill level and through improving the level of technology used when providing the service.

Customisation

Customisation refers to creation of individualised products to meet the specific needs of the customers. Services are generally customised, although aspects of services can be standardised as seen in the fast-food sector.

Cost

Cost as a performance objective refers to the minimisation of expenses such that operations processes are conducted as cheaply as possible.

The acquisition of new technologies can help a business to lower costs, use inputs better and minimise wastage. Moreover, a business will also seek to reduce supplier costs, manage inventory to reduce cost and maximise flexibility, and find distribution methods that are most cost and time effective.

All of the performance objectives will be allocated particular targets or goals, and will be measured against the achievement of those targets.

- **New Product or Service Design and Development**

An important strategy for the operations processes of business is the creation, or design and development, of new products (goods and services). The design, development, launch and sale of new products enable a business to grow and to attain a competitive advantage.

Design relates to new products, ideas and innovations.

Development to implementing and testing ideas.

There are two different approaches that determine product design and development:

- Consumer preferences
- Changes and innovations in technology

Important factors in new product design and development include:

- Quality
- Supply chain management
- Capacity management
- Cost

Service design and development differs from the design and development of products, as services are intangible and 'consumed' as they are produced.

A service can be:

- Explicit: the application of time, expertise, skill, and effort
- Implicit: the feeling of being looked after

- **Supply Chain Management**

Supply chain management (SCM) involves integrating and managing the flow of supplies throughout the inputs, transformation processes (throughput and value adding) and outputs to best meet the needs of customers.

Logistics, e-commerce, global sourcing

Logistics refers to the physical distribution and transportation of products. The use of warehouses and distribution centres is crucial to the successful management and movement of inventories.

E-Commerce enables businesses to source through online links to suppliers through business-to-business (B2B) processes and also enables customer's direct access to products through business-to-consumer (B2C) processes.

Global Sourcing

Sourcing, in the context of SCM, involves the purchasing of inputs for transformations processes. There have been four recent trends in sourcing:

- Supplier rationalisation
- Vertical (backwards) integration
- Cost minimisation
- A shift to flexible supply chain processes.

Global sourcing involves the use of global markets for the purchasing of any supplies; however, in the context of SCM, global sourcing refers to where and how supplies are sourced within the limitation of geography.

- **Outsourcing**

Outsourcing involves taking to market those internal business processes and activities that can be done better and at a lower cost when given to external vendors.

The term 'outsourcing' is often called business process outsourcing (BPO) and captures a range of outsourced business processes including:

- Finance and accounting outsourcing (FAO)
- Knowledge process outsourcing (KPO) - legal process outsourcing (LPO)

Advantages and disadvantages

The advantages or benefits of outsourcing include:

- Simplification
- Efficiency and cost savings
- Increased process capability
- Increased accountability
- Access to skill/resources lacking within the business
- Provides a capacity to focus on core competencies, thus improving in-house performance and several strategic benefits

The challenges and issues facing businesses that use outsourcing include:

- The cost and uncertainty with payback
- Issues with communication and language
- Loss of control of standards and information security
- Loss of corporate memory and costs associated with IT, organisational change, redesign and management of hierarchies

- **Technology**

The thoughtful application of technology helps a business create a competitive advantage.

Technology in the operations function may be classified according to whether it applies to and improves inputs, transformations processes and outputs; or whether it makes the managerial and administrative functions smoother.

Leading edge, established

Leading Edge Technology is the technology that is the most advanced or innovative at any point in time.

By utilising the best available technologies businesses can create products more quickly and to higher standards, with less waste, and also operate more effectively.

Established Technology is the technology that has been developed and widely used, and is simply accepted without question. Established technologies are functionally sound and help to establish basic standards for productivity and speed. Such technologies include the use of computers and various software packages in managing business operations and functions.

Both forms of technology give businesses efficiencies, productivity gains and a capacity to improve operations processes

- **Inventory Management**

Inventory or stock refers to the amount of raw materials, work-in-progress and finished goods that a business has on hand at any particular point in time. Inventory management is another crucial facet of operations management, and the strategies applied to the management of inventory will have a significant impact on transformations processes.

Advantages and disadvantages of holding stock, LIFO, FIFO, JIT

Holding Stock

All businesses will carry some stock. The issue of importance to business is exactly how much to carry.

Advantages

There are several advantages associated with holding stock:

- Being able to respond quickly to changes in demand
- Allow development of new markets that can be supplied stock quickly
- Availability
- Guards against uncertainty/supply issues
- Production faults are covered

Disadvantages

Despite there being many advantages of holding stock, the trend is to hold as little stock as possible and to adopt a 'make-to-order' approach. That is, there are many perceived disadvantages of holding stock. These include:

- Costs (of holding and handling)
- Tying up of money that could be used elsewhere

- Need of storage space
- Quality and freshness issues/expiry dates
- Less efficient use of working capital
- Decrease in demand/change in market

Inventory Evaluation Methods

Businesses that buy stock need to decide how much to carry in inventories. At the end of an accounting period, it is important that the value of unsold stock be determined. It is also very important to know the value of stock sold so that profit can be correctly determined. However, how do you calculate the value of the remaining stock — the inventory valuation — if the price of the goods making it up change during the accounting period? There are different approaches to inventory valuation. The main inventory valuation techniques include:

- LIFO (last-in-first-out)
- FIFO (first-in-first-out)

LIFO (Last-In-First-Out)

The simplified application of LIFO would cost *each* unit sold at the *last* cost recorded. Under this simplified method, the total number of items sold was 2200 and the cost for each unit is assumed to be \$120. Therefore, the total cost of sales is $2200 \times \$120 = \$264\,000$ and the gross profit is:

$$\text{Total sales} - \text{Total cost of sales} = \$363\,000 - \$264\,000 = \$99\,000.$$

The advantage of using LIFO is that the prices used to calculate the cost of sales, and therefore the gross profit, are more recent and therefore more closely reflect their economic value. However, in times of falling prices, LIFO overstates profits and maximises taxes.

FIFO (First-In-First-Out)

The simplified application of FIFO would cost each unit sold at the first cost recorded. Under this simplified method, the total number of units sold was 2200 and the cost for each unit is assumed to be \$100. Therefore, the total cost of sales is $2200 \times \$100 = \$220\,000$ and the gross profit is:

$$\text{Total sales} - \text{Total cost of sales} = \$363\,000 - \$220\,000 = \$143\,000.$$

In general, neither LIFO nor FIFO is necessarily better. The important point to remember is that during periods of price changes, two businesses (performing equally well in most respects) could legitimately report differing profit levels depending upon the inventory valuation method used. Because the inventory valuation method has such a powerful impact on gross profit, a business must state in the footnotes to its financial accounts which method is used.

JIT (Just-In-Time)

One means of managing stock is to apply a just-in-time (JIT) approach, which aims to overcome the problem of end-of-period stock valuation: a lean production method. This is because a JIT approach aims to have the business only make enough products to meet demand. A JIT approach also allows

retailers to display a wider range of products, as they need to store less and can order in response to consumer demand. This, therefore, saves money, as there are no expensive holding and insurance costs. Moreover, shrinkage costs and losses due to obsolescence are also minimised. However, a JIT approach requires a very flexible operations function with flexible processing. It also requires a very high ability to respond quickly to changes in market demand as well as reliable supplier deliveries, which must be received at the appropriate time.

- **Quality Management**

'Quality' is a term used to describe the degree of excellence of a product or service, and its fitness for a stated purpose. Quality management refers to those processes that a business undertakes to ensure consistency, reliability, safety and fitness of purpose of product.

Control

Quality Control reduces problems and defects in the product by using inspections at various points in the production process.

- Inspection, measurement and intervention
- Feedback is passed on to each stage of operations

Assurance

Quality assurance (QA) involves the use of a system to ensure that set standards are achieved in production. This is done through taking a series of measurements and assessing them against pre-determined quality standards.

- Application of international standards, such as ISO 9000 series
- Business strives for 'world's best practice'

Improvement

Quality improvement focuses on two aspects: continuous improvement and total quality management – a focus on continual improvement is an ongoing commitment to improving a business' goods or services – innovation, employee involvement and quality are closely aligned and indicate quality working processes

Continuous Improvement: the belief that over time processes will be made more efficient and effective.

Total Quality Management (TQM): is an ongoing, business-wide commitment to excellence that is applied to every aspect of the business's operation. It focuses on managing the total business to deliver quality to customers.

To achieve TQM, objectives requires four elements:

- Benchmarking
- Employee empowerment
- A focus on the customer
- Continuous improvement

- **Overcoming Resistance to Change**

A notable influence on operations strategy arises from the need to manage and be responsive to change. All businesses are subject to change from the external environment. Legislative and regulatory changes, changes in economic conditions, social changes over time and technological breakthroughs all impact on the business and shape its operations. Moreover, change can also come from within the business through the initiative of staff or the application of technology and a focus on innovation.

Resistance to change can be a major obstacle to the realisation of operations goals. Overcoming the resistance to change is a necessary aspect of change management.

There are two principal sources of resistance to change: financial and psychological (inertia)

Financial costs, purchasing new equipment, redundancy payments, retraining, reorganising plant layout, inertia

Financial Costs

One major cause of a resistance to change from managers and business owners is that of financial costs. The main financial costs associated with change include the:

- Cost of purchasing new equipment
- Cost of redundancies
- Costs of retraining employees
- Costs associated with structural reorganisation of the business, including changes to plant and equipment layouts.

Each of these costs to a greater or lesser extent can be a cause for concern by business owners and operations managers who need to manage change.

Purchasing New Equipment

- Purchasing latest machinery, computer hardware and software, technology

Redundancy Payments

- Downsizing due to outsourcing or quality improvements leads to staff reductions and payouts to them

Retraining

- Retained employees will need to learn new skills, such as knowledge/understanding of software or multi-skilling

Reorganising Plant Layout

- Improved supply chain or technological improvements mean new processes and new flows between stages

Inertia

Forces within a business that resist change and prefer the way things were; often middle managers. Inertia can be due to feelings of uncertainty or fear of the unknown

Resistance to change can be overcome by a business identifying the source(s) of change and assessing whether there is a need to accommodate change.

Lowering the resistance to change through communicating a need for change will result in widespread support for the change.

- **Global Factors**

There are several global factors that present opportunities when assessing the operations strategies available for operations managers. These opportunities may be classified as:

- Global sourcing
- Economies of scale
- Scanning and learning
- Research and development (R&D)

Global sourcing, economies of scale, scanning and learning, research and development

Global Sourcing is a broad term that refers to businesses purchasing supplies or services without being constrained by location.

Although a key aspect of global sourcing involves procurement for the supply chain, the concept is much broader than simply a supply chain management strategy. Global sourcing as an operations strategy involves the sourcing of any business operations that gives the business cost advantages. In this broad meaning, global sourcing includes any business operations outsourced.

Acquiring raw materials, human resources and supplies from the best/cheapest location around the world

Economies of Scale refers to cost advantages that can be gained by producing on a larger scale. This means that businesses can lower their per unit input costs.

Expanding the scale of operations into countries where the inputs are cheaper or the laws/taxes are less, which enables the business to make a cheaper product

Economies of scale become a global factor when businesses sell to global markets. Clearly, any individual nation has a limited population to sell to. When a business expands into global markets, the need to source globally becomes a strategic decision. Similarly, the need to sell to global markets becomes a decision based on scale advantages. As the scale of production increases, the costs per unit falls. This means that profitability can rise. Moreover, product lifecycles are extended, which means there is greater added value on production.

Scanning and Learning can be a very valuable operations management tool as it can help managers adapt best practice to the business operations.

All businesses can benefit from scanning the global environment and learning from the best practice of businesses around the world.

Continually checking and changing the business due to the trends in markets and competitor's behaviour

Research and Development (R&D) helps businesses to create leading edge technologies, and to create innovative products and solutions. It can make a very big difference to the level of innovation, quality and competitive advantage of a business.

Finding ways to improve existing or introduce new products.

Government encourages R&D, and may offer taxation incentives and grants. These incentives and grants assist businesses to invest and allocate resources into R&D.