Unit 1 Operation Management Overview

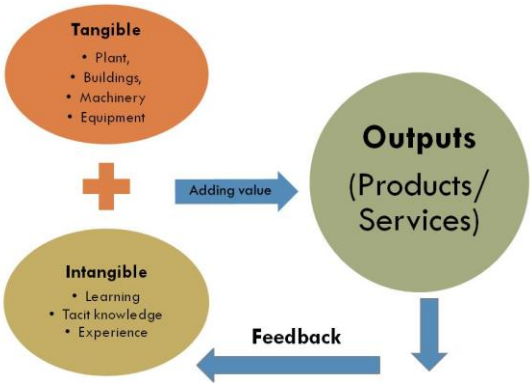
Definition

Operation Management is the set of activities that create goods and services through the transformation of inputs (materials, energy, customers' requirements, information, skills, finance, etc.) into outputs for the end customer (Slack, 2001).

The important things to remember

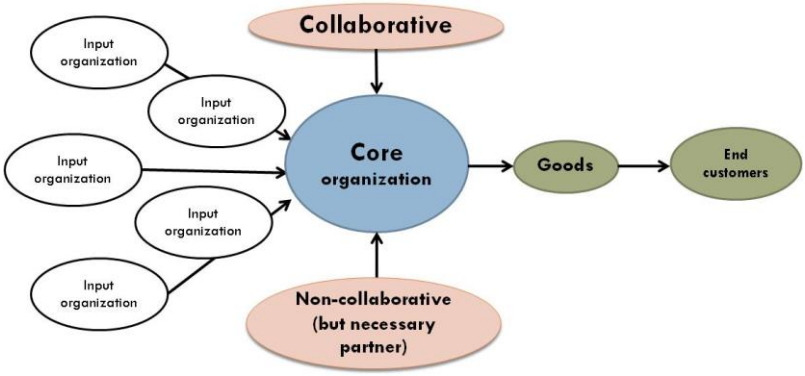
All organizations produce some mixture of products and services. For example, if you buy a software on a disc it is classed as a product, but if you download it over the internet, it is classed as a service. Operations management has an important impact on both revenue and cost and therefore profits.

Operation system



Modern era of operations management

Organizations see themselves as part of a wider, extended enterprise. There is a network of collaborative partners' link together to form an extended enterprise within an industry.



What are the similarities between all operations?

Below is an example of transforming resources (facilities and staff) in three very different types of operation.

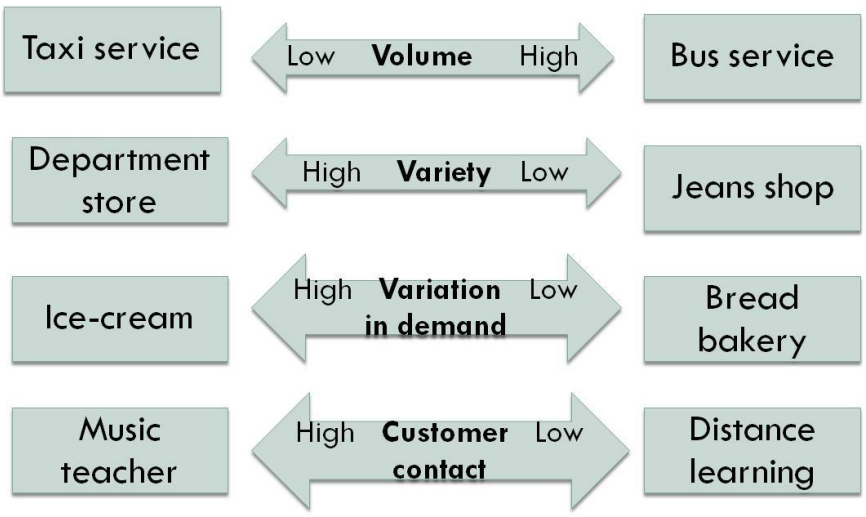
Types	Ferry company	Paper manufacturer	Radio station
Facilities	• Ships on-board navigation • Dry docks • Materials-handling equipment	• Paper-making machines • Packing machinery • Warehouses	• Broadcasting equipment • Studios and Studio equipment • Transmitters
Staff	• Sailors • Engineers • Maintenance staff • Catering staff • Cleaners	• Operators • Chemists and chemical engineers • Process plant engineers	• Disc jockeys • Announcers • Technicians

How are operations different from each other? (The Four Vs of Operations)

- **Volume** – how many products or services are made by the operation?
- **Variety** – how many different types of products or services are made by the operation?
- **Variation** – how much does the level of demand change over time?
- **Visibility** – how much of the operation's internal working are 'exposed' to its customers?

Examples

The picture indicates that operations whose profiles occupy the right-hand extreme of the dimensions (high volume, low variety, low variation and low visibility) tend to operate at lower cost than those at the other end.



Responsibility for Operations Managers

- **Management of value:** value added
- **Capacity management:** the right volume of goods and services
- **Location decisions:** where the company will expand its outlets to
- **Process management:** what are the nature, specification, and assembly/delivery of the product or service
- **Managing technology:** searching for and purchasing appropriate equipment
- **Human resources management:** human know-how and capabilities

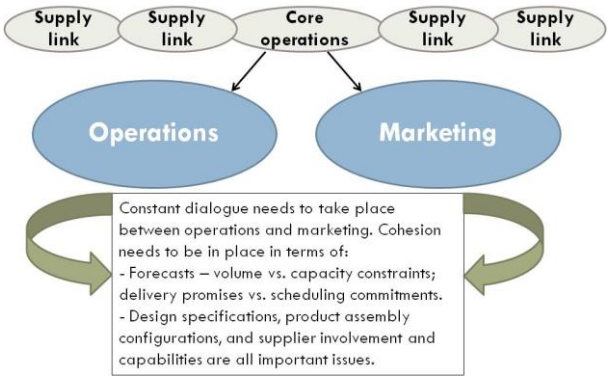
The manufacturing/Service 'Divide'

The main point for this is that manufacturing and service operations often combine to provide an complete offer to customers and other key stakeholders. That means a retail outlets (a service setting) are very dependent upon manufactured goods. In turn, manufactured goods depend on excellent service in retail outlets. For example, the automobile industry is often seen as a purely manufacturing concern. However, for customers, the after sale service is very important in the decision to purchase.

Operations Management and Marketing

The ability to enter and compete in both new and existing markets is very dependent upon operations capabilities. This, in turn, can make companies achieve customer requirements.

The critical like between marketing and operations



Activity: Value Stream Analysis

Value stream analysis is based on the idea that the firm consists of a sequence of activities, each of which is designed to add some value to the product or service as it moves towards the customer. However, the production of goods or provision of services also implies cost and unnecessary time, space, etc. to the process.

The furniture value chain

Your task is to draw **Value Stream Map** for a particular industry. Then give examples of value added activities as well as waste for each stage of the stream.

For example,

Saw milling to furniture

- **Value added** : delivery timber on time
- **Waste/cost** : wrong specifications, which in turn, lead to late delivery

Unit 2 Operations Strategy

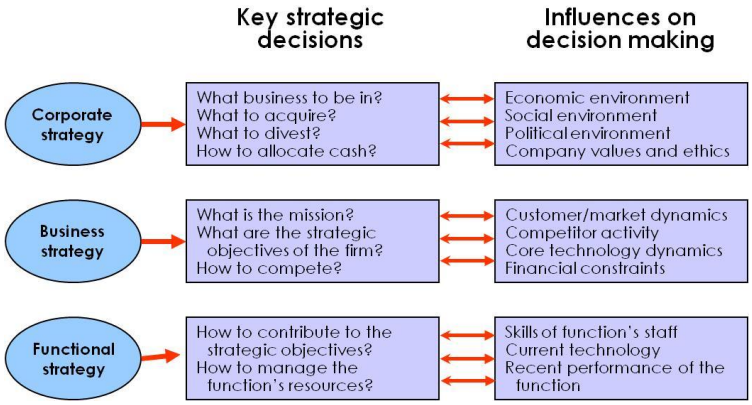
Definition of Operation strategy

Operations strategy is the total pattern of decisions and actions which set the role, objectives and activities of the operation so that they contribute to and support the organization's business strategy …'

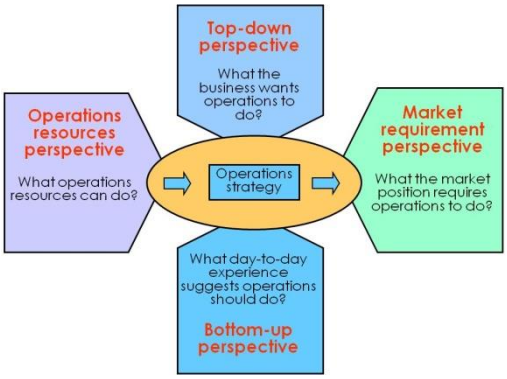
Purposes of Operations Strategy

To contribute directly to the strategic **objectives** of the next level up in the hierarchy;
To help other parts of the business make their own contribution to strategy

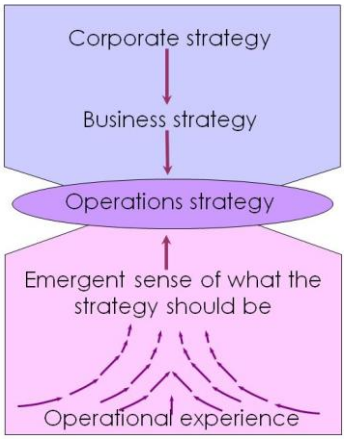
The Strategy Hierarchy



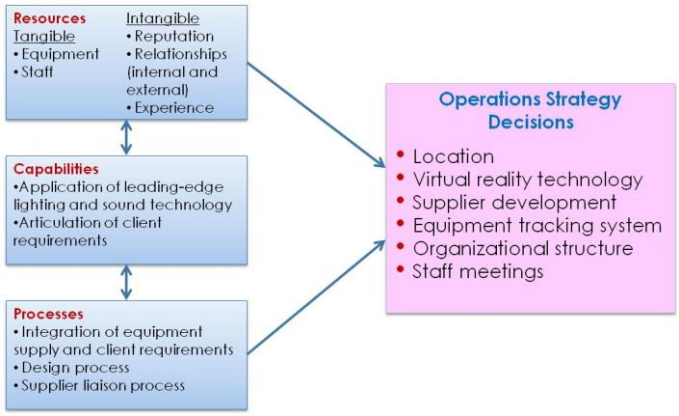
The four perspectives on operations strategy



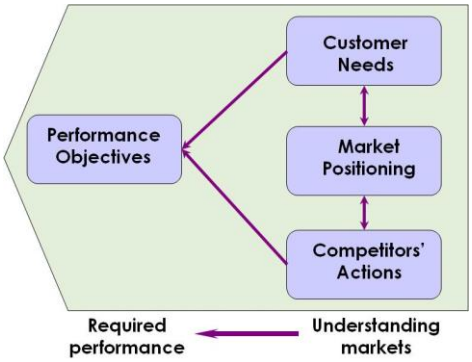
1. Top-down and bottom-up perspectives



2. The operations resource perspective (Example of the lighting company)



3. The market perspective on operations strategy



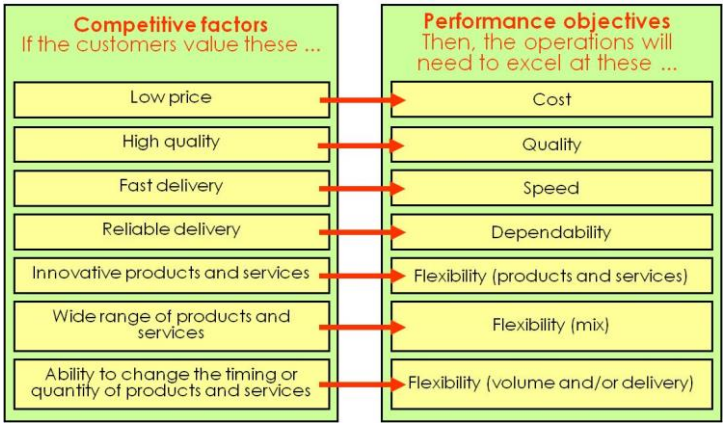
Market requirements and operations resources perspectives of operations strategy

Operations strategy reconciles the requirements of the market with the capabilities of operations resources

Relative Importance of each performance objective

1. The Influence of the organisation's **customers**
2. The influence of the organisation's **competitors**
3. The stage of organisation's **products and services in their life cycle**

1. Customer influence on performance objectives

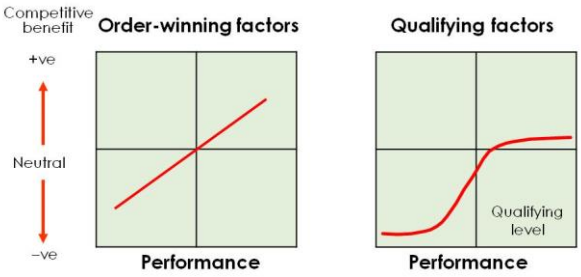


2. Order Winning and Qualifying Objectives

Terry Hill (1995; 2005) explained order-winning and order qualifying that…

- **Order winners** are those factors that win orders in the marketplace over competitors, such as low cost, delivery requirements.
- **Order qualifying** are those factors that the firm needs to be able to achieve in order to compete at all in the marketplace. Without these capabilities the firm will lose orders – in fact, order qualifiers may become order losers for the firm. In high-tech industries, for example, an order qualifier must include up-to-date technology – without this the firm cannot hope to compete and will decline. Another example is Taco Bell Restaurant. John Martin transformed Taco Bell into a fast-food restaurant, he discovered that offering Mexican food was only an order-qualifying factor. Customers' order-winning criteria were found to be what was termed 'FACT' (fast, accurate, clean, timely).

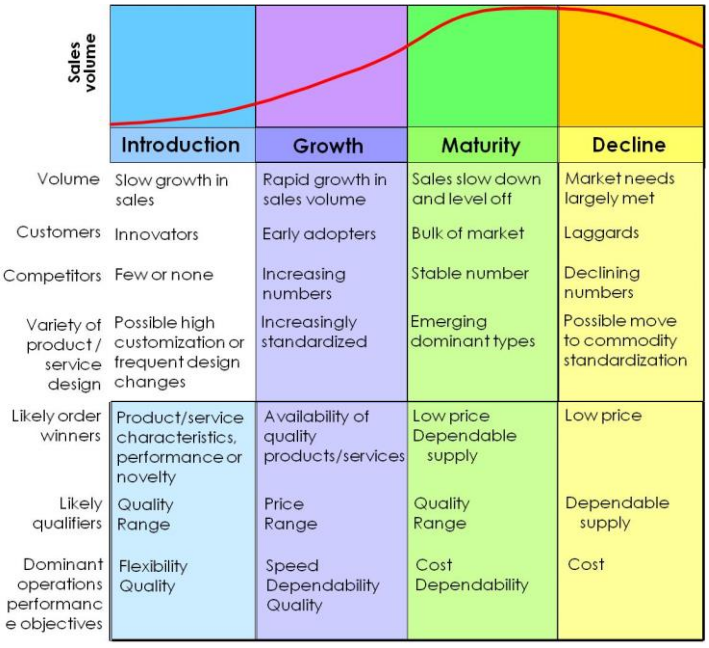
Order-winning and order-qualifying graph



The first graph shows a steady and significant increase in their contribution to competitiveness as the operation gets better at providing them.

The second graph shows that the company only starts to make a contribution to competitiveness when the operation manages to raise its performance to a qualifying level.

3. Stage of Product Life Cycle



Methods to Develop Operations Strategy

The Hill Methodology

Based on the top driven and market driven perspectives.

- Step 1 – understanding the long-term corporate objectives
- Step 2 – how the marketing strategy has developed to achieve the corporate objectives
- Step 3 – translates marketing strategy into 'competitive factors' – order winning and qualifying
- Step 4 – Process choice – define a set of structural characteristics of the operation which are consistent with each other and appropriate for the way the company wishes to compete
- Step 5 – Infrastructural features of the operation

The challenge of operations strategy formulation

An operations strategy should be:

- Appropriate ...
- Comprehensive ...
- Coherent
- Consistent over time

The five P's of operations strategy implementation

1. *Purpose* – a shared understanding of the motivation, boundaries and context for developing the operations strategy
2. *Point of entry* – the point in the organization where the process of implementation starts
3. *Process* – how the operations strategy formulation process is made explicit
4. *Project management* – the management of the implementation
5. *Participation* – who is involved in the implementation

Unit 3 Supply Management

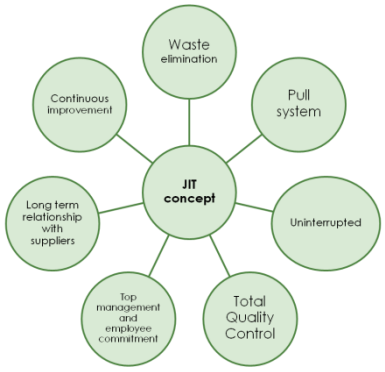
The Important of Supply

Managing the provision of the resources necessary to conduct the operations of the organisation – a function variously called purchasing, procurement, buying, and materials management (it doesn't really matter which term we use) – is now increasingly a matter of competing for scarce commodities which may differentiate the product or service in the eyes of the customer or consumer.

The strategic Important of Supply over time

For business (and therefore for Operations Management) the current importance of supply chains can be linked to the rise of international ***mass production*** in the early part of the twentieth century. As North American manufacturers began to assemble products, most notably automobiles, in several, geographically distant, locations, they created 'networked' organisations.

Just In Time concept



Supply and Outsourcing

In the needs of lower cost and sustain its product quality, a firm may choose to outsource its production offshore. For example, UK firms decide to shift customer service operations to India since 1990s due to the need of reducing cost. However, it can create a strong newcomer into the industry

Activity

Choose a case study, analyze, summarize, and present.

- Toyota
- Apple
- Zara
- Adidas

Unit 4 Innovation

What is innovation

Innovation is the core business process associated with *renewing* what the organization does and what it offers to the world. Examples of recent major innovation include: Amazon in online retailing, eBay in e-auctions, Skype in voice over internet telecoms and Google in everything from search engines, through advertising to mobile telephones.

Learning to Managing Innovation

Case study : 3M company

3M – a company whose commitment to innovation is such that it based its branding on themes like 'Innovation – working for you.' 3M see strategic advantage in their being able to come up with a regular stream of product innovation, so much so that they have a policy that 50% of sales should come from products invented during the past 3 years. In practice this means that they are betting on their ability to bring new ideas to market not once or twice but consistently and across a range which now numbers around 60,000 products world-wide.

Operation and Innovation

The key message here for operations management is to ensure that the ways in which the organization carries out its various tasks are tuned to capturing and using knowledge. And much of this comes through **learning by doing**, trying things out and capturing useful lessons from that experience for next time.

Type of Innovation

1. *Product innovation* – changes in the things (products/services) which an organization offers;
2. *Process innovation* – changes in the ways in which they are created and delivered;
3. *Position innovation* – changes in the context in which the products/services are introduced;
4. *Paradigm innovation* – changes in the underlying mental models which frame what the organization does.

1. Product/Service: It is an example of the move to electronic mechanisms, to mobile communications and now to 'smart' phones which involve the convergence of computing and communications.

2. Process : a change in the manufacturing methods and equipment used for production, such as mobile banking as an alternative to banking systems.

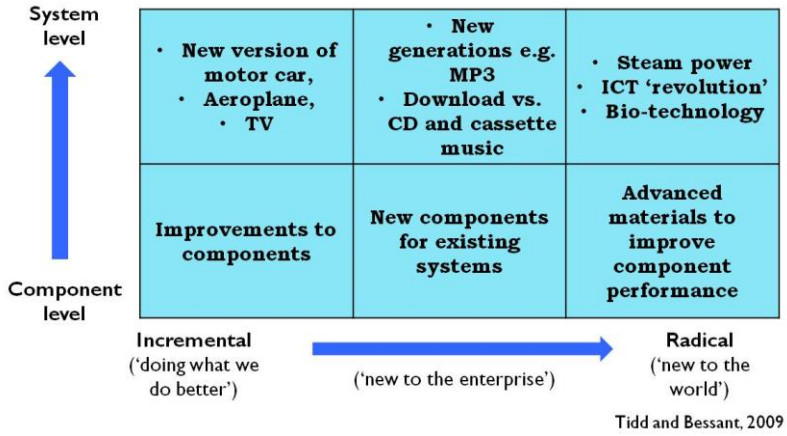
3. Position : Haagen Dazs changing the target market for ice cream from children to consenting adults.

4. Paradigm : iTunes platform – a complete system of personalized entertainment

Component vs. System Level

- Component level – innovation at a component level
- System level – innovation at a system level

Type of Innovation



Activity

Give examples of types of innovation

Unit 5 Sustainable Operations Management

What is the important of sustainability?

Since the operations must be managed in a way that will enable the firm to compete against extensive and increasing levels of competition from around the world, sustainability is a part of this increased competition.

The 'Triple Bottom Line'

The graph illustrates that focusing only one or two aspect is not enough and even leads to unsustainable activity

Focus on Sustainable OM

At the micro-level, firms' operational decisions determine the production and distribution technologies and system design that they employ. These in tern determine how efficiently (and which) materials and energy are consumed as well as the type and intensity of waste injected into ecosystems. Sustainable OM, therefore, potentially has an important role to play in contributing to solutions for the sustainability challenges.

To fulfill that potential, we need to generate research that enables production and distribution systems to operate more efficiently with respect to their environmental and social impact.

Inputs: The supply chain

Sustainability in supply chain: carbon leakage

Under the Kyoto protocol (UNFCCC) and international trade rules, countries' emissions are based on production levels rather than consumption. For some western countries more than 30% of consumption-based emissions are imported and hence not accounted for, whilst for China 22.5% of its emissions are generated for the production of goods for consumers elsewhere (Davis & Caldeira, 2010) That is why this is called 'carbon leakage' - carbon emissions slip through the measurement net and this can introduce significant inequalities on countries' right to carbon allowances.

Emerging of environmental management standard

As the awareness of environmental management grew, the ISO 14000 series emerged, designed to instil 'best practice' – again including supply chain management, in an environmental management context. ISO 14000/01 was a success and is still very well respected. As with ISO 9000/01, the environmental standard is focused on how a product or service is produced rather than on the product itself. ISO 19011 is a combined scheme for an organisation that wishes to be accredited for both standards at once.

Process: In the operation

An innovation response for sustainability: lean thinking

Example: Japan manufacturing techniques: move from supply-led thinking to demand-led (using JIT system). This technique is applied with the removal of waste. Taichi Ohno, Chief Engineer at Toyota, developed the list of seven types of waste and production engineers worldwide began to learn.

Ohno's Seven Waste and sustainability issues

Ohno's waste	Sustainability issues (example)
Overproduction: producing more than you can sell or use	30 million tons of foods in US are wasted annually
Unnecessary transportation: wasted energy in relocation	Waste of non-renewable fuel in transportation
Inventory: has stock over demand	• Produce high volume of products consume high space in the storage. • Products (such as foods) has spoiled.
Motion: operator making movements that are unnecessary	Operator spends time looking for parts, tools, documents.
Defects: wasted effort embodied in something that cannot be sold or used, or needs rework	The rework of scrap page that cannot use is a waste of resources
Over-processing: doing more work on something than is required by the customer	Doing more work to produce one product that can only be sold for a small amount of customer
Waiting: doing something that not effectively used	Time not being used effectively when moving production to the next stage

Outputs: Products and services

1. Reverse Logistics: Remanufacturing – the return of unsold goods, recycling for disassembly and reclaim of materials.
2. Choice Editing: consumers have to make choices in their purchases according to sustainability issues.

Exercise: Live Cycle Assessment

Live Cycle Assessment (LCA) is a tool for assessing the environmental impacts of a product, process or service form design to disposal. LCA involves the collection and evaluation of quantitative data on the inputs and outputs of material, energy and waste flows associated with a product over its entire life cycle so that the environmental impacts can be determined

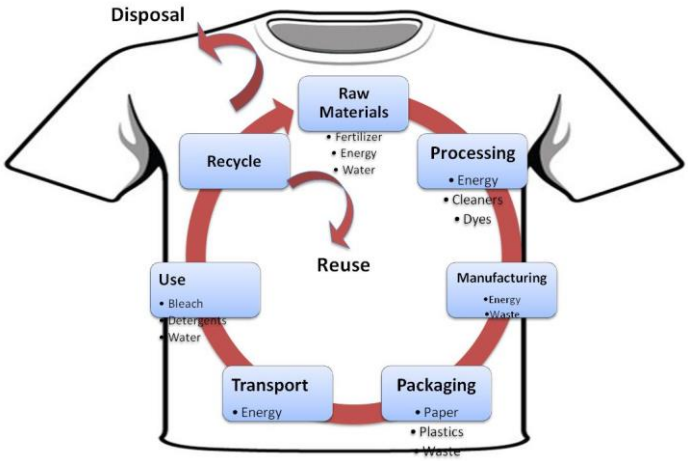
In order to carry out an LCA it is necessary to:

- Compile an inventory of relevant inputs and out puts;
- Evaluate their potential environmental impacts;
- Interpret the results of the inventory and impacts in relation to the specific objectives of study.

The LCA for a product is a summation of the impacts of:

- Extraction of the relevant raw materials
- Refinement and conversion to process materials
- Manufacturing and packaging processes
- Transportation and distribution at each stage
- Operation or use during its lifetime
- Final transportation, waste treatment and disposal

Life Cycle Assessment of a T-Shirt



Unit 6 Human Resources

HRM and Lean

'Lean' thinking has revolutionized productivity in all sorts of settings, much of it coming through **using the ideas and experience** of the people closest to operational tasks developing ways of doing them better. But this doesn't happen by accident – it all depends on them being trained, feeling empowered and actually motivated to contribute their ideas.

HRM excellence - examples

- The long-running success story of **General Electric** owes much to its 'Workout' programme originally instituted by Jack Welch which harnessed the initiative and ideas of its huge workforce.
- **Toyota** has managed to remain the world's most productive carmaker year on year through a high degree of involvement of its workforce in continuous improvement – *kaizen*.
- **3M**'s survival and strength over a hundred years of operation owes much to the strong cultural foundations laid down one of its early CEOs, William McKnight.

HRM and Technology

There is another compelling reason for **paying attention to the human resource** dimension in strategic operations management – if we don't, there is **a high risk** that our sophisticated **technologies won't work!** Experience has shown that we still need people in many situations – and over-reliance on the equipment end of technology can have disastrous consequences.

Western firms vs. Japanese firms

Whilst many Western manufacturers experienced growing problems of productivity, quality and flexibility during the 1970s it became clear that elsewhere – and particularly in **Japan** – the same story was not true. Manufacturing businesses there seemed able to manage the process of delivering customer value through speed, flexibility, quality and with high productivity.

Key elements in HRM in operations

Area	Key elements
Commitment to people as strategic resources	• Employment security • Choosing the right people • Valuing and rewarding them • Sending the right signals
Shared strategic purpose	• Strategic leadership • Shared planning processes • Policy deployment • Information sharing • Employee engagement and ownership
Enabling structures	• Appropriate organization design • Job and work organization design • Devolved decision making • Supportive communications

Stretching and sustained learning and development	• Commitment to training and development • Embedding a learning cycle • Measurement • Continuous improvement culture
Shared involvement	• Team working • Cross-boundary working • Participation and involvement mechanisms • Stakeholder focus and involvement

Key points

People provide flexibility – and at a time when 'agility' and 'customisation' are increasingly in demand in manufacturing and service operations, human resources become central to delivering this. Automation is a powerful resource but even the most advanced systems lack the flexibility and adaptability which human interaction can provide. These are big challenges for the strategic operations manager – not only does he/she have to create and implement new structures and procedures to enable and support more active participation in the development and improvement of the business – they also have to play a key role in the process of helping the organisation 'unlearn' some of the beliefs and accompanying practices which pushed people to the side of the stage.

Unit 7 Transformation Process

The Important of Transformation Process

The physical layout and the transformation process that an organisation employs are critical factors for strategic operations management. This is because: both the layout and, more specifically, the process transformation process (or process choice as it is sometimes called), provide massive clues about what the organisation can do, as well as what it cannot do.

Process and Product Technology

Investment decisions are critical and must be made with the aim of equipping the firm or the plant to be more competitive in the market. Furthermore, wrong process choice decisions may severely reduce the company's capability to satisfy customer demands in particular markets. Process choice and technology are both vital because key competitive factors for customers including cost, delivery speed and flexibility can be enhanced by their combination. If appropriate investment is made in technology and process choice, the resultant capacity and capability should become a central part of the firm's competitive weaponry.

The Financial Factor in Process Automation and Technology

2 things to avoid:

1. Technophilia "Throwing Money" at the Problem
2. Not Investing – A False Accounting Issue

Example: Keller (2001: Collision) Tells How Inappropriate Investment Was Made At General Motors:

While Smith provided the money for automation and supported it completely, he clearly didn't understand it - nor did his engineering staff who encouraged him. With its 260 gleaming new robots for welding, assembling, and painting cars; its fifty automated guided vehicles to deliver parts to the assembly line; and a complement of cameras and computers to monitor, inspect, and control the process, the plant put star's in Smith's eyes. He believed it held the promise of a new era of efficiency and quality and would eventually become a model for all assembly plants. What it became was a nightmare of inefficiency, producing poor-quality vehicles despite the heroic efforts of workers to correct mistakes before they were shipped to dealers" (p.169)

Layout and Process Choice
There are 4 types of layout
Fixed position;
Process layout;
A hybrid of process and product layouts, based around cells;
Product layout.
1. Fixed position

This is used where a product may be heavy, bulky or fragile and in this approach operators come to the product itself. The product is completed ‘on site’ and is not moved during completion. The product is housed around a particular, focused area.

2. Process layout

A plant or service location has specific activities or machinery grouped together. The machines are not laid out in a particular, sequential process. Therefore, the product does not move in a specified sequence but will go to a machine centre when required for the particular product.

The advantage is the flexibility in both equipment and labour assignments. The breakdown of a particular machine will not halt an entire process and work can transferred to other machines in the department.

‘Random' movement takes place as products are moved according to process requirements. There is no ‘flow' as such – each product will have its particular process requirements and will move to each machine group as and when required

Examples: Manufacturing – low-volume furniture, haute couture clothing, and jewelry (craft-type manufacture). In services – hospitals are also laid out like this. Patients move around departments and wards as necessary. Hairdressing is another service example where areas such as washing, drying, and cutting are put in place to complete a range of different styles. A department store (retailing) is also arranged on this basis.

3. The hybrid process/product layout

Since the previous layout is not dedicated to a particular product family (customer) but are available for a range of products. Another approach is to group machines or activities together around a focused, product family cell.

In manufacturing, machines or activities are grouped together in a way that best supports the manufacture of a particular family of products, or to provide a cluster of similar services. The variety of products or services around a particular group or ‘cell’ may be quite large but the essential nature of the product will remain similar and will, therefore, warrant a cell of its own, distinct from other, product family cells.

4. Product layout

Machines are dedicated to a particular product – or a very similar small range of product – and each stage of manufacture is distinct from the next. Each of the stations is laid out in an operational sequence specific to the manufacture of a particular product or the provision of a repetitious service offering. This kind of a layout has been used in some surgical procedures.

Example of assembly line surgery

Process Choice

Process choice will provide essential, major clues about how a firm competes and what it can – and cannot – do. The five types are:

Project;

Job;

Batch;

Line; and
Continuous process.
The Key Distinction of Volume and Variety Outputs from Process Choice
1. Project processes
In the ‘project’ manufacturing environments, the nature of the products is often large-scale and complex. The designs of the products undertaken in project manufacturing are, essentially, unique by virtue of their not being repeated in exactly the same way. The process tends to be ‘fixed’. Scheduling of projects tends to be undertaken in a ‘phased-completion’ program, where each phase of completion will be distinct and separate from other subsequent, or parallel, stages.
Examples:
In manufacturing
Major high-tech projects such as flight simulator manufacture.
Construction in all forms such as bridge manufacture, tunnel construction, and ship-building are a common application of project process choice.
In services
Consulting – the relationship, expectations, and outcomes with each client should be seen as ‘unique’. This means that the project process links to product layout.
2. Job processes
In manufacturing, job processes are used for ‘one-off’ or very small order requirements, similar to project manufacture. However, the difference is that the product can often be moved during manufacture. Perceived uniqueness is often a key factor for job manufacture. The volume is very small and the products tend to be a ‘one-off’ in terms of design; it is very unlikely that they will be repeated in the short term.
Key characteristics
Investment in automation is for general purpose process technology rather than product specific investment.
Many different products are run throughout the plant and materials handling has to be modified and adjusted to suit many different products and types.
Detailed planning will evolve around sequencing requirements for each product, capacities for each work centre and order priorities: because of this scheduling is relatively complicated, in comparison to repetitive 'line' manufacture.
Examples:
In Manufacture
Craft manufacture, such as making special haute-couture clothing. The job processes are as follow.
Making prototypes of new products – even if the end volume is likely to be high, it makes sense to produce a ‘one-off’ or very low volume, which lends itself to job manufacture.
Making unique products such as machines, tools, and fixtures to make other products. The process choice (job) is linked to the process layout.
In Manufacture
Service shop, such as car repairs and hospital service

3. Batch process

As volume begins to increase, either in terms of individual products, or in the manufacture of similar ‘types’ of ‘families’ of products the process will develop into ‘batch’ manufacture. The difficulty is that competitive focus can often become blurred. Therefore, the key is to map the range of products in terms of either ‘job’ or ‘line’ characteristics. This can be rearranged either in terms of the similarity of finished products or by common process groupings.

Key characteristics

Automation, especially for lower volumes of batch manufacturing, tends to be general purpose, rather than dedicated to a particular product whose volume does not demand product-specific investment in automation.

Scheduling is complicated and has to be completely reviewed on a regular, on-going basis - this applies to new products, 'one-off's that may be required, together with relatively high volume, standard products: all of these types will need to be scheduled.

Operators have to be able to perform a number of functions - this is obviously true of 'job' type processes. In batch, though, this flexibility is crucial in that it will allow operators to move to various workstations as required.

Where automation is being used, set-up time should be short: the ideal set up times is quick enough to accommodate run lengths of just one unit, switching over to other models and volumes as, and when, required.

Examples

Manufacture: bread making, where batches of similar types are produced. In general, batch processes link to process layout, although high-volume batches will tend to have a type of line (product) layout, depending upon how often the product is reproduced.

Services: call-centres, the response message to many telephone call centres is: ‘press “1” for this service; press “2” for that service’ and so on is considered to be a routing procedures.

3. Line processes

A ‘line’ process becomes more appropriate as the volume of a particular product increases. Each stage of manufacture will be distinct from the next, and value and cost are added at each stage of manufacture until the product is completed. The line is dedicated to a particular product (with possible variations of models) and introducing new products that are significantly different from the former product is difficult or even impossible to realize on an existing line manufacturing process.

Key characteristics

Process times should be fast - which is critical in order to satisfy delivery speed requirements. There should be simplification in production planning and control and the tasks themselves should also be simplified for each workstation.

There should be small amounts of work in process: in fact, work in process (which, in accounting terms, can be viewed as an asset) is a liability to the company which can ruin cash-flow and stifle quick response to market requirements.

Materials handling between stations should be placed as closely as possible to each other.

Materials flow and control are critical: Just-in Time lends itself most noticeably to 'line' or very high volume batch production. Stock-outs have to be avoided although, at the same time, excess stock is a waste and a liability, rather than an asset (materials can be viewed as an asset on the balance sheet which is misleading and alien to world class manufacturing.

Examples
Manufacture: High volume, ‘standard’ products such as particular models of cars, TVs, hi-fi, VCRs and computers. The process choice (line) ties it to the product type of layout.
4. Continuous processes
This is used when a process can (or must) run all day for each day of the year, on a continuous basis.
The volume is typically very high and the process is dedicated to making only on product. Huge investment in dedicated plant is often required.
Example
Manufacturing: a chemical refining plant, steel works, and very high-volume food processing

The Link Between Process Choice and Layout
Summary of Process Characteristics

Key headings linking process and layout
The Link Between Process Choice and Marketing Strategy
Manufacturing eras and their impact on process choice
The Changing Task of Manufacturing Management
From ‘pure standardization’ to ‘pure customization’
Key points
A process choice will indicate what a firm can and cannot do. Process choice may significantly influence what the company sells and what it is able to offer.
Layout and Process choice are major strategic importance to manufacturing and services operations. The options to choose from are also essentially similar - it's not an infinite variety but a small number of options and switching between one to the other is by no means cost free - so there is an important strategic objective to align the transformation process with market requirements and to understand the implications of changing.

Activity
Draw a layout of a hospital according to the following requirements:
The whole idea was to cut down the walking time of the nurses
Reduce time of walking up and down the hallways to the central station
Easy access to medical supply and linen supply room
Nurses stations should easily reach all the patients rooms