

Table of Contents

(Unit 5.3) Lean Production and Quality Management	3
Lean Production	3
(Kaizen) continues improvement	3
JIT production	3
Cradle to cradle design and manufacturing	4
Quality Control, and Quality Assurance	5
Methods of Quality Management	5
Quality circle	5
Benchmarking	6
Total quality management(TQM)	6
National and international quality	7
Gantt chart (Tool)	7
Critical path analysis	8
Critical path analysis	9
Latest finish time(LFT)	10
Calculating free flow and total float	10
(Unit 5.4) Location	11
Location of production	11
Methods of reorganizing production	12
(Unit 5.6) Production Planning	14
Supply chain process	14
Local vs global procurement	14
Just in time and just in case production	14
Just in time production	15
Just in case production	15
Stock control charts	15
Operations calculations	16
Make or buy decisions	17
Factors affecting make or buy decisions	17
Quantitative factors	18
Reasons to make:	18
Reasons to buy;	18
(Unit 5.7) Crisis Management	19
Crisis management vs contingency planning	19
Contingency planning	19

Effective crisis management.....	19
Communication	19
Transparency	19
Speed.....	20
Control.....	20
Impact of contingency planning	21
Cost	21
Time	21
Risk	21
Safety.....	21
<i>(Unit 5.8) Research and Development</i>	<i>21</i>
<i>(Unit 5.9) Management and Information System</i>	<i>22</i>
The Big Picture.....	22
Critical Infrastructures	22
Databases, data analytics, and data centers	22
ethcial considerations	22
Cloud Computing	23
Artificial neural networks (ANN)	23
Cybersecurity.....	23
Evaluation of critical Data infrastructure	24

(Unit 5.3) Lean Production and Quality Management [SEP] efficiency and waste

Efficiency

- Efficiency is the process which transforms physical, human, and financial output into outputs
- An increase in efficiency reduces cost of production
- quality, speed, and results are all factors of an increase in efficiency

Waste

- Is the process which does not add value to the customer
- Waste means loss, which is often lost and results in damage to people and planet
- When waste is reduced, cost can be reduced as well

Toyota made a process called TIMWOOD, which represents:

- Transportation
- Inputs
- Motion
- Waiting
- Over processing
- Over production
- Defects

Lean Production

- Set of strategies used to reduce waste in production process
- Optimising the manufacturing process
- Can be implemented in 2 ways
- Kaizen
- JIT(just in time)

(Kaizen) continues improvement

- Represents the constant need for improvements
- A kaizen works by conducting a meeting where businesses take a kaizen (as an idea to improve the business)
- Can come from workers from around a factory
- Thousands of ideas can be suggested every year

JIT production

- Aims to minimise costs by trying to eliminate or reduce the current stock of the business

- Is based on system where orders are placed to arrive just in time for use, rather than holding them as extra stock
- Requires excellent relationship with company and suppliers

Advantages

- Increased cash flow, and reduced costs
- Improved operations
- Increased capacity

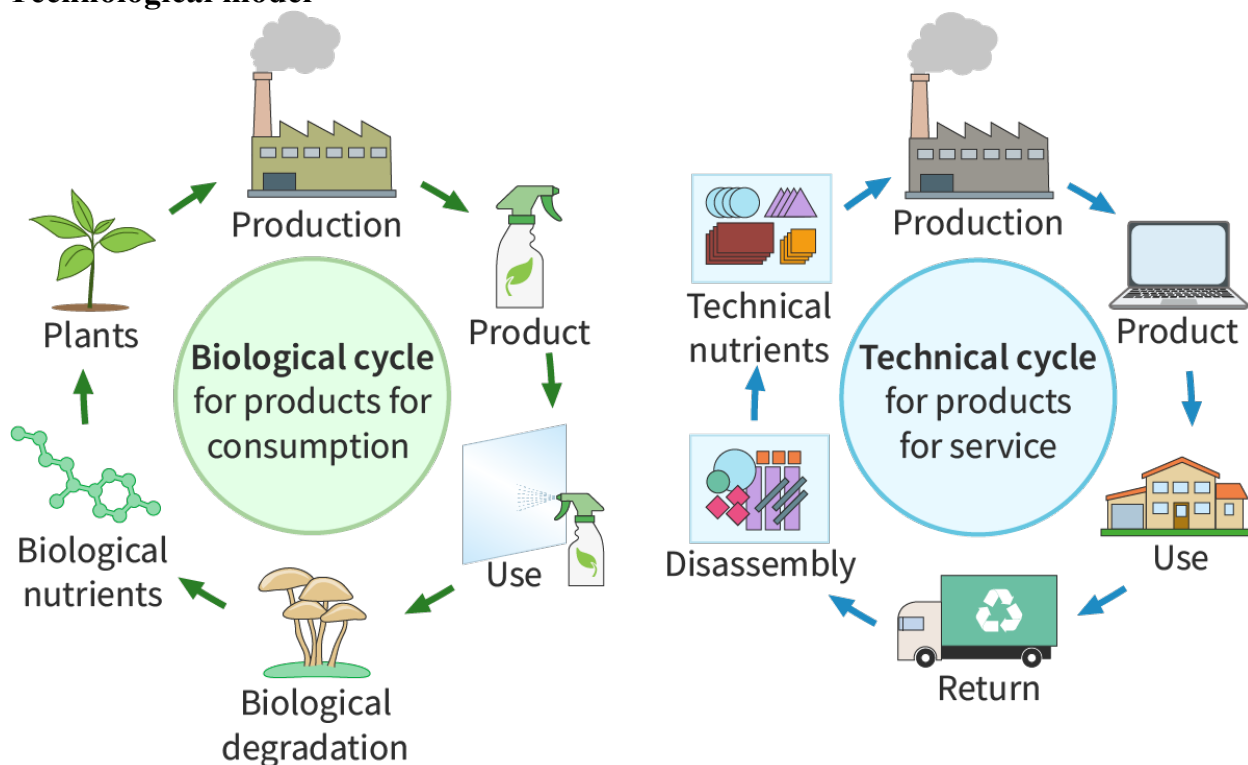
Disadvantages

- Reduced economies of scale
- High risk
- Reduced resilience

Cradle to cradle design and manufacturing

- Is a model used to design products to minimise waste and negative effect on the environment
- The model focuses on sustainability
- There are 2 main types of cycles
- Biological
- technological

Technological model



- Focuses on ideas of re using And recycling.

- Products are made using sustainable materials
- It is used for products and services
- For example, using glass instead of plastic to design drinkable water bottles

Biological cycle

- Focuses on products used for consumption
- Biodegradable materials are used
- Products are broken down into things such as bacteria and fungi
- Example

C2C accreditation

- An accreditation given which shows business uses C2C

It can

- Improve brand image
- Widen target market

Quality Control, and Quality Assurance

Quality control

- Quality control refers to the inspection of a product to find defects, and remove them before delivery to customer

Quality assurance

- The process which includes strategies to remove the defects and improve the products
- Is a form of empowerment which leads to higher motivation
- Important for employees to be trained to use it

Methods of Quality Management

Includes a variety of different strategies such as

- Quality circles
- Benchmarking
- Total quality management (TQM)

Quality circle

- Is a group of employees which regularly discuss improvements for the product quality
- Employees often come from diverse areas in the company
- This allows for different options on different sectors of the business

Advantages

- Motivation

- Improved quality
- Reduced costs

Disadvantages

- Reduced productivity
- Training costs may be high
- Not suited for all organisations

Benchmarking

- Process which a business compares itself based on criteria, to the leading industries, to see what can be learned from it
- It can be exploring the areas which can be improved
- For example, student may benchmark their test results with class mates, to see what they may need to improve

It involves 2 steps

1. Identify which company has best process or results in desired area
2. Find out how company does it, and learn from them

All parts of a business can be improved by the use of benchmarking

Advantages

- Improved quality
- Understand competitors and consumers
- Customer satisfaction increased/ revenues

Disadvantages

- Lack of transferability
- Lack of info
- Selection of right benchmark(if chosen wrong misleads business)

Total quality management(TQM)

- Where every employee is responsible for maintaining quality of product

It consists of

- Empowerment
- Internal customers

Empowerment involves giving employees authority to change or improve part of role

Internal customers are groups in a business which receive goods or services from a business

- When done correctly, leads to higher level of teamwork and communication

- Empowered to reduce waste

Advantages

- Motivation
- Improved quality
- Reduced costs

Disadvantages

- Reduced productivity
- Training costs
- Not suited for every organisation

National and international quality

- Businesses can apply for inspection and evaluation of product quality, and assurance
- When inspection is complete, business receives recommendations to improvement for quality assurance
- A stamp of approval is given, to show good quality

The stamp can

- Improve brand image
- Widen target market

Gantt chart (Tool)

When a business make a plan, they consider:

- Deliverable
- Time period
- Resources

They all need to be planned and managed, which can be hard in larger longer lasting projects

- A Gantt chart is a tool used to show a project plan

Business management internal assessment	1	2	3	4	5	6	7	8	9	10
Develop 2–3 research questions for teacher feedback or discussion. Include concepts, tools/theories and potential sources for the IA.										
Choose a topic.										
Prepare and maintain/edit a bibliography list of works cited.										
Finish secondary research, and possibly primary research as well. Prepare supporting documents.										
Write an introduction and prepare an analysis outline for teacher feedback/discussion.										
Write an analysis and evaluation.										
Write a conclusion. Submit full first draft to teacher for feedback.										
Revise draft with teacher's feedback, proofread. Check in-text citations, bibliography, and supporting documents.										
Submit final internal assessment.										

It shows the 2 main sections

- Column lists all tasks needed to complete project
- Column 2 captures how long each task will take

Information is also included like:

- Start and end dates
- People responsible for task
- Other resources needed
- Info on if task is dependent on another
- Milestones

Columns can be added to show them

Critical path analysis

- CPA is a project planning tool
- It shows the critical path of a project, which is minimum time for it to be completed

Used to gain insight on

- Tasks involved
- How long task is expected to take
- Order of tasks to be completed
- Whether they can be completed at the same Time

- Deadlines to keep project on track
- Whether steps have buffer time

Critical path analysis

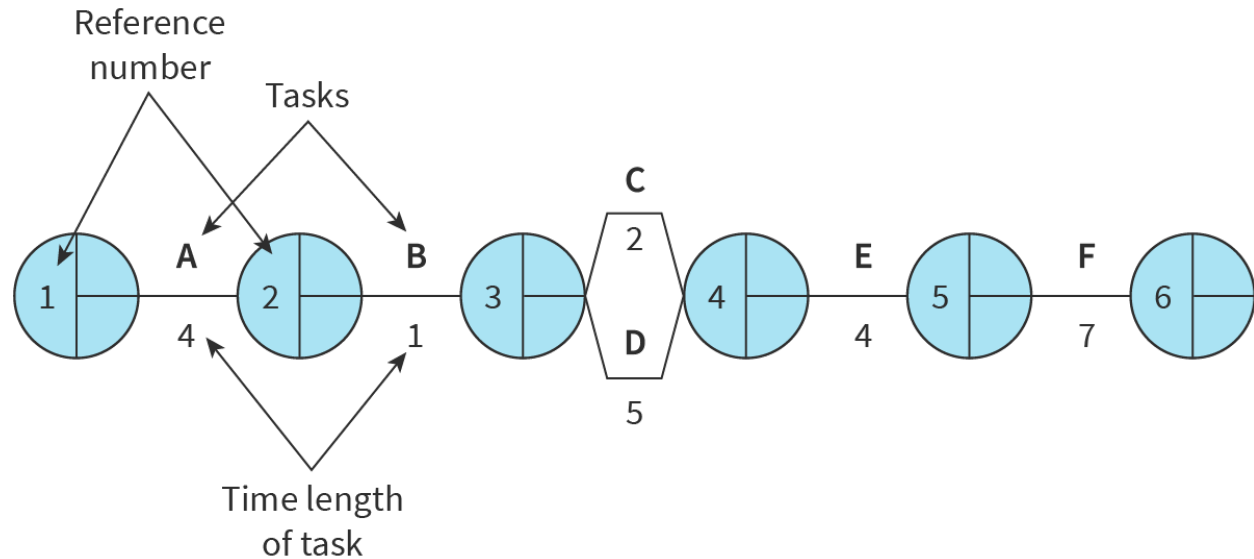


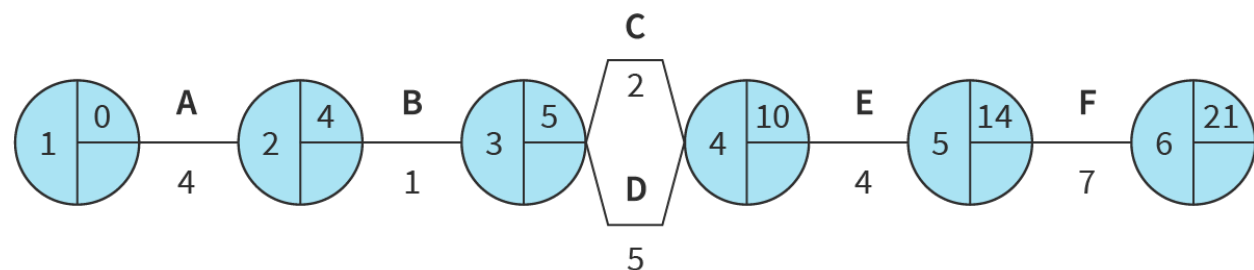
Diagram showcases the basics of the critical path analysis

It shows

- reference number
- Task letter (from a-z)
- Time go length of task

Adding earliest start time, and latest finish time to nodes

- Earliest start time indicates earliest time a task can begin



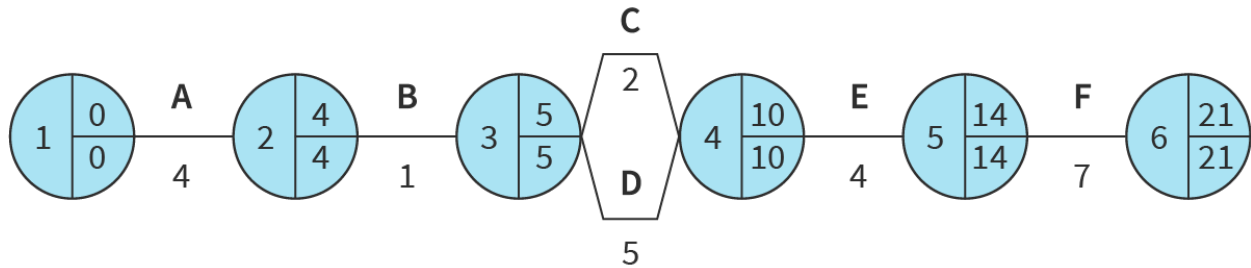
On the diagram, the earliest start time is seen on the top side of the node

- Number 1 can be started on week 0
- Number 2 on week 4 so B starts on day 4
- Number 3 on week 5 so C and D start on day 5
- Number 4 on week 10 so task E starts on day 10
- Number 5 on week 14 so task so task F starts on day 14

- Number 5 on week 21 so final task starts on day 21

Latest finish time(LFT)

- Moves from right to left rather than from left to right
- Refers to time when latest task is complete



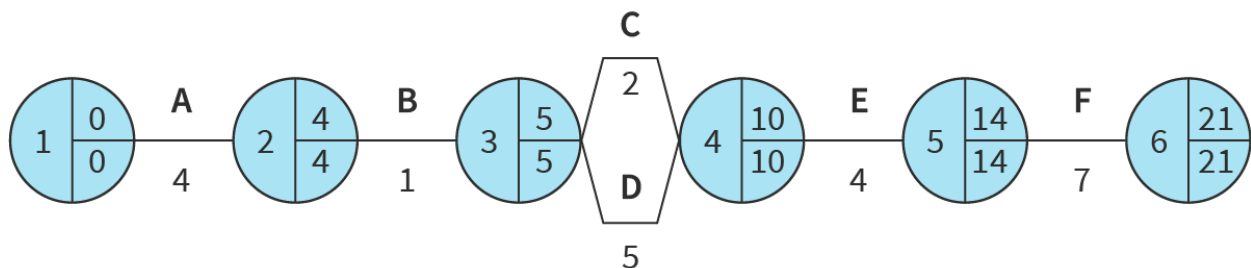
- Number 1 can be started on week 0
- Number 2 on week 4 so B ends on day 4
- Number 3 on week 5 so C and D ends on day 5
- Number 4 on week 10 so task E ends on day 10
- Number 5 on week 14 so task so task F ends on day 14
- Number 5 on week 21 so final task ends on day 21

Calculating free flow and total float

- Float time is the amount of time a task can overrun its estimate, but not disrupt time for other projects
- Free float is the amount of time a task can overrun its time estimate

It can be calculated by

Free float of task y = (EST) of next task - (EST) of task Y - (EST) of start - duration of task Y



In this case, to get the free float of task B

$$\begin{aligned} &\text{EST C} - \text{EST B} - \text{duration of B} \\ &= 5 - 4 - 1 = 0 \end{aligned}$$

Task B has 0 free float

Now for C ^[L]_[SEP]

$$\begin{aligned}\text{EST C} &= \text{EST D} - \text{EST C} - \text{duration of C} \\ &= 10 - 5 - 2 \\ &= 3\end{aligned}$$

To get total float of task Y

$$\text{Total float of task y} = (\text{LST}) \text{ of Y} - \text{duration of task Y} - (\text{EST}) \text{ of Y}$$

So for task E

$$\text{Total float} = 14 - 10 - 4$$

$$= 0 \text{ days}$$

Task E has 0 days total float meaning that it must finish on time, or whole project will be delayed

$\text{Total float} = \text{LFT current task} - \text{EST current task} - \text{duration current task}$

$$\text{Free float} = \text{EST next task} - \text{EST current task} - \text{duration current task}$$

$$\text{Total float} = \text{LFT current task} - \text{EST current task} - \text{duration current task}$$

(Unit 5.4) Location

Location of production

There are many ways which business chooses a location over another one

They include steeple factors like

- sociocultural
- Technological
- Environmental and ethical
- Political and legal

Sociocultural

- way people live, believe and value
- Includes family, life, religion, education, and cuisine
- Tied the local area with community

Technological

- access to transport networks allows stores and suppliers to give raw materials, which allows external economics of scale
- Business may use clustering at areas where cars dominate transport
- Cities change infrastructure to make it easy to walk and cycle then drive
- Working and e commerce had huge impact on location decision

Economic

- looks at economic situation
- Inflation
- GDP
- Tax
- Position of economy
- Rent cost etc
- Tesla located in Germany because of access to skilled workers
- Businesses may look at locating in areas where employees are paid less, if skill isn't needed

Environmental, and ethical

- for ethics, if business chooses to locate due to lower cost labour or weaker environmental care
- It's unethical, but businesses exploit such things
- Businesses can choose a location to enhance their environmental and ethical impact
- Locate in area with significant unemployment, committing to paying fair wages
- Can also open in a place where environment is cared about, and make a positive impact

Political and legal factors

- political stability is important for business
- Legislation and regulation is also an issue businesses consider
- Trade barriers and free trade agreements impact business decision, due to imports and exports
- Government's financial help impacts business decision on location
- Consider internal and external factors of businesses location

Methods of reorganizing production

- outsourcing
- Insourcing
- Offshoring
- Re shoring

Outsourcing

- when a business hires an external company/person to carry out a task it can do itself
- Can be used to pass running certain facilities like a factory to a subcontractor
- Might result in loss of control

Offshoring

- when a business relocates it's operations to another country
- By relocating, it can lower costs, and increase the overall productivity
- Companies are more likely to offshore to countries which have low minimum wages, and environmental care
- Is considered to be unethical most of the time when done

Insourcing

- when a business ends it's contracts with external suppliers to perform the task themselves
- Can bring cost savings, and increases the control
- May be used commercial secrets, or improve quality if outsourcing was not efficient

Re shoring

- when a business brings back a part of its production from a country back to its origin.
- Done to manage supply chains more efficiently
- Allows for business to have more control over production and operations
- Reduces risks
- Might result in higher cost of production

(Unit 5.6) Production Planning

Supply chain process

- stages of production which product passes, from extraction of raw materials, to delivery of products and services to customers
- Supply chain management is working with business suppliers to elite good quality production compartments of final goods.
- They consider different factors when selecting suppliers, such as:
impact on stakeholders
Cost
Reliability
Product quality
Lead times

Local vs global procurement

- procurement is the purchasing of goods and services used by a business to produce its goods
- Businesses may choose to supply locally, then globally
- Can be due to customers

Adv of local

- Greater control, less risk
- Lower transport costs
- Local social, and global ecological benefits

Disadvantages of local

- high production costs
- Less choice

Adv of global

- greater choice
- Lower cost of production

Disadvantages of global

- greater risk
- Lack of transparency and control

Just in time and just in case production

Just in time production

- raw materials are ordered and delivered immediately before its use, to minimise stock.
- Reduces costs and waste

Adv

- improved cash flow and lower costs
- Improved operations
- Increased capacity

Disadvantages

- Reduced economies of scale
- High risk
- Reduced resilience

Just in case production

- business holds larger levels of stocks to continue to operate when unpredictable event is faced
- Results in higher storage costs and more résilient to disruptions

Adv

- resilience
- Economies of scale
- Less risk

Disadvantages

- waste
- Higher storage costs
- Less working capital

Stock control charts

- a way to monitor and analyse stock levels and better costs
- Records when sticks are delivered and when their sold
- Can be used to know when to re stock and how much you should re stock

Max stock level

- total amount of inventory company holds

Buffer stock level

- stock held just in case there is an unexpected order, or late delivery

Lead time

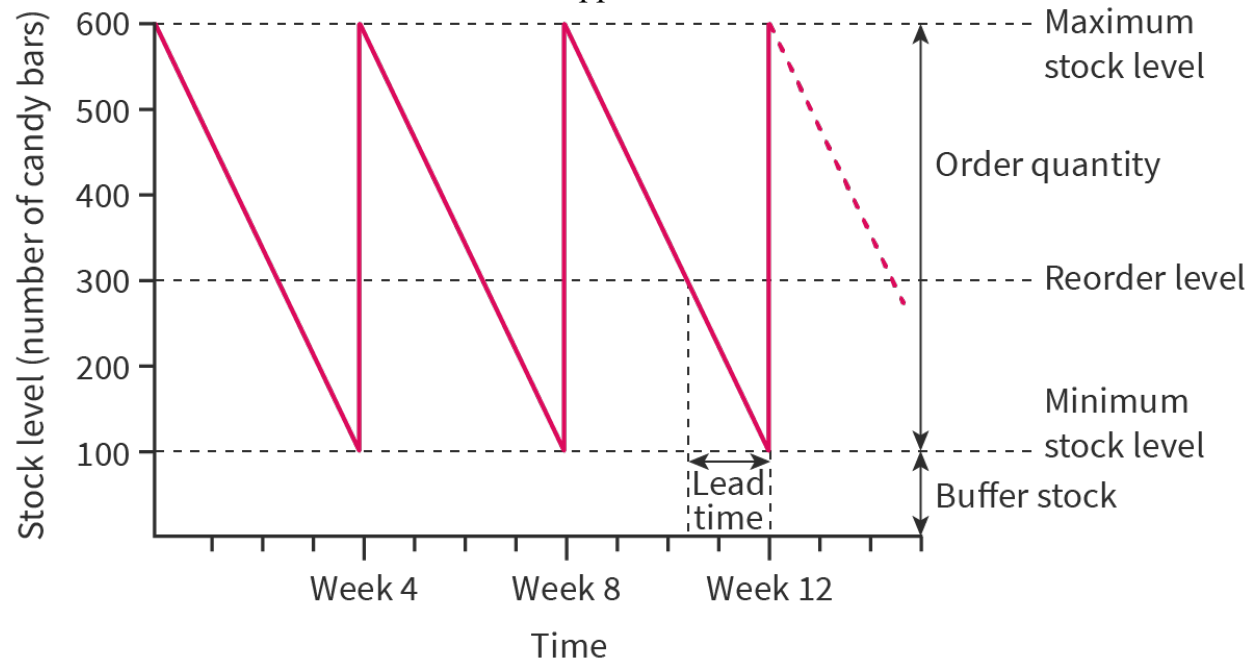
- time it takes Supplier to fulfill an order

Reorder level

- where new stock is ordered from a supplier

Reorder quantity

- amount of stock ordered from a supplier



Operations calculations

- need tools to track performance of departments
- Businesses use performance indicators such as:

Productivity rate

Labour productivity

Capital productivity

Defect rate

Operating leverage

Capacity utilization rate

Productivity rate

- measures average efficiency of production

Formula: $\text{total output} / \text{total input} \times 100$

Labour productivity

3. measures output per worker over a defined period of time

Formula: $\text{total output} / \text{number of employees}$

Capital productivity

- how effectively a business uses its capital to generate fixed outputs

Formula: $\text{total output} / \text{capital input}$

Unit costs

- cost of producing a single unit of output

Formula: $\text{total cost} / \text{output}$

- if unit cost is lower, then profit increases
- If unit cost is higher, profit decreases

Defect rate

- percentage of outputs that do not meet expected quality standards

Formula: $\text{defects} / \text{output tested} \times 100$

High defect rate could cause:

- harm customers caused by defect
- Need to recall defective products, which has high costs
- Undermining of confidence in all products
- Possible costly legal action

Operating leverage

- the measurement of the companies fixed costs, relative to the total costs

Formula: $\text{quantity} \times (\text{price} - \text{variable cost per unit}) / \text{quantity} \times (\text{price} - \text{variable cost}) - \text{fixed costs}$

Capacity utilisation

- the extent which a business is using its productive capacity. It is a %

Formula: $\text{actual output} / \text{productivity capacity} \times 100$

Make or buy decisions

- businesses have to decide whether to make the product in house, or to outsource it

Factors affecting make or buy decisions

Qualitative factors

- total and avg costs
- Defect rates
- Capacity utilisation
- Productivity rate
- Cost of logistics

- Capex
- Profitability

Quantitative factors

- quantity management
- Reputation and PR
- Ethical implications
- Availability of production
- Changing demand
- Supply chain and lead times
- Spécialisation

Cost to make

- is the total cost of production if manufacturing is kept in house

Formula: $(\text{average variable costs} \times \text{quantity}) + \text{fixed costs}$

Cost to buy

- total cost of contracting production to a supplier(outsourcing)

Formula: $\text{price} \times \text{quantity}$

Reasons to make:

- quality and cost control through vertical integration
- Protecting intellectual property
- Meeting global and local responsibilities

Reasons to buy;

- Spécialisation and expertise
- Low costs due to economies of scale
- Lower fixed costs

(Unit 5.7) Crisis Management

Crisis management vs contingency planning

- crisis management is the process where a business can take to limit damage caused by an unpredicted event or crisis
- Aims to return to normal business operations, asap

May come in forms like

- cyber attack
- Product recall due to defects
- War/conflict
- Employee conflict
- Natural disaster
- Lawsuit or accusation

Contingency planning

- is the process of creating a plan to follow if a crisis occurs
- It can be seen as a plan B
- It focuses mainly on:

Risk management at an investment bank

Safety management at a factory

Compliance department in a financial institution

Effective crisis management

- Details can vary according to the situation
- Depends on:

Communication

Transparency

Speed

Control

Communication

- Communication with internal and external stakeholders is necessary in a crisis
- Everyone must understand the issue
- Then 2 way communication may be needed to stabilise it
- Can help find potential solutions

Transparency

- Is the full disclosure of the situation business is in
- Business should be transparent with employees and everyone in company
- It can back fire if found later that company was not transparent

Speed

- goal is to return to normal as fast as possible
- Rapid and effective decision making helps achieve the goals
- Contingency plan can help
- Can allow managers to make the rapid decisions for the company

Control

- a well understood organizational structure can help in maintaining control
- Makes chain of command easier, which is line of authority in a business specifying who reports to whom
- Enables business to be resilient during crisis
- Orders can move down chain of command fast during crisis
- Only works with effective leaders

Impact of contingency planning

- can impact organisations:

Cost

Time

Risk

Safety

Cost

- if a crisis occurs, plans are designed to allow managers to make decisions which can minimise the damage caused to the costs of the business
- Can minimize costs on paying machinery, losing staff, and customers
- plans should be updated regularly
- Should include diverse plans to succeed

Time

- if solutions to problems are developed in advance, company can save a lot of time
- Can minimize losses with company

Risk

- effective plan can minimize the risk of accidents and loss of life

Safety

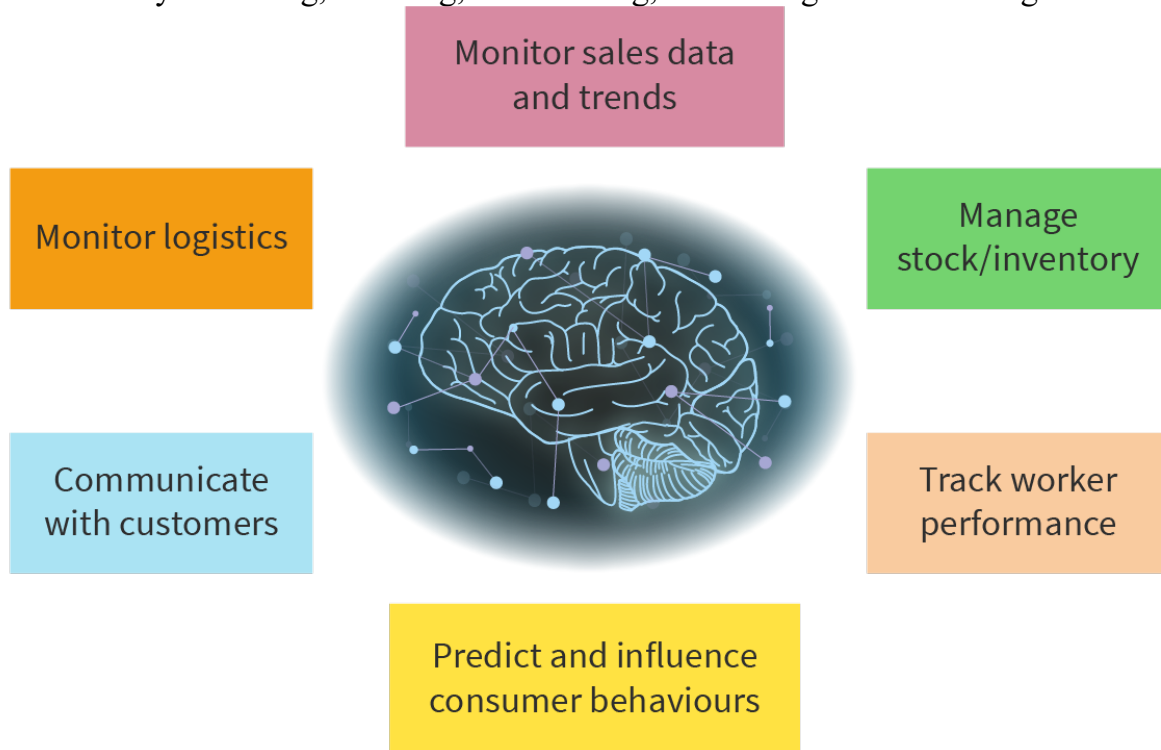
- Contingency plans can be used to deal with extreme weathers, to prevent any injuries and ensure maximum safety
- It needs an investment of both time and money
- School may do fire drills, to practice in case it occurs in real time

(Unit 5.8) Research and Development

(Unit 5.9) Management and Information System

The Big Picture

- explores various management information systems. they are made to help in decision-making
- done by collecting, collating, coordinating, controlling and channeling information



Critical Infrastructures

digital applications require technological infrastructure like:

- data centres
- cloud computing
- artificial neural networks

Databases, data analytics, and data centers

- data is valuable for businesses
- it can help in marketing, patterns, and trends
- can be used to maximize profit
- can help market segmentation and develop a more personal market
- can help in sales forecasting

ethical considerations

- how much data is being collected?

- Do consumers know how much and what data is being collected about them and how it is being used?
- Who has access to this data and under what circumstances?
- Is the data secure?
- Is the data being used for malicious purposes?

Cloud Computing

- possible from data centers
- it includes data storage, networking of computers, software, and databases

Artificial neural networks (ANN)

- they are the connections of computer systems and nodes that are like neurons of the brain
- large quantities of data gathered by management tech systems
- used to train algorithms
- they can spot patterns and trends
- patterns and trends can be used to make decisions faster

it can be used in marketing to:

- predict consumer behavior
- automate marketing services
- create target content
- forecast sales trends
- personalize marketing

Cybersecurity

- cybercrime is an activity carried out using computers, and digital technology
- it can cost businesses more than 10 trillion dollars by 2025

- cybersecurity is the process of using technology and systems designed to block systems by criminals

some forms of cybercrimes are:

- hacking
- ransomware
- distributed denial of service attacks (DDOS)
- it is a major threat to consumers and the business
- may harm financial and personal data

Evaluation of critical Data infrastructure

advantages

- profits
- customer satisfaction
- sustainability
- security

disadvantages

- cost
- consumer manipulation
- sustainability
- ethical and legal considerations