

## TOPIC: THE PRODUCTION FUNCTION

### PRODUCTION PROCESS

Production is the processing of raw materials into finished goods.

The raw materials have to be processed to ensure a good quality product.

The final goods are sold to the consumer.

Production produces four types of goods or services:

- **Consumer goods** durable and non-durable, which are bought by consumers.
- **Capital goods** machinery and equipment, for further use in the production process.
- **Semi-finished** goods are goods that may be used in a further production process to make another product e.g. the planks to make a table.
- **Services** e.g. banks, lawyers, doctors

### PRODUCTION SYSTEMS

It is the process which is followed to make products.

Manufacturers need to choose their production systems carefully as this impact directly on the cost, time and quality of the product.

Criteria when choosing a production system

- **Product variety** – the number of products that are the same or unique in the production process.
- **Volume of the products** – the number of the products that need to be produced in a certain time.
- **Machinery and equipment** – some machinery is very expensive and can only be used for certain processes.

The three production systems are mass production, batch production and job production.

### Mass production

#### Characteristics of mass production

Mass production is used when the product variety is low and the volumes are high.

It allows a product to move through the process from beginning to end.

The products are all identical and go through the same process.

Mass production has improved efficiency and productivity.

Examples are: making yogurt, car manufacturing

#### Advantages of mass production

Speeds up the production process making the turnaround time much quicker.

Mass production reduces the costs of the production process

The unit cost of the product is cheaper and therefore the final price of the product can be reduced, and it is easier to determine the profit margin.

Mass production allows for large volumes to be produced in a short period of time.

There is greater control over the production process.

The quality of the products is standardised and when one has a problem, it is easy to see it.

Increases productivity by using people and machines optimally

Part of the mass production is the accuracy of every step in the production process which means that the final product is more likely to be accurate and of a certain quality.

Each person is trained to do a specific job and specialises in that job.

Resources are easily measured and raw production materials can be bought when needed.

The machines use skilled operators that are well trained.

Work can be done over a 24-hour periods, using different shifts of operators.

### **Disadvantages of mass production**

It is expensive to set up a factory and purchase the machinery for mass production

Cannot be used on production processes with very valuable resources, e.g. diamonds

Very inflexible and does not allow for unique products. They all come out uniform.

When there is a fault in the machinery or process, it is often only after many products have been made that the error is detected. This can waste time, money and resources.

If one piece of the machinery breaks the whole production process is stopped.

Equipment often requires highly specialised operators that earn high incomes.

Insurance is high on the machinery.

The process is very inflexible and innovative ideas and changes are difficult to implement.

The process is repetitive and workers can get bored.

### **Batch production**

#### **Characteristics of batch production**

Batch production is used when the variety is high and the volumes are low, but not as low as in job production.

Products are produced in batches rather than one by one.

Within each batch all products are identical but batches are different from each other Bakeries use this process where they bake a large number of croissants and then moving on to bake bread.

Example: printing companies receive different batches of items to print. They use the same machines but the settings and resources have to change with every batch.

#### **Advantages of batch production**

The costs are not high as large batches of similar products can be produced at one time.

Companies can take advantage of bulk buying.

Machinery is not as expensive as mass production and do not need such skilled operators.

There is greater flexibility and plans can be changed and adjusted with every batch.

Machinery does not cause big delays in the production process.

Quantities of batches can be changed easily, which reduces wastage.

Workers can specialise at a certain part of the process and can learn to use the specialist machinery, which increases productivity.

**Disadvantages of batch production**

It requires a lot of different machinery which can be very expensive.

Machinery needs to be serviced and cleaned down the line, which can add to the production costs.

The goods and services do not always meet the exact specifications of the customers.

Need to keep and store large quantities of raw materials.

Final goods need to be stored, which can be costly.

Some workers may become demotivated if they specialise in one task. (max = 10)

Time delays in waiting for one batch to finish before the next one can get started.

**Job production****Characteristics of job production**

A job production system is used when the variety of the products is high or product standardisation is low or the volumes are low.

The products are worked on by a skilled person or a group of skilled people.

Each order for a job may be unique and require different ideas and techniques.

Example: oil paintings, wedding dresses, wood carvings

**Advantages of job production**

Company can be innovative and change ideas and designs with very little costs involved.

Every product is different so employees don't get bored.

Products made in job production are unique and often in demand.

Company can charge higher prices for the products because they are customised.

Set-up costs are not expensive and large machines are not needed.

It is easy to control the process.

Excellent quality as each product is made to own specifications.

It is not necessary to wait for one product to be finished before starting on the next one.

**Disadvantages of job production**

Need well skilled and creative employees.

Employees are very skilled and require large salaries.

It takes a lot of time to make each item.

Rely heavily on the skills of the employees.

Raw materials are costly and cannot be bought in bulk.

Normally a high cost per item.

Not many opportunities to automate the process.

## **PRODUCTION PLANNING**

Production planning involves setting targets and guidelines for production as well as creating standards and measurements to test results.

### **The production planning steps**

- **Planning** – the planning of each aspect of the overall process. It includes the layout of the factory and the flow of materials through the process. Decisions are taken to determine what materials to use and how many to purchase. Budgets, machines and manpower are calculated and used to determine expected output.
- **Routing** – establishes the best and cheapest way to sequence the production process.
- **Scheduling** – involves the timing of the production process. It also prioritise certain jobs and determines which jobs need to be completed before the next one can take place.
- **Loading** – involves allocating every person or machine to their specific task.

## **PRODUCTION CONTROL**

It controls each individual task and action in the production process and establishes the starting and finishing of each task.

### **The production control steps**

- **Dispatching** – converts the planning into action. It provides instruction for beginning the process, checking the time and costs involves in the process, checking the flow of work according to the routing and supervising the process.
- **Following up** – looks at the progress of the work. It deals with unplanned issues and problems and sort out misunderstandings in terms of the job process requirements.
- **Inspection** – involves the checking of the quality of the final product. Legal and regulatory processes are also checked to ensure that the necessary standards are met.
- **Corrective action** – involves any adjustments to the planning process and also deal with staffing issues.

## **SAFETY MANAGEMENT**

### **Purpose of the Occupational Health and Safety Act/OHSA**

The aim is to provide for the health and safety of employees at work and during the use of plants and machinery.

It outlines the roles and responsibilities of employers, employees, designers, importers, suppliers and sellers.

The act requires that the main dangers of the workplace be identified and eliminated. It requires that employees are expected to co-operate and follow the necessary instructions and report any unsafe situations.

### **Ways the business can comply with the Occupational Health and Safety Act.**

Develop and distribute the health and safety policy to employees.

Review existing health and safety procedures, equipment and staff training.

Appoint a health and safety officer at the workplace.

Maintain an accident register.

Establish health and safety committees consisting of representatives from both management and staff.

Obtain copies of any relevant codes of practice or any guidelines issued by Department of Labour.

### **The role of safety and health representative in the workplace**

They must check the effectiveness of health and safety measures.

They must identify potential dangers in the workplace.

They must investigate together with the employer any accidents or complaints from the workers.

Provide and maintain all the equipment that is necessary to perform the work.

Reduce dangers to workers by providing protective clothing.

Ensure that dangerous equipment is used under the supervision of trained workers.

Promote safety education to limit dangers to employees.

Initiate, promote, maintain and review measures ensuring the health and safety of the workers.

### **Aspects that must be included in their workplace safety policy**

Recognise the need to comply with minimum standards of the act.

Recognise the priority and safety in relation to other organisational goals and policies

Acknowledge the right of every employee to work in a safe and healthy environment.

Stipulate that management is responsible for occupational health and safety programmes.

Explain the general responsibilities of all employees.

Health and safety shall not be compromised.

The policy date and signatures of the CEO.

Be visibly displayed for all workers to see.

Review date of the policy.

Unacceptable performance of health and safety duties will not be tolerated.

Encourage cooperation with unions and workers to involve all employees in implementing the health and safety policy into practice.

## **Production costs**

### **Meaning of production costs**

This refers to costs incurred by an enterprise in producing a product.

It consists of primary and overhead costs.

### **Components of production costs**

#### **Primary costs**

This consists of direct raw material and labour costs that are used in the manufacturing of a product.

#### **Overhead costs**

This consists of variables overhead and fixed costs.

**Fixed costs** are production costs that must be paid no matter how many units are manufactured. Examples are rent, salaries, insurance premiums, bond repayments.

**Variable overhead costs** will vary depending on how many units are produced.

The more units that are manufactured the higher the variable costs will be.

Examples are water & electricity, telephone, wages, items needed to produce.

**Total costs** = Fixed costs + variable costs

**Unit cost** = total cost ÷ number of units produced

### **BREAK-EVEN ANALYSIS**

Break-even means that the income of the business is equal to its expenses.

It is the point where the total revenue = the total costs.

The business does not make a profit or a loss.

A business needs to sell more units than the breakeven point to make a profit.

Study the information below of T- Girl Food (Pty) Ltd, a manufacturer of the best ready – made meat based meals.

<b>T – Girl Food (Pty) Ltd</b>	<b>Production cost for October 2018</b>
Raw materials	R 140 000
Labour	R 185 000
Insurance	R 30 000
Rent	R 18 000
Cleaning material	R 10 000
Packaging	R 8 000

T- Girl Food (Pty) Ltd manufactured 30 000 ready meals during the month of October 2018.

**Calculate the variable costs**

**Calculate the fixed costs**

**Calculate the total production costs**

**Calculate the production cost for one ready – made meal**

### **Role of the production function in the manufacturing process**

The production function provides high quality services/products according to specifications.

The production processes of a business are done correctly through proper production planning and control.

Products and services are produced at the lowest possible cost to allow for profit maximisation.

The production function communicates the roles and responsibilities to the production workforce.

Ensuring that products meet customers' requirements by being safe, reliable and durable.

Having good after-sales services and warranties.

Empowering workers so that they can take pride in their workmanship.

Getting accreditation from the SABS/ISO 9001 to ensure that quality products are being produced.

Specifying the product or service standards and take note of the factors that consumers use to judge quality.

Monitoring processes and find the root causes of production problems.

Implementing quality control systems to ensure that quality building products are consistently being produced.

Utilising machines and equipment optimally.

Accurately calculate the production costs.

Selecting the appropriate production system e.g. mass, batch or job production.

### **QUALITY PERFORMANCE**

#### **The concept of quality**

Quality is a measure of how good a product or process is. It is the result of good quality processes or products meeting the highest possible standards.

#### **Differences between quality control and quality assurance**

<b>Quality control</b>	<b>Quality assurance</b>
<ul style="list-style-type: none"> <li>• <b>Inspection of the final product</b> to ensure that it meets the required standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Carried out <b>during and after</b> the production process to ensure that required standards have been met at every stage of the process.</li> </ul>
<ul style="list-style-type: none"> <li>• Includes setting targets and taking corrective measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensures that every process is aimed at getting the product right the first time and prevents mistakes from happening again.</li> </ul>
<ul style="list-style-type: none"> <li>• Checking raw materials, employees, machinery, workmanship and products to ensure that high standards are maintained.</li> </ul>	<ul style="list-style-type: none"> <li>• The 'building in' of quality as opposed to 'checking for' quality</li> </ul>

### Distinction between quality management and quality performance

Quality management	Quality performance
<ul style="list-style-type: none"> <li>Techniques used to improve the quality of a product</li> </ul>	<ul style="list-style-type: none"> <li>Total performance of each department measured against the specified standards</li> </ul>
<ul style="list-style-type: none"> <li>Can be used for accountability within each of the business functions</li> </ul>	<ul style="list-style-type: none"> <li>Can be obtained if all departments work together towards the same quality standards.</li> </ul>
<ul style="list-style-type: none"> <li>Aims to ensure that the quality of goods and services focuses on the means to achieve consistency.</li> </ul>	<ul style="list-style-type: none"> <li>Quality is measured through physical product, statistical output of processes or surveys of the users and/ or buyers of goods and services.</li> </ul>

### Benefits of a good quality management system

- Time and resources are used efficiently.
- Vision, mission and business goals may be achieved.
- Business has a competitive advantage over its competitors.
- Increased market share improve profitability.
- Improves business image as there are less returns.
- Effective customer services are rendered, resulting in increased customer satisfaction.
- Productivity increases through proper time management and using high quality resources.
- Products and services are constantly improved resulting in increased levels of customer satisfaction.
- Regular training will continuously improve the quality of employees' skills and knowledge.
- Employers and employees will have a healthy working relationship resulting in productive workers.

### TOTAL QUALITY MANAGEMENT (TQM)

#### Description / Definition

TQM involves every part of the business and quality is everyone's responsibility, including every department and every employee.

All employees take responsibility for the quality of their work and outputs.

Machines and equipment are checked regularly.

All inputs, including raw materials, are checked thoroughly and there are regular discussions on how to improve the quality.

The quality management process includes a customer survey which informs the business of any changes that needs to be made.

TQM is about continuously planning, doing and checking quality of the entire business.



## **THE TOTAL QUALITY MANAGEMENT (TQM) ELEMENTS**

### **Continuous skills development**

A skills audit should be conducted to determine the qualifications and competence of staff that can influence the quality of products / processes.

Workers who lack skills should be trained in line with their job description.

Regular evaluation of training material improves the effectiveness of the training.

Suitable induction programmes promoting quality should be implemented.

Quality guidelines for managers should be used to monitor continuous skills development.

### **Total client / customer satisfaction**

The business should understand current and future customer needs.

Provide quality products and services to satisfy customer needs and expectations.

Customers will be satisfied if products and services meet their needs, requirements and expectations.

Businesses need to conduct effective market research to determine customer needs or to develop products and services that will meet or exceed those needs.

Businesses need to implement efficient, friendly customer services and customer care systems.

### **Continuous improvements to systems and processes**

Processes and systems are the flow of activities implemented to create or deliver products and services to customers.

Businesses that have quality processes and systems in place will produce good quality products and can provide excellent customer services.

It should be easy for customers to understand processes so that they don't waste their time with long complicated procedures.

Employees need to understand the operating systems and service delivery systems.

Identify problem areas of the business to be able to devise relevant solutions thereof.

### **How to implement continuous improvements to systems and processes – the PDCA cycle / steps:**

**Plan:** identify the problem and develop a plan for improvement to processes and systems.

**Do:** implement the change on a small scale. Implement the processes and systems.

**Check / analyse:** use data to analyse the results of change. Determine whether it made a difference. Check whether the processes are working effectively. Assess, plan and establish if it is working.

**Act as needed:** devise strategies on how to continually improve. If the change was successful implement it on a wider scale. Continuously revise the process.

### **Adequate financing and capacity.**

There should be enough funds available for proper quality management processes, e.g. to have systems in place to prevent errors in the process.

Funds should be available for market and product research to gather information on quality improvement.

Suitable equipment should be available for testing and maintaining high quality standards.

Funds should be available for regular internal / external testing of products and processes to maintain high quality.

**Planning monitoring and evaluation**

Monitoring and evaluation systems prevent product defects and wastages and minimises customer complaints.

Allow for quality control checks and procedures at key production points.

**A quality circle** is a group of employees, with a variety of skills and experiences, coming together to solve problems related to quality and to implement improvements.

**Importance of quality circles in TQM**

- Solve problems related to quality and implement improvements.
- Investigate problems and suggest solutions to management.
- Ensure that there is no duplication of activities in the workplace.
- Make suggestions for improving systems and processes in the workplace.
- Improve the quality of products and services and the productivity through regular reviews of quality processes.
- Monitor strategies to improve the smooth running of business operations.
- Reduce costs of redundancy in the long run.
- Increase employees' morale and motivation.

**The negative impact of poorly implemented TQM**

- Setting unrealistic deadlines that may not be achieved.
- Employees may not be adequately trained resulting in poor quality products.
- There is a decline in productivity due to work stoppages.
- Businesses may not be able to make the necessary changes to satisfy the needs of the customers.
- The reputation of the business may suffer because of faulty goods.
- Investors may withdraw their investment if there is a decline in profits.
- Bad publicity due to poor quality products supplied.

**Reduction of cost of quality through TQM**

- Introduce quality circles, small teams of five to ten employees, who meet regularly to discuss ways to improve the quality of their work.
- Schedule activities to eliminate duplication of tasks.
- Share responsibility for quality output amongst management and workers.
- Train employees at all levels so that everyone understands their role in quality management.
- Develop work systems that empower employees to find new ways of improving quality.
- Improve communication about the quality challenges so that everyone can learn from past experiences.
- Reduce investment on expensive but ineffective inspection procedures in the production process.
- Implement proactive maintenance programmes for machinery to eliminate breakdowns.

**TOPIC: PRODUCTION FUNCTION – ACTIVITY**

1. Complete the following statements by filling in the missing word(s):
  - a) \_\_\_\_\_ refers to converting raw materials into final products.
  - b) The two main production systems are the \_\_\_\_\_ production system and the \_\_\_\_\_ production system.
  - c) The \_\_\_\_\_ production system is capable of accommodating greater product variety.
  - d) \_\_\_\_\_ involves exercising control over each activity that takes place during the production process.
  - e) \_\_\_\_\_ aims to ensure that goods produced are not faulty.
2. Read the scenario below and answer the questions that follow.

**QUINNIE HOMEMADE HOT SAUCE**

Quinton is a Grade 11 learner who lives in Kwa-Zulu Natal. Despite his age, Quinton has already cultivated several business interests. He established a successful business called Quinnie Homemade Hot sauce. He produced five thousand hot sauces and made a lot of profit. He invested some of the profit for future expansion.

- 2.1 Identify the production system that Quinnie has used for his business. Motivate your answer by quoting from the scenario above. (3)
  - 2.2 Discuss the impact of the production system identified in QUESTION 2.1. (6)
  - 2.3 Name **TWO** other production systems that Quinton can use in his business. (2)
  - 2.4 Analyse the impact of **ONE** of the production systems suggested in QUESTION 2.3. (8)
3. Define production planning. (2)
  4. Outline **FOUR** aspects that must be considered during production planning. (4)
  5. Read the following scenario and answer the questions that follow:

**DIMASA PLATINUM MINE (DPM)**

DIMASA Platinum Mine is not concerned about the impact of the Occupational Health and Safety Act on their business. Some employees feel that the business does not take health and safety measures into consideration. One of the employees has suggested that the business must ensure that they draft a workplace safety policy.

- 5.1 Explain the purpose of the Occupational Health and Safety Act. (4)
  - 5.2 Recommend ways in which DPM can comply with the Occupational Health and Safety Act. (6)
  - 5.3 Advise DPM on aspects that must be included in the workplace safety policy. (10)
6. Explaining the meaning of production costs (4)
  7. Discuss TWO components of production costs. (6)
  8. Elaborate on the meaning of the break-even point. (4)

9. Describe the term Total Quality Management (TQM)? (4)
10. Name the TQM elements. (5)
11. Give a word(s) for the following descriptions.
- The process carried out during and after the production process to ensure required standards have been met at every stage of the process.
  - The inspecting of the final product to ensure that it meets the required standards.
  - A framework that a business uses to manage key processes to meet the correct standards.
  - There are production costs that must be paid no matter how many units are manufactured.
  - Some costs will vary depending on how many units are produced.
  - The income of the business is equal to its expenses there is no profit and no loss.
12. Read the case study below and then answer the question below.

### TRANDY SUPERMARKET

Trandy Supermarket buys their milk directly from Easy Dairy Farm. A day after delivery Trandy Supermarket discovered that the milk had become sour. Trandy Supermarket immediately informed Easy Dairy Farm about the situation but nothing was done. Easy Dairy Farm lost many customers as a result of this challenge.

- Advise Easy Dairy Farm on how to implement a *continuous improvement cycle* to improve the quality of their product. (8)
13. Identify the total quality management (TQM) elements illustrated in each statement below.
- The management of TKM Fresh Fruit ensures that customer complaints are handled within 24 hours.
  - The employees of Tumi's Consulting regularly attend training courses on service delivery.
  - Home Appliances Manufacturers uses modern production technology to ensure their products are in line with the latest innovations.
  - The managing director of Themba's Holiday Lodge allows staff to make inputs during strategic planning sessions.
  - Duncan Computers can afford to employ two additional experts in their Information Technology department. (10)
14. Write an essay on quality of performance and include the following:
- \* Describe the term total quality management (TQM).
  - \* Discuss any **FIVE** elements of total quality management (TQM).
  - \* Explain how total quality management (TQM) can reduce the cost of quality.
  - \* Analyse the negative impact of total quality management (TQM) if poorly implemented by businesses.