

CHAPTER XIII**OPERATIONS
MANAGEMENT**

13.1 Introduction to Operations

13.2 Production methods

13.3 Break-even analysis

13.4 Purchasing

13.5 Stock Controlling

13.6 Quality & Productivity



Concepts & Issues that emerge from the content

- ❖ Introduction to operations
 - + Operations concept
 - + Introduction to operations management
- ❖ Production methods
 - + Introduction & classification
 - + Selecting a method
 - + Operational layout planning
- ❖ Break-even analysis
 - + Total cost & total revenue
 - + BEP analysis
 - + Usefulness & limitations of BEP analysis
- ❖ Purchasing
 - + Introduction & purchasing process
 - + Facts considered
- ❖ Stock controlling
 - + Introduction & necessity
 - + Methods of stock controlling
- ❖ Stock levels
 - + Various levels
 - + Calculation of stock levels
- ❖ Costs of stocks
 - + Total cost of stocks
 - + Economic order quantity (EOQ)
- ❖ Quality
 - + Introduction & quality control importance
 - + Quality control techniques
- ❖ Productivity
 - + Introduction & importance
 - + Improving productivity

What is the “Conversion Process” in Operations Management?

Input	Conversion Process	Output
<ul style="list-style-type: none"> • Land • Labour • Capital • Entrepreneurship • Knowledge • Time • Information • Energy 	<ul style="list-style-type: none"> • Follow production procedures • Select a production method • Use required resources • Use technological knowledge 	<ul style="list-style-type: none"> • Products (Goods & Services)

What is Value Addition?

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The value of the product increases by adding a value to the inputs at each stage in the conversion process.

Ex-

What are the methods of conversion in Operations Management?

1. Analytic System

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2. Synthetic System

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What are the functions of Operations Management?

1. Production Engineering
2. Production Planning
3. Purchasing
4. Production Control
5. Research & Development



1. Production Engineering

Making decisions on the production process, required plant and machinery, production schedule, required materials, deciding of required quantity of materials & their quality etc. is referred to as production engineering.

Production process decision, necessary infrastructure decision, production time table decision & raw materials & its policy decisions are sub factors of production engineering.

2. Production Planning

The activities of determining the requirements such as required plants, machinery, materials, labor etc. by an organization for its production process are referred as production planning.

The program prepared in production planning is known as production plan. The production plan can be categorized as short-term production plans and long-term production plans.

3. Purchasing

This is the process of acquiring the required items of materials & parts, capital items & supplies & business services required for the conversion process.

Obtaining the right materials in required quantity, at the required time & at the minimum cost is the purpose of the purchasing function. Therefore many organizations prefer to have a specialized purchasing department.

4. Production Control

This is where the organization identifies whether the actual production process is in line with the production plan prepared.

Here inspecting if the goals established in accordance with production engineering and production planning, are being reached & if not, determining necessary corrective / remedial actions for them, are done under production control.

Machine control, quality control, stock control, cost control & progress control are sub factors of production control

5. Research & Development

This is the function that continuously works towards identifying new products, production methods, new resources etc & improving them overtime.

Collecting information regarding existing product, production process, new production planning and developing them are sub functions of research and development.

What is designing the production process?

This is the process of building an effective production process which will help the organization achieve its production plan in an efficient & effective manner. The activities involved in designing the production process can be;

1. Identify the supply chain
2. Forecasting the demand
3. Planning the production capacity
4. Choosing a production facility location
5. Deciding the factory layout
6. Scheduling work

What is supply chain?

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It is the network of all the individuals, organizations, resources, activities & technology involved in creation & sale of a product from the delivery source of supplier till the delivery to the end user.

Each & every step in the supply chain will have a direct & indirect impact on the organization & its conversion process since a smooth flow of a wide variety of materials is needed.

What are the advantages of a good supply chain?

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Note –

What is forecasting demand?

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Demand is what decides what product, how & how much needs to be produced. If the demand can be identified, to meet such demand, a business can identify how much of materials are to be purchased, at how many intervals, what type & quality of materials etc.

To determine correct level of demand, the organization can use the following sources;



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Note –

What is Production Capacity?

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Once the organization has determined the level of demand, it needs to ensure that it has the required capacity to produce the quantity to meet the demand. Production capacity will include the ability of the following;

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What are the factors that determine production capacity?

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What is a Production facility location?

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Selecting the right location is important to increase efficiency & quality while reducing costs. In other words the right location might build a business while a wrong location will fail.

What are the factors considered when selecting a production facility location?

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Note –

What are the social impacts of locating a production facility?

Social Costs	Social Benefits
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+	+
+	+
+	+
+	+

Note –

13.2 PRODUCTION METHODS

What are the Methods of Production?

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Note –

What are the factors considered when selecting an appropriate production method?

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What is Job Production?

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What are the special features of Job Production?

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What are the advantages & disadvantages of Job Production?

Advantages	Disadvantages
+	+
+	+
+	+
+	+
+	+

What is Batch Production?

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What are the special features of Batch Production?

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What are the advantages & disadvantages of Batch Production?

Advantages	Disadvantages
+	+
+	+
+	+
+	+
+	+

What is Flow / Mass Production?

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What are the special features of Flow Production?

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What are the advantages & disadvantages of Flow Production?

Advantages	Disadvantages
+	+
+	+
+	+
+	+
+	+

What is Process Production?

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What are the special features of Process Production?

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What are the advantages & disadvantages of Process Production?

Advantages	Disadvantages
+	+
+	+
+	+
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What is a facility layout?

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Note –

What are the common types of facility layouts found?

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What are the factors considered in setting up a facility layout?

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What is the importance of a facility layout?

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What is Process / Functional Layout?

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What is Product / Assembly-line Layout?

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What is Cellular Layout?

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What is Fixed Position Layout?

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13.3 BREAK-EVEN ANALYSIS

What is Break-even Point?

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What is Break-even Analysis?

This is the study of the mathematical relationship between costs & sales revenue under a given standard set a firm’s fixed costs & variable costs. In this financial analysis, the objective is to determine the number of products that must be sold to cover the costs.

In other words, it is a control tool that summarizes various levels of profit & loss associated with various levels of production. This is very helpful in planning as well as pricing of products. The BEP can be presented in a mathematical or graphical manner.

What are the basic elements of Break-even analysis?

1. Fixed Cost (FC)

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2. Variable Cost (VC)

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3. Total Cost (TC)

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4. Total Revenue (TR)

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5. Profit

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6. Loss

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What is the BEP Formula?

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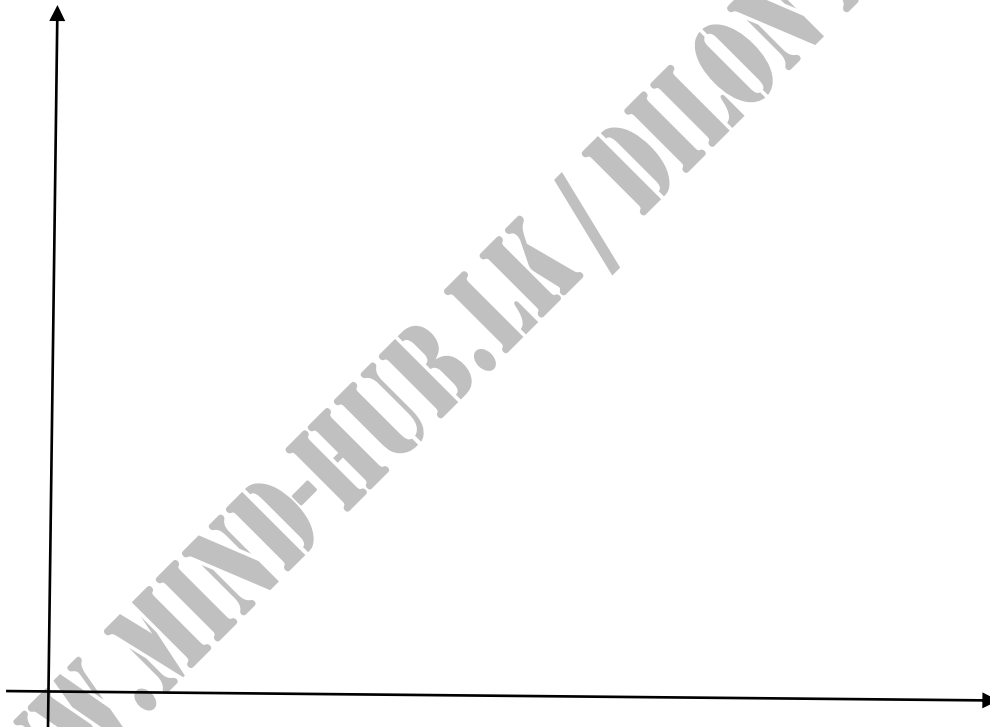
Ex- Ltd has given you the following information;

Total fixed cost for the period Rs. 5,000/-

Selling price per unit Rs. 10/-

Variable cost per unit Rs. 5/-

How can BEP be calculated in a graph?



What are the benefits of calculating BEP?

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What are the limitations of BEP?

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13.4 PURCHASING

What is the Purchasing Function?

This is the function in the production department which does the buying / acquiring of the necessary & needed items for the production function so that conversion process can continue smoothly.

Obtaining the right materials in required quantity, at the required time & at the minimum cost is the purpose of the purchasing function. Therefore many organizations prefer to have a specialized purchasing department.

What are the main purchases of a conventional business organization?

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What are steps of the Purchasing Process?

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What are the factors to be considered in Purchasing?

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What are the negative consequences of improper purchasing?

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13.5 STOCK CONTROLLING

What is Stock Controlling?

This is the process of ensuring that appropriate levels of stocks are maintained by the business at the lowest cost to ensure production can continue smoothly & market demand can be met without any shortages.

Objective of stock controlling can be maintaining the “Optimum level” of stocks which means there is the right level that won’t be over (excess or surplus) stocks or under (deficit or shortage) stocks.

What is Stocks?

This is a set of any items held & maintained by the business to meet future business needs. The most common category of stocks maintained can be;

1. Raw Materials

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2. Work in Progress

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3. Finished Goods

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4. Other necessary items

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What are the advantages of a good stock controlling system?

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What are the stock controlling methods found?

Different businesses use different types of stock controlling methods depending on the type & capacity of the business. They can be;

1. Stock level method
2. ABC analysis
3. Two-bin system
4. Continuous stock recording system
5. Computerized stock controlling
6. JIT system

What are the principle costs involved in Stock Controlling?

1. Ordering costs

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2. Holding Costs

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3. Stock-out Costs

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What is Stock Level method?

This is maintaining stocks at an appropriate level by considering the following 4 stock levels;

1. Re-order level

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Note -

Lead Time -

Demand in Lead Time -

Cycle Time -

2. Economic Order Quantity

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Ex- Calculate the EOQ form the following information;

Annual demand 2500 units

Ordering cost per unit Rs. 40/-

Holding cost per unit Rs. 5/-



3. Minimum Stock Level

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4. Maximum Stock Level

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What are the consequences of having too-much stocks?

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What are the consequences of having too-little stocks?

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What is ABC analysis?

This is where items in stocks will be analyzed & categorized based on value of each item & the amount of space it needs in the warehouse. This method is suitable for an organization that has a large variety of stocks. It can be explained as;

A – Higher value, less space

B – Medium value, medium space

C – Less value, more space

Item	Value	Space
A		
B		
C		

Ex-

What is Two-bin system?

This is where two bins / baskets / storage units used to store stocks. One will be large while the other is small. First the large bin is used & once it is over, the small bin will be used after placing order for stocks. In other words, the end of the large bin is the re-order level while the small bin will be the demand in lead time. Once stocks arrive, first the small bin is filled & then the large bin.

Ex-

What is continuous stock recording system?

This is where the changes in stocks are recorded then and there and keeping the records so that the balance in the store can be known at any time. For this purpose, the following 2 documents will be used;

1. Bin Card

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2. Stores Ledger Card

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What is Computerized Stock Controlling?

This is the usage of various stock controlling software & packages for inventory control. This is very common today since all receipts & issues of stocks gets recorded & updated immediately after scanning the bar-coded product.

Ex-



Some advantages of this approach can be;

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What is JIT System?

This is an inventory control technique for reducing inventories to a minimum level by arranging for production components to be delivered to the production facility just in time to be used. This concept was introduced by Toyota Motor Corporation & is also known as “Zero inventory” & “Kanban”.

This strategy not only increases efficiency but reduces wastage & warehousing costs & thereby reducing the overall cost of production. Unfortunately this method doesn’t suit most companies.

What are the advantages & disadvantages of JIT?

Advantages	Disadvantages
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+.	+.
+.	+.
+.	+.
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What are the problems faced by Sri Lankan businesses in implementing the JIT system?

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13.6 QUALITY & PRODUCTIVITY

What is Quality?

Quality is the extent to which a product reasonably does perform what it is supposed to do. In other words, the ability of a good or a service to satisfy the consumer needs and wants. Quality has a positive relationship with price. The elements that make up quality of a products can be;



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What is Quality Control (QC)?

This is the process of ensuring that the goods which are produced are upto the anticipated level of quality. In other words, the process of confirming if the production is done so as to meet the quality standards established by the producer & to meet the minimum legal requirements. In this process, the goods in quality will be certified while necessary action is taken for the goods not in quality.

A quality control process shall have the following costs;

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What are the methods used for Quality Control (QC)?

- 1. Quality Circles
- 2. Zero Defects
- 3. Quality Assurance
- 4. Quality Standards
- 5. Statistical Process Control

1. Quality Circles

This is where employees doing a particular job would get together in small groups & discuss the problems they face, come up with solutions & present them to the relevant authorities for implementation. The group is mostly voluntary & members are employees who do the same or similar work.

2. Zero Defects

This is the process of assuring that every product produced is without any defects. Accordingly, arrangements are made to produce the product correctly at first time itself, rather than allowing & accepting a margin for error that is unavoidable is done by the zero defects technique.

3. Quality Assurance (QA)

This is where supervisors as well as employees involved in the production process will be continuously involved in checking & ensuring quality of product in both production & after production on a voluntary basis. Here procedures are followed to perform every stage of the



production process with a formal examination in order to confirm the quality of the product. This is an approach of preventing mistakes.

4. Quality Standards

This is where the production process will be done in a manner that confirms & being inline with local & international standards. In other words, conducting the manufacturing activities so as to meet the national & international standards. By this, the consumer reliability on quality could be gained.

5. Statistical Process Control

This is the collection / gathering of data regarding the performance of the production process & communicating those data to relevant parties in diagrams, tables and graphs so that necessary control measures can be taken.

What is the importance of Quality Control to an organization?

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What is Research & Development?

This is the function that continuously works towards identifying new products, production methods, new resources etc & improving them overtime.

Collecting information regarding existing product, production process, new production planning and developing them are sub functions of research and development.

The R&D department is considered not only an asset but an integral part of operations for many dynamic organizations today.

What are the benefits of R&D for a Business?

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What is Productivity?

This is the ratio indicating the relationship between the input & output of a business organization for a given time period. Productivity is used to measure the efficiency & effectiveness of the production process.

Productivity can be measured as “Total Productivity” or “Partial Productivity”.

Total Productivity	
Material Productivity	
Labour Productivity	
Machinery Productivity	

Why Productivity is important for a Business?

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What are the methods of improving Total Productivity?

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What are the methods of improving Partial Productivity?

Material	Labour	Machinery



What are the modern technology methods used to improve productivity?

1. Computer Aided Designing (CAD)

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2. Computer Aided Manufacturing (CAM)

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3. Computer Numerical Control (CNC)

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4. Computer Integrated Manufacturing (CIM)

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5. Flexible Manufacturing System (FMS)

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6. Robotics

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What are the advantages & disadvantages of New Technology?

Advantages		Disadvantages	
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