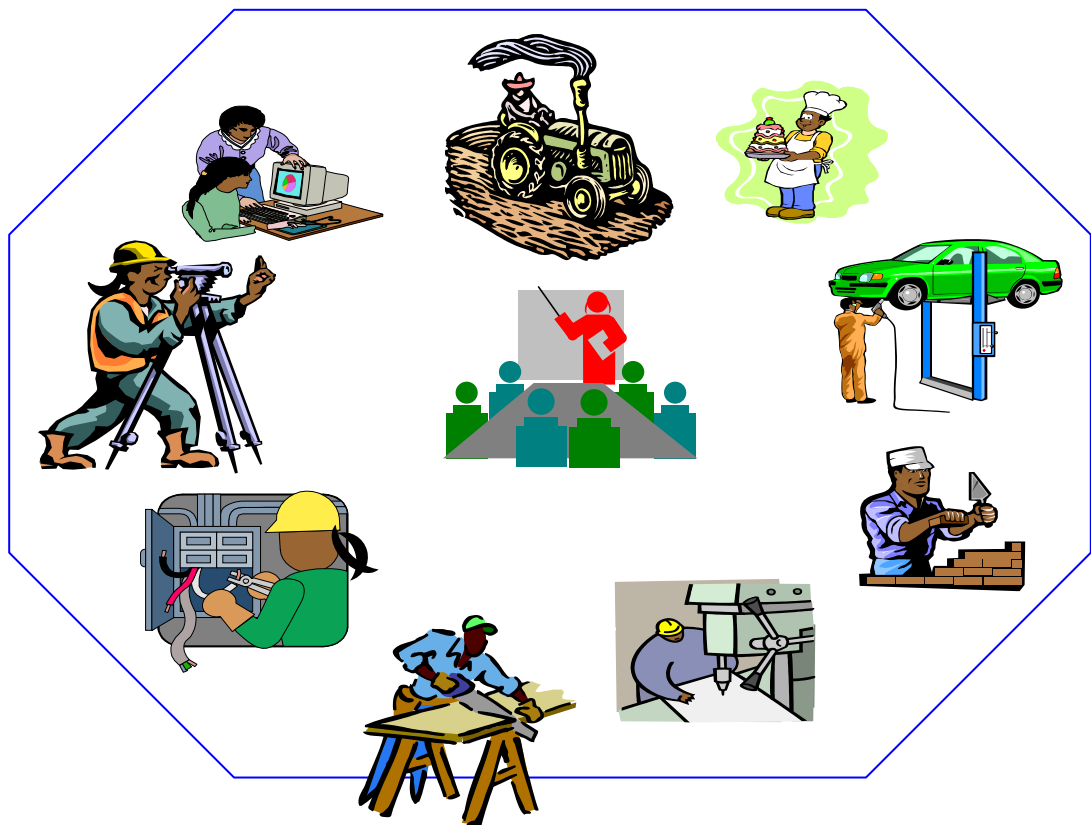




**FURNITURE MAKING OPERATION  
MANAGEMENT LEVEL IV V1  
Based on September, 2012, Version 2 Occupational  
standards (OS)**

**LEARNING GUIDE -31-34**



**Module Title: Undertaking Process Planning and Production  
Scheduling**

**LG Code: IND FOM4 M08 LO (1-4) LG (31-34)**

**TTLM Code: IND FOM4 TTLM 0221 V1**

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**LG #31**

**LO #1- Review process specifications**

**Instruction sheet**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Requiring Engineering and production data.
- Determining the production processes
- Obtaining and Examining Specifications.

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:

- Examine and require Engineering production data.
- Determine the production processes
- Obtain and Examine Specifications.

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

**Engineering and production data**

Production/operations management is the process, which combines and transforms various resources used in the production/operations subsystem of the organization into value added product/services in a controlled manner as per the policies of the organization. Therefore, it is that part of an organization, which is concerned with the transformation of a range of inputs into the required (products/services) having the requisite quality level.

The set of interrelated management activities, which are involved in manufacturing certain products, is called as production management. If the same concept is extended to services management, then the corresponding set of management activities is called as operations management.

Production planning and control is a tool available to the management to achieve the stated objectives. Thus, a production system is encompassed by the four factors. i.e. quantity, quality, cost and time.

Production planning starts with the analysis of the given data, i.e., demand for products, delivery schedule etc., and on the basis of the information available, a scheme of utilization of firms resources like machines, materials and men are worked out to obtain the target in the most economical way.

Once the plan is prepared, then execution of plan is performed in line with the details given in the plan. Production control comes into action if there is any deviation between the actual and planned. The corrective action is taken so as to achieve the targets set as per plan by using control techniques.

Thus production planning and control can be defined as the “direction and coordination of firms’ resources towards attaining the prefixed goals.” Production planning and control helps to achieve uninterrupted flow of materials through production line by making available the materials at right time and required quantity.

The day to day running of manufacturing and service system rests with Production Planning.

The purpose of the production planning is to ensure that manufacturing run effectively and efficiently and produces products as required by customers.

Production planning in furniture construction



## Planning the work

Planning-is thinking through an activity before performing or doing it/the actual work Importance of planning

- ✓ To reduce or avoid mistake
- ✓ To reduce wastage of material
- ✓ To save time, energy and money
- ✓ To obtain a finished product of superior quality

Basic steps of production planning

1. Project specification
2. Preparation of plan of production

### 1. project specification

#### a. choosing the project It is done by :-

- looking pictures
- referring different text books
- furniture catalogs
- magazines
- project
- furniture show rooms and else where

skill is as necessary to choose a project and constructing it. The project one choose for realization should be one that:-

- ✓ One likes, enjoy and believes it, making/constructing
- ✓ Will be beautiful and attractive when finished
- ✓ Is within the limits of one's ability (skills), time he has to work in, and of materials he can get at hand

#### b. making freehand sketching

At the beginning idea about the project are developed through making free hand rough sketches of a project.

Necessity/advantage of making sketches

- ✓ To put ideas on the paper quickly
- ✓ To develop ones idea about the project
- ✓ To make modification to the original design
- ✓ To make change according to ones need/interest



After the design becomes completely clear these ideas are organized in to a finished drawing of the project complete with dimensions and notes.

### C. making presentation drawing

It can be done after the design has been refined and well developed through free hand sketching of the project.

Presentation drawing:- is a pictorial drawing that shows the picture of the object as it looks like when ready for use. It serves to further organize ones ideas and provides a drawing that will be used to present project proposals.

Presentation drawings are drawn with drawing instruments and it is helpful in the preparation of subsequent working drawings so that the picture of the object can be combined with dimensioning.

Presentation drawings are useful because:-

- ✓ They serve for further organize ones idea about the project
- ✓ It provides a means of presenting ones project proposal
- ✓ Helps to prepare subsequent working drawing so that the picture of the object can be combined with dimensioning.

Various types of pictorial drawings are used as presentation drawing. The easiest and most common are:-

- i. isometric drawing
- ii. oblique/ cabinet drawing

#### Isometric drawing

- In an isometric drawing the line showing the side of the object is drawn at an angle of 30 degree to the horizontal.
- All views/faces are shown as one drawing
- Vertical lines showing the outline/boundary line of the object is accurately vertical

#### Oblique (cabinet) drawing

- Show all the three sides of the object
- The line showing the side of the object is drawn at 45 degree from the horizontal
- Only one half of the true length to produce a more realistic appearance

When making presentation drawing it is necessary to:-

- Show only visible outline of the object
- Makes the drawing as simple as possible
- Keep the dimension to a minimum or express them in a note form





- Include any key details that will be helpful in describing the methods and details of construction
- List general specifications' concerning materials and finish

#### **d. making working drawing**

Is a kind of language that can be understood by technicians of any branch of industry including building and manufacturing industries.

The aim (goal) of working drawing is to provide such a complete description that the product could be constructed by someone else without any further explanations or information

For the planning of production, working drawing is very important it:-

- It gives information about the design, methods of construction, kinds of materials needed and the dimensions of the finished work and it is of its various parts.
- Save time and money
- Shows joints and methods of assembly
- Helps to eliminate mistakes in construction
- To enable worker to construct the article independently
- Components of working drawing
  - i. orthographic view
  - ii. section view
  - iii. detail drawing(part detail and joint detail)
  - iv. exploded/assembly drawing

#### **preparation of plan for production**

a. making plan of procedure:- is list of actions

No	Steps	tools and machines required
1	Cross cutting	Table saw
2	Planning	Hand plan or jointer and thicknesses



b. making bill of material :- is a list of material one needs to build a project

i. lumber list(lumber specification)

Includes finished stock list and stock cutting list (cutout list) in which sheet materials such as plywood, particle boards, hared boards, sliced veneer e.t.c. are included.

No	Name of parts	No of pieces in an article(Qty)	Kinds of wood	unit	Specification	Cutout size,mm			Finished size, mm		
						T	W	L	T	W	L
1	Top	1	zigba	M <sup>3</sup>	20*450*650	20	450	650	18	400	600

**Recommended allowance:-**

- for length = up to 25mm
- for width = 5-10mm
- for thickness =2-5mm

ii. supply material list

list and cost of such items as plastics, metals, fittings (hard ware like handle, knob, hinge,.....).the cost of this materials also included

No	Item name	quantity	specification	Unit	size	Unit cost	Total cost	remark
1	glue	¼	Dell	Kg		80	20	
2	nail	10	Akaka	Kg	No-5	30	300	

**C. making cutting list**

A cutting list is a tabulated list showing information about the materials required for the job. It shows you things like the kind of material needed for each part, how much to use, length, width and thickness of the material, and any special notes on what needs to be done.

It can be basically done during hallow block furniture construction

So to complete a cutting list you need to

- ☛ Assess the specifications- consider what needs to be done



- ☛ Identify the process to be used-this must include the materials and machining sequence to be used
- ☛ Complete the cutting list against specifications as outlined

Cutting list Job:-safety kit and suggestion box							
Item no	Part name	Qty	length	width	thickness	Material	remark

**d. making cost list/ lumber order to calculate selling cost**

No	No of pieces in an article	Kind of wood	Cut out size, mm			No of m <sup>3</sup> /m <sup>2</sup> or No of standard sheet	Cost per m <sup>3</sup> /m <sup>2</sup> or No of standard sheet	Total cost
			T	W	L			

Total cost of material = cost of wooden material + cost of supply material

Selling cost = total cost of material + 15%of total material cost for solid wood wastage + 5% of total material cost for manmade board wastage + 20-25% of total material cost for labor cost + 10-15% of total material cost for overhead expense + 10-15 % of total material cost for profit.



Self-Check -1	Written Test
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. ----are arranged based on the sequence of operations required to produce a product or provide a service
2. ----- are created for primitive processes and some higher level processes on a data flow diagram

**Part two short answer**

3. What are the two general forms for Process specifications? Given an example

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____
Rating: _____



Information Sheet-2	Determining the production processes .
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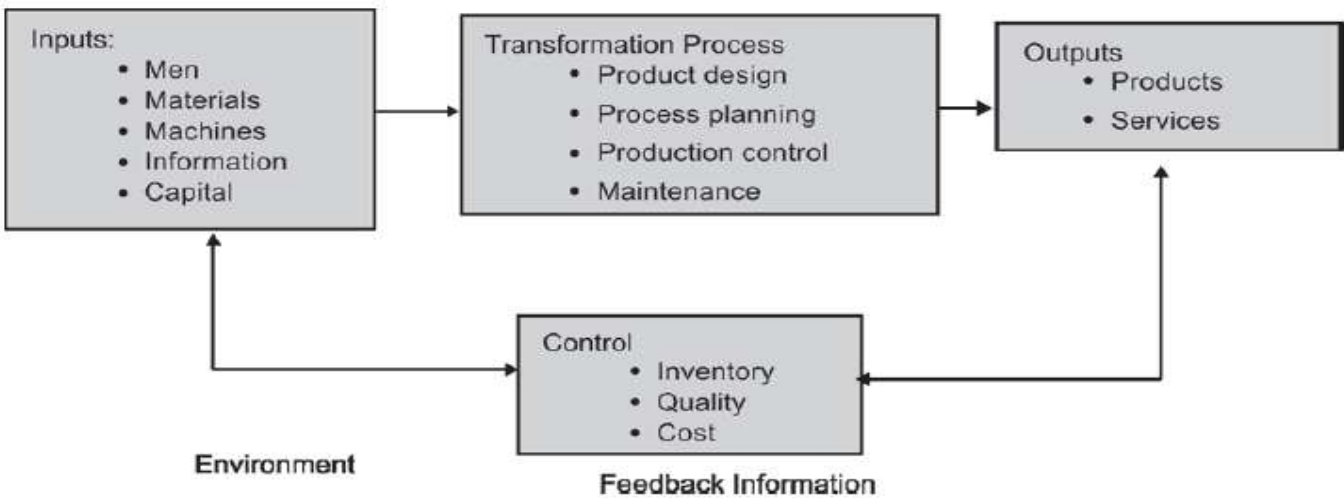
### Determining the production processes

**Production** is defined as ‘the step-by-step conversion of one form of material into another form through chemical or mechanical process to create or enhance the utility of the product to the user’. Thus production is a value addition process. At each stage of processing, there will be value addition.

Modern manufacturing enterprises that manage these production systems must cope with the economic realities of the modern world. These realities include the following:

- Globalization
- International outsourcing
- Local outsourcing
- Contract manufacturing
- Trend toward the service sector
- Quality expectations
- Operational efficiency

**System:** It consists of elements or components. The elements or components are interlinked together to achieve the objective for which it exists. Eg: human body, educational institutions, business organizations.





## **Product Vs Scheduling**

**Product:** The end result of the manufacturing process to be offered to the market place to satisfy a need or a want.

**Scheduling:** Establishing the timing of the use of equipment, facilities and human activities in an organization

**Sequencing** - determining the order in which jobs will be processed

## **How to Sequence Jobs**

Which of several jobs should be scheduled first?

- Techniques are available to do short-term planning of jobs based on available capacity & priorities
- Everything is #1 Priority

## **Commonly Used Priorities Rules**

- First come, first served (FCFS)
- Shortest processing time (SPT)
- Earliest due date (EDD)

## **How to Use Priority Rules**

1. Decide which priority rule to use
2. List all jobs waiting to be processed with their job time
3. Using priority rule determine which job has highest priority then second, third and so on

## **Measuring Performance**

- **Flow time of a job:** Duration of time from a job enters into the system until it leaves
- **Lateness of a job:** Amount by which completion date exceeds due date. Could be negative.
- **Tardiness**  $\max(\text{lateness}, 0)$  How long after the due date a job was completed, measures due date performance

**Makespan:** total time needed to finish a group of jobs

Average number of jobs until the last is finished:

$$= \text{Total flow time} / \text{Make span}$$



**Example: sequencing rules**

Jobs	Processing time	Due date
A	11	61
B	29	45
C	31	31
D	1	33
E	2	32

**EX:FCFS**

Jobs	Proc. time	Flow time	DD	Late	Tardy
A	11	11	61	-50	0
B	29	40	45	-5	0
C	31	71	31	40	40
D	1	72	33	39	39
E	2	74	32	42	42
<b>Total</b>		<b>268</b>	<b>202</b>	<b>66</b>	<b>121</b>
<b>Aver.</b>		<b>53.6</b>	<b>40.4</b>	<b>13.2</b>	<b>24.2</b>

**EX: SPT to minimize the total flow time**

Jobs	Proc. time	Flow time	DD	Late	Tardy
A	1	1	33	-32	0
B	2	3	32	-29	0
C	11	14	61	-47	0
D	29	43	45	-2	0
E	31	74	31	43	43
<b>Total</b>		<b>135</b>	<b>202</b>	<b>-67</b>	<b>43</b>
<b>Aver.</b>		<b>27.0</b>	<b>40.4</b>	<b>-13.4</b>	<b>8.6</b>



### EX: EDD to minimize the maximum lateness

Jobs	Proc. time	Flow time	DD	Late	Tardy
A	31	31	33	0	0
B	2	33	32	1	1
C	1	34	61	1	1
D	29	63	45	18	18
E	11	74	31	13	13
<b>Total</b>		<b>235</b>	<b>202</b>	<b>33</b>	<b>33</b>
<b>Aver.</b>		<b>47.0</b>	<b>40.4</b>	<b>6.6</b>	<b>6.6</b>

#### Example summary

Rule	Average Flow Time (days)	Average Tardiness (days)	Average Number of Jobs at the work center
FCFS	53.6	24.2	268/74 = 3.62
SPT	27	8.6	135/74 = 3.82
EDD	47	6.6	235/ = 3.17

### Scheduling Performance Calculations

Job A finishes on day 10	Job B finishes on day 13	Job C finishes on day 17	Job D ends on day 20
--------------------------	--------------------------	--------------------------	----------------------

- **Calculation mean flow time:**
  - ✓  $MFT = (\text{sum job flow times}) / \# \text{ of jobs}$   
 $= (10+13+17+20)/4 = 60/4 = 15 \text{ days}$
- **Calculating average number of jobs in the system:**
  - ✓  $\text{Average \# Jobs} = (\text{sum job flow times}) / \# \text{ days to complete batch}$   
 $= (60)/20 = 3 \text{ job}$
- **Makespan is the length of time to complete a batch**
  - ✓  $\text{Makespan} = \text{Completion time for Job D minus start time for Job A}$   
 $= 20 - 0 = 20 \text{ days}$
- Lateness and Tardiness are both measures related to customer service
- Average tardiness is a more relevant **Customer Service** measurement as illustrated below





### Example 15-5 Calculating job lateness and job tardiness

Job	Completion Date	Due Date	Lateness	Tardiness
A	10	15	-5	0
B	13	15	-2	0
C	17	10	7	7
D	20	20	0	0
		<b>Average</b>	<b>0</b>	<b>1.75</b>



Self-Check -2

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. ---- is a value addition process
2. ----- is the end result of the manufacturing process to be offered to the market place to satisfy a need or a want.

**Part two short answer**

3. List Common Priorities Rules
4. How to Use Priority Rules

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

**Basic definitions: specifications**

A **specification** is an explicit set of requirements to be satisfied by a material, product, or service. “Specifications” is a general term applying to all directions, provisions, and requirements pertaining to the performance of the work and payment for the work.

**Content of a Specification**

A specification might include:

- Descriptive title and scope of the specification
- Date of last effective revision and revision designation
- Person, office, or agency responsible for questions on the specification, updates, and deviations.
- The significance or importance of the specification and its intended use.
- Terminology and definitions to clarify the meanings of the specification
- Test methods for measuring all specified characteristics
- Material requirements: physical, mechanical, electrical, chemical, etc. Targets and tolerances.
- Performance requirements. Targets and tolerances.
- Workmanship
- Certifications required.
- Safety considerations and requirements
- Environmental considerations and requirements
- Quality requirements, Sampling (statistics), inspections, acceptance criteria
- Person, office, or agency responsible for enforcement of the specification.
- Completion and delivery.
- Provisions for rejection, reinsertion, rehearing, corrective measures & etc

The most important function of a spec is to design the program. Even if you are working on code all by yourself, and you write a spec solely for your own benefit, the act of writing the spec -- describing how the program works in minute detail - will force you to actually design the program. So that's giant reason number one to write a spec.

Giant reason number two is to save time communicating. When you write a spec, you only



have to communicate how the program is supposed to work once. Everybody on the team can just read the spec.

Number three giant important reason to have a spec is that without a detailed spec, it's impossible to make a schedule.

### specification requirements

- A specification is a specific description of particular subjects. An engineering specification contains detail description of all workman ship and material .which are required to complete an engineering projects in accordance with its drawing and detail the quality of material to be used and the quality of workmanship to be achieved during construction, this data regarding the material and workman ship is conveyed in a separate contract document which is known as the specification for the works.
- The building specifications are an important group of documents which forms part of the contract. The building specifications consist of plans, elevations and items which the customer has specified. These documents are used to work out the contract price at the beginning of the project. When planning the project, the building specifications only affect the scheduling of a job.
- **A specification** is “a written document describing in detail the scope of work, materials to be used, methods of installation, and quality of workmanship for a parcel of work to be placed under contract; usually utilized in conjunction with working (contract) drawings in building construction”. In turn, a collection of *specifications* is defined as “a part of the contract documents contained in the project manual consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship”.
- Specifications, as defined above, are typically involved in many project types including commercial, municipal and other large scale projects. They become especially important when a project is utilizing a public bidding process or when there are very detailed requirements for the project. Although specifications are not meant to address all issues that may come up during construction, they typically outline how to deal with issues in the field and define the project in much greater detail than drawings, contracts and agreements alone.
- Specifications play an important role in the ultimate success of any construction project. It is important that all of the goals and intents for the project are considered in the specifications including those of the client, a fully integrated design team, the builder and the eventual tenants. Specifications that are clear, well written and organized according to Master Format can result in greater bid accuracy, reduced complications in the field, quantifiable measures of



the projects success and clarity of the client's requirements and desires throughout the project lifecycle.

- Specifications should be clear, concise, and brief descriptions of what is required to execute the proposed trade of work
- Specifications describe the nature and the class of the work, materials to be used in the work, workmanship etc. and is very important for the execution of the work. The cost of a work depends much on the **specifications**. Specifications should be clear

**Specifications generally describe the following: -**

- Type and quality of materials, equipment's, labor or workmanship
- Methods of fabrication, installation and erection
- Standards, codes and tests
- Allowance, submittals and substitutions
- Cost included, insurance and bonds
- Project records and site facilities.
- Construction methods

**Purposes of specifications**

The purpose of specifications generally includes:

- Guide the bidder at the time of tendering to arrive at a reasonable cost for the work
- Provide guidance for execution and supervision of works.
- Guide the contractor for the purchase of materials
- Serve as a part of contract document to limit and describe the rights and obligations of

Each contracting parties.

- Guide the bidder to identify his capacity to execute the work.
- Serve as fabrication and installation guide for temporary and permanent works.
- Guide the contractor for the purchase and/or hiring of equipments.
- Serve for the owner to know what he/she is entitled to receive
- Serve for the manufacturers of construction materials, equipments, tools etc to grade,

Classify, and improve qualities of their produces.

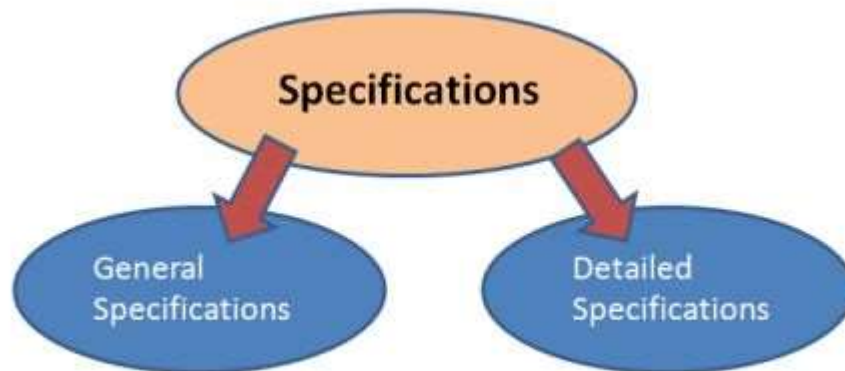
- Indirectly, the specifications are very much related to the legal considerations,



## Purpose of giving Specifications

- The cost of a unit quantity of work is governed by its specifications.
  - Specification of a work is required to describe the quality and quantity of different materials required for a construction work and is one of the essential contract documents.
  - This also specifies the workmanship and the method of doing the work. Thus specification of a work serves as a guide to a supervising staff of a contractor as well as to the owner to execute the work to their satisfaction.
  - A work is carried out according to its specification and the contractor is paid for the same. Any change in specification changes the tendered rate.
  - As the rate of work is based on the specification, a contractor can calculate the rates of various items of works in tender with his procurement rates of materials and labor. Thus tender rate without specification of works is baseless, incomplete and invalid.
1. Specification is necessary to specify the equipment tools and plants to be engaged for a work and thus enables to procure them beforehand.
- The necessity of specification is to verify and check the strength of materials for a work involved in a project.

## Types of specification



## General Specifications

In general specifications, nature and class of works and names of materials that should be used are described. Only a brief description of each and every item is given. It is useful for estimating the project. The general specifications do not form a part of contract document.



## Detailed Specifications

The **detailed specifications** form a part of a contract document. They specify the qualities, quantities and proportions of materials and the method of preparation and execution for a particular item of works in a project. The detailed specifications of the different items of the work are prepared separately and they describe what the work should be and how they shall be executed. While writing the detailed specifications, the same order sequence as the work is to be carried out is to be maintained.

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			January 0121



Self-Check -3	Written test
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**Directions:** Write correct answer

1. Write types of specification? (2 point)
2. Date of last effective revision and revision designation ? (3 point)
3. What are the benefits of detailed specifications? (5 point)

**Note:** Satisfactory rating – 5 points

Unsatisfactory - below 5 points

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Answer sheet**

- 1.....
- 2.....
- 3.....





Lap test -1	Written test
-------------	--------------

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**PART I MULTIPLE CHOICE : .....Choose the best answer (20 points)**

1. Is a convenient method for decomposing the project complexity in a rational manner into work packages and elementary activities.  
A. cost break down structure                      B. work Break down structure  
C. organizational break down structure    D. all
2. Describes the amounts of individual resources an existing schedule requires during specific time periods.  
A. resource loading      B. resource limited      C. resource loading leveling    D. scheduling
3. The period-by-period variations in resource loading by shifting tasks within their slack/lose allowances.  
A. resource loading      B. resource limited      C. resource loading leveling    D. scheduling
4. Placing of the plan on a calendar and showing the allocation of the equipment and manpower that will put the plan into effect.  
A. resource loading      B. planning      C. resource loading leveling    D. scheduling
5. Disadvantages of the Bar Chart  
A. does not show how they are related to one another  
B. useful only for simple projects where activities are more or less simultaneous  
C. Not useful on a more complex project  
D. Shows only the time necessary to complete certain work                      E. all
6. Which one of the following is not the executive function of the construction manager?  
A. To plan      B. To evaluate      C. To organize                      D. To control
7. It is a "private, informal process in which parties are assisted by one or more neutral third parties in their efforts towards settlement  
A. Arbitration      B. Negotiation      C. Mediation      D. Litigation



<b>LG #32</b>	<b>LO #2- Determine production sequence</b>
<b>Instruction sheet</b>	
<p>This learning guide is developed to provide you the necessary information regarding the following <b>content coverage</b> and topics:</p> <ul style="list-style-type: none"><li>• Identifying and flow charts are produce</li><li>• preparing in accordance with operating procedures material and parts</li><li>• Requiring the documented in accordance with Tools and equipment</li><li>• Representing documented and clearly process steps</li></ul> <p>This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:</p> <ul style="list-style-type: none"><li>• Identify and flow charts are produce</li><li>• prepare in accordance with operating procedures material and parts</li><li>• Require the documented in accordance with Tools and equipment</li><li>• Represented documented and clearly process steps</li></ul>	
<b>Learning Instructions:</b>	
<ol style="list-style-type: none"><li>1. Read the specific objectives of this Learning Guide.</li><li>2. Follow the instructions described below.</li><li>3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.</li><li>4. Accomplish the “Self-checks” which are placed following all information sheets.</li><li>5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).</li><li>6. If you earned a satisfactory evaluation proceed to “Operation sheets</li><li>7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,</li><li>8. If your performance is satisfactory proceed to the next learning guide,</li><li>9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.</li></ol>	



Information Sheet-1	Identifying and flow charts are produce.
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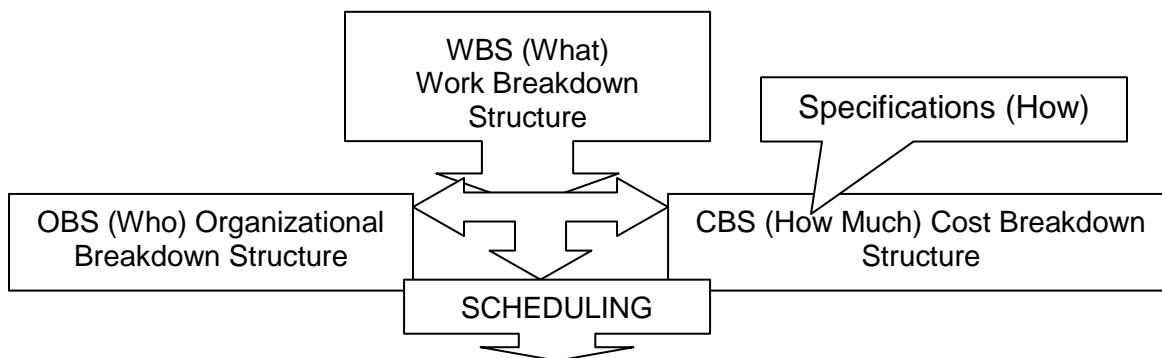
### Project Planning

- A function of coordinating in a logical order all the activities, persons, machines and materials necessary to complete the project;
- Manufacture project planning is a method of determining **“What” is going to be done, “How” things are going to be done, “Who” will be doing activities and “How much” activities will cost.**
- In this sense planning does not cover scheduling, which addresses the “When”, but once planning is complete scheduling can be done
- **Project:** A set of partially ordered, interrelated activities that must be completed to achieve a goal. Main processes include:
  - ✓ Activity definition
  - ✓ Activity sequencing
  - ✓ Activity resource estimating
  - ✓ Activity duration estimating
  - ✓ Schedule development
  - ✓ Schedule control

Once the basic planning and preparation of the master plan are finished, a plan should be made for the construction . It should proceed as follows:

- ✓ plans, specifications and cost estimates; ~
- ✓ tender documents;
- ✓ selection of contractor and award of work;
- ✓ construction activities;
- ✓ project management and control; and
- ✓ handing over for commissioning.

Fig. 1.1. General frame work for the planning process





## 1. Work Breakdown Structure (WBS)

The WBS is a convenient method for decomposing the project complexity in a rational manner into work packages and elementary activities. Some firms prefer to use a standard means of identifying work packages common to all similar projects. These work packages are then coded so that both costs and the schedule can be controlled.

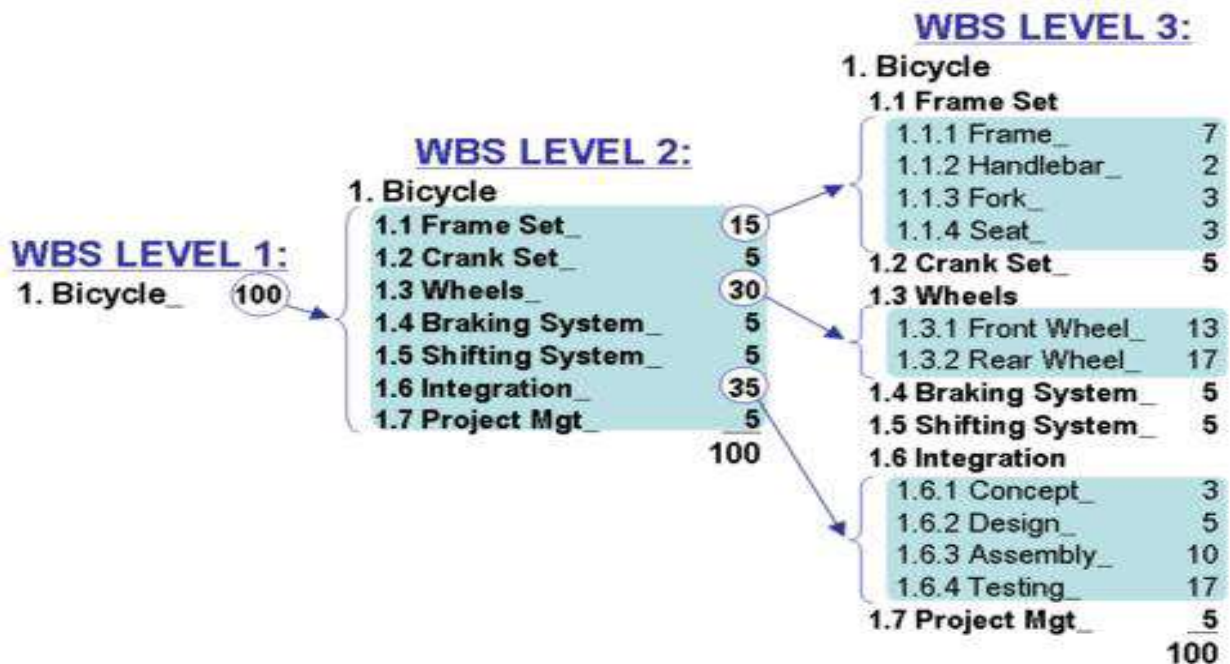
In essence, the WBS divides and subdivides a project into different components, whether by area, phase, function, or other considerations. The highest level in the WBS consists of a single element, the project. At the next level, there may be only a few elements or items.

A Work Breakdown Structure helps in organizing *what* needs to be done in small packages of activities.

The work breakdown structure (WBS) is a hierarchical system that represents the construction project in increasing levels of detail to define, organize and display the project work in measurable and manageable components.

Work Breakdown Structure

- ✓ Level 1 Project
- ✓ Level 2 Subproject
- ✓ Level 3 Sub-network
- ✓ Level 4 Activity
- ✓ Level 5 Sub-activity



Commonly there are three main types of WBS, namely,

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### 1. Project WBS 2. Standard WBS 3. Contract WBS.

- The Project WBS is an operational tool usually prepared by contractors to monitor and control the work
- A standard WBS is a breakdown structure of activities carried out in the past for a similar project: the past project WBS can that can be used as a template for the new one.
- A contract WBS is agreed between owner and contractor. This is a decomposition of the scope of work into the main elements that will be used for progress measurement, control and payment of the contract price. It may include less detail than a Project WBS.

### 2. Organizational Breakdown Structure – “Who”

Once what needs to be done is defined, it is necessary that all human resources required to perform the project are identified. Depending on the portions of work scope, the project may need engineering skills, procurement capabilities, construction labor, management staff, etc.

The Organization Breakdown Structure is a practical method to decompose the pool of human resources needed to execute all of the tasks into different competence areas and then into project roles, independently of the number of individuals that will be assigned the specified role

The OBS is prepared with the idea that each task in the WBS must be assigned to a role or committee of roles. In other words, roles are allocated to detailed tasks.

#### Project resources

- Internal resources
  - ✓ Project management team
  - ✓ Project Manager
  - ✓ Work shop Manager
  - ✓ Scheduler
  - ✓ Work shop inspector
  - ✓ Engineering
  - ✓ Project Engineer
  - ✓ Architect
  - ✓ Civil Engineer
- Project labor
  - ✓ Foreman
  - ✓ General worker
- External resources



- Sub Manufactures
  - ✓ Electrical
  - ✓ Etc.
- Material suppliers
  - ✓ Manufacturing commodities
  - ✓ Steel pre-casted structures

With a specified number of resources and related estimated work load required to perform the task. To summarize the planning process thus far, we have created the WBS and have now incorporated a responsible committee or person to each element of the WBS. In essence, from activities developed in the WBS we have allocated resources through the OBS.

### The Resource Allocation Problem

- A shortcoming of most scheduling procedures is that they do not address the issues of resource utilization and availability.
- Scheduling procedures tend to focus on time rather than physical resources.
- Time itself is always a critical resource in project management, one that is unique. ***because it can neither be inventoried nor renewed.***
- Schedules should be evaluated not merely in terms of meeting project highlight, but also ***in terms of the timing and use of scarce resources.***
- A fundamental measure of the project manager’s success in project management is the skill with which the trade-offs among ***performance, time, and cost are managed.***
- The extreme points of the relationship between ***time use and resource use*** are these:
  - ✓ **Time Limited:** The project must be finished by a certain time, using as few resources as possible. But it is time, not resource usage, that is critical.
  - ✓ **Resource Limited:** The project must be finished as soon as possible, but without exceeding some specific level of resource usage or some general resource constraint.
- If all three variables - time, cost, specifications - are fixed, the system is “over determined”.
- A system-constrained task requires a fixed amount of time and known quantities of resources.

### Resource Loading

- Resource loading describes the amounts of individual resources an existing schedule requires during specific time periods.
- The loads (requirements) of each resource type are listed as a function of time period.



- Resource loading gives a general understanding of the demands a project or set of projects will make on a firm's resources.
- An excellent guide for early, rough project planning.
- Because the project action plan is the source of information on activity precedence's, durations, and resources requirements, it is the primary input for both the project schedule and its budget.
- The action plan links the schedule directly to specific demands for resources .
- The project manager must be aware of the flows of usage for each input resource throughout the life of the project.
- It is the project manager's responsibility to ensure that the required resources, in the required amounts, are available when and where they are needed.

### Resource Leveling

- Resource leveling aims to minimize the period-by-period variations in resource loading by shifting tasks within their slack/lose allowances
- The purpose is to create a smoother distribution of resource usage
- Several advantages include:
  - ✓ May be able to use a "just-in-time" inventory policy
- When resources are leveled, the associated costs also tend to be leveled
- The project manager must be aware of the cash flows associated with the project and of the means of shifting them in ways that are useful to the parent firm
- Resource leveling is a procedure that can be used for almost all projects, whether or not resources are constrained

### 3. Cost Breakdown Structure – “How Much”

Now that we have discussed “what” is going to be accomplished through the WBS and “who” is going to perform activities through the OBS, owners and contractors want to know how much things will cost.

Determining the cost is done through the Cost Breakdown Structure (CBS). The CBS is a system for dividing a project into hardware elements and sub elements, functions and sub functions and cost categories. It is a hierarchical structure that classifies resources into cost accounts, typically labor, materials, and other direct costs. In addition it represents the economic breakdown of the project into budgets per work package. This will allow the project manager to track project progress and expenditure according to planning breakdown of activities and responsibilities.



A CBS includes all direct full cost of labor, material, as well as the so-called project overhead, which is still a direct cost required to execute the project.

There are two main approaches to direct cost breakdown structuring. Which is used in a particular circumstance depends on the different purposes of cost accounting.

**The first one** makes use of the WBS as the project cost control structure, so that the CBS and WBS are the same structure and each cost account is consistent with a work package or detailed task. In other words, the accounting structure is the same WBS that has been filled with cost information: the end result is a hierarchical structure of cost to be used by the project team for both budgeting, accounting and control. With this kind of CBS, Activity Based Costing (ABC) method drives both estimation of budget and accounting of actual expenditures.

**A second approach** to CBS budgeting is to use the corporate multiple-project cost control structure as the project cost accounting system. With this method, each WBS activity has to be associated with a cost account by the means of a cost code. The coding system may be a firm-specific or a common standardized one, such as the Master Format developed by the Construction Specifications Institute of the United States, the ISO Unit Class, the German KKS valuable for power plant construction, or the Construction and the Engineering Information Classification System.

#### 4. Scheduling

- Placing of the plan on a calendar and showing the allocation of the equipment and manpower that will put the plan into effect;
- The process of converting a general or outline plan for a project into a time-based graphic presentation using information on available resources and time constraints
- Scheduling is a management tool
- It can be used to satisfy a number of objectives
  - ✓ Coordination
  - ✓ Analysis and forecasting
  - ✓ Reporting against a baseline
- **Scheduling enables you to Coordination**
  - ✓ Integrate the activities of the various project participants
  - ✓ Show interface responsibilities particularly with respect to timing
  - ✓ Secure, record and communicate commitment to tasks by the various contributors to the project effort
  - ✓ Identify the key activity sequence (critical path) determining the length of the project





- ✓ Display departmental work loading and hence facilitate departmental planning
- ✓ Provide the basis for more detailed scheduling

- **Scheduling enables analysis and forecasting**

- ✓ Show priorities for procuring equipment, material, labor and services
- ✓ Analyze complex work areas with many interrelated activities through network analysis
- ✓ Facilitate long range planning and future resource allocation
- ✓ Measure progress
- ✓ Measure performance
- ✓ Maintain control over time and cost of the project
- ✓ Produce a cash flow forecast

- **Use scheduling for reporting**

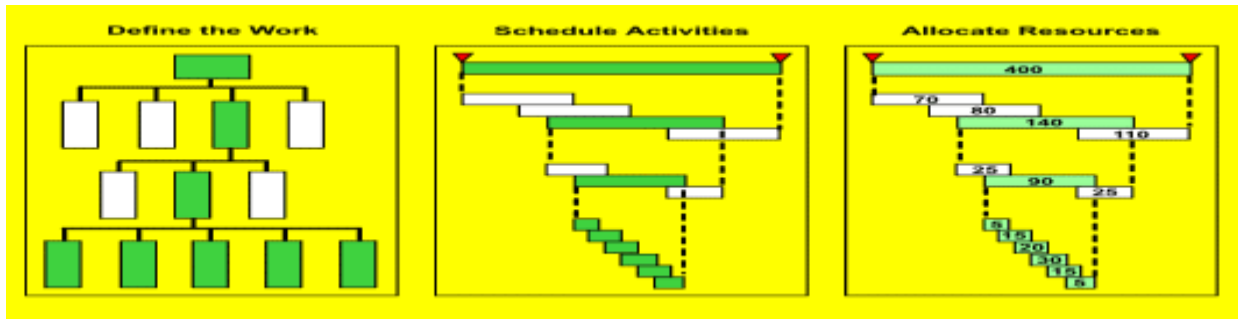
- ✓ Provide a visible summary of important or major activities
- ✓ Report planned completion dates
- ✓ Report deviations from plan
- ✓ Provide an early warning system for delays
- ✓ Monitor cash flow
- ✓ Record actual dates
- ✓ For forecasting
- ✓ For estimating on future projects

### **Characteristics of a Good Schedule**

- A good schedule will be
  - ✓ Logical
  - ✓ Simple and easy to work with
  - ✓ Easy to monitor
  - ✓ Flexible, easy to revise
  - ✓ Specific and timely
- It will also
  - ✓ Anticipate problems
  - ✓ Promote effective communication



## Three Basic Steps to a Project Schedule



Methods of scheduling:

- Bar / Gantt Chart
- Critical Path Method

The bar/Gantt chart

activity	Weeks									
	Start	2	3	4	5	6	7	8	9	10
Cutting		█	█							
Sizing			█	█	█					
Sanding				█	█	█	█			
Assembling						█	█	█		
Finishing								█	█	█

- Disadvantages of the Bar Chart
  - ✓ Shows only the time necessary to complete certain works but does not show how they are related to one another;
  - ✓ Useful only for simple projects where activities are more or less simultaneous or where string of sequential activities are involved;
  - ✓ Not useful on a more complex project;

## PERT / CPM

### PERT

- Program Evaluation and Review Technique.
- Designed to provide the management a periodic reporting of current status and an outlook for the future on meeting approved plans and schedules.
- Answers the question such as:
  - ✓ Is this a feasible schedule ?
  - ✓ What are the probabilities of making it ?



## CPM

- Critical Path Method
- Designed as a tool for planning, scheduling & control of construction work.
- Emphasis on the work or activities to be managed.

## PERT/CPM

- A control tool for defining the parts of construction job & then putting them together in a network form;
- Serves as an aid to the construction manager by seeing the whole picture of the entire job;
- Encourages periodic re-evaluation & providing an accurate measure of progress;

## Phases of PERT / CPM

### I. Planning Phase

- Determining the relationship between the work operation and the sequence in which they are to be performed;
- Inputs are;
  - ✓ Network diagram defining the activities in the project;
  - ✓ Duration of activities;
  - ✓ Cost estimates of the activities for monitoring cost and cash flow requirements;
  - ✓ Resource estimates;
  - ✓ Trade indicators (responsibility) for activity grouping;

### II. Scheduling Phase

- Process of translating the arrow diagram into table of calendar days which is done by converting working days into calendar days with the inclusion of weekends, holidays, weather and other time lost;

#### Outputs are;

- Schedule of activities showing the ff;
  - ✓ Critical activities
  - ✓ Earliest start date
  - ✓ Earliest finish date
  - ✓ Latest start date
  - ✓ Latest finish date
  - ✓ Float, which refers to the extra time available for an activity;
- Bar chart of a time-scaled network (arrow diagram)



- Resource analysis showing the number & kind of resources, manpower, equipment & etc., that are required for each day of the project;
- Cash requirement prediction;

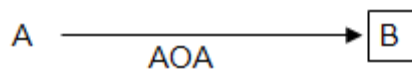
### III. Controlling and Monitoring Phase

- Concept of flexibility and updating or re-computing, brought about by changing conditions.
- Uses actual data which includes the ff;
  - ✓ Addition of new activities on the project
  - ✓ Deletion of some activities
  - ✓ Changes as to duration, description, trade indicators, cost estimates or resource estimates
  - ✓ Actual starting dates
  - ✓ Actual finishing dates

#### Project Network Analysis (CPM Method)

##### Two types of Network Diagram

- Activity on Arrow (Arrow Diagramming)
  - ✓ Used arrows to designate activities



- ✓ Nodes represents the beginning & end of activities, which are called event

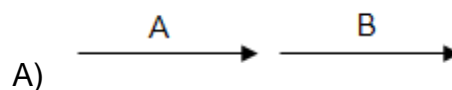
##### Activity on Node (Procedure Diagramming)

- ✓ Use nodes to designate activities

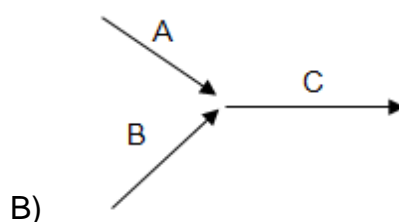


- ✓ Nodes represents activities;

##### Elements of A Network Diagram

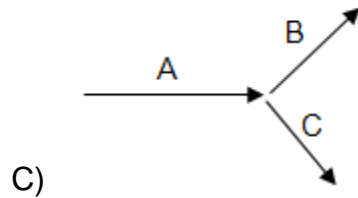


**Work B cannot start until work A is completed**

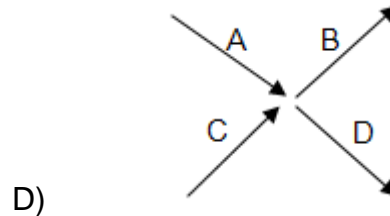




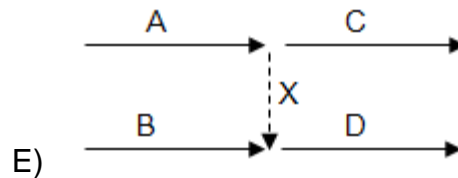
**Work C cannot start until both work A and B is completed**



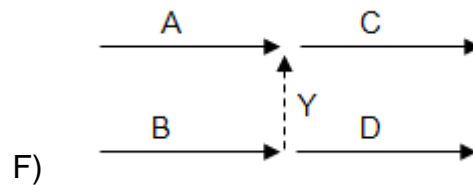
**Work A must be completed before B and C can start**



**Both A and C must be completed before either B and D can start;**



- Both jobs A and B must be completed before job D can start;
- Job C depends on the completion of job A only;
- X is called a dummy;



- Both jobs A and B must be completed before job C can start;
- Job D depends on the completion of job B only;
- y is called a dummy;

### Definitions

- Activity;
  - ✓ A specific job or task that has to be performed;
  - ✓ Normally time is required to complete an activity;
- Event;
  - ✓ The start or completion of an activity;
  - ✓ Requires no time in itself;



- ✓ Indicated as a circle, square, ellipse or any form of geometrical symbols with a number written therein;
- Arrow;
  - ✓ A line drawn to represent each activity in a network;
  - ✓ Usually designated by two numbers, one on the tail, and the other on the head;
- Dummy;
  - ✓ An artificial activity, usually represented by a broken line and does not require time;

#### Definitions

- Early Start (ES);
  - ✓ Earliest time an activity can start;
- Duration (D);
  - ✓ Estimated time to perform an activity;
- Early Finish (EF);
  - ✓ Earliest time an activity can be finished;
  - ✓  $EF = ES + D$ ;
- Late Start (LS);
  - ✓ Latest time an activity can be started without delaying the completion of the project;
  - ✓  $LS = LF - D$ ;
- Late Finish (LF);
  - ✓ Latest time an activity can be finished without delaying the completion of the project;
  - ✓  $LF = LS + D$

#### Definitions

- Total Float (TF);
  - ✓ The amount of time that an activity may be delayed without delaying the completion of the project;
  - ✓  $TF = LS - ES$  or ;
  - ✓  $TF = LF - EF$ ;
- Free Float (FF);
  - ✓ Time that the finish of an activity can be delayed without delaying the early start time of any of the following activity;
  - ✓  $FF = ES$  (of following activity) –  $EF$  (of this activity);
- Critical Path;
  - ✓ Longest interconnected path of activities through the network;



- ✓ Determines the overall duration of the project;
- ✓ All activities on the critical have zero float time;
- ✓ A project may have more than one critical path;

### Definitions

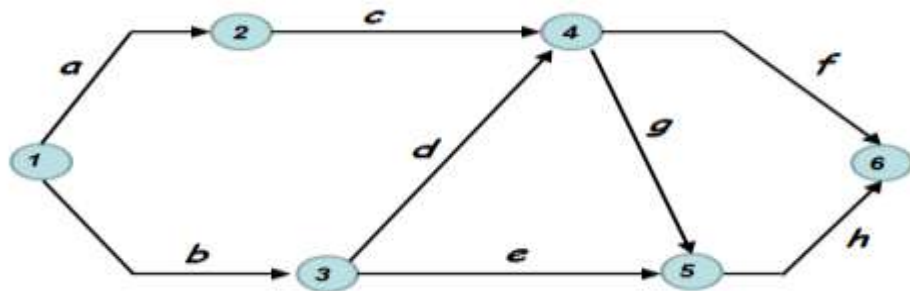
- Critical Activity;
  - ✓ Activities that are located on the critical path;
  - ✓ Has zero float time;
  - ✓  $LS - ES = 0$ ;
  - ✓  $LF - EF = 0$ ;

### Rules for Numbering Events in a Network Diagram

- All events should be numbered from left to right;
- No event number should be lower than the number of event preceding it;
- Event numbers shall increase from left to right;
- Events should be numbered from top to bottom;

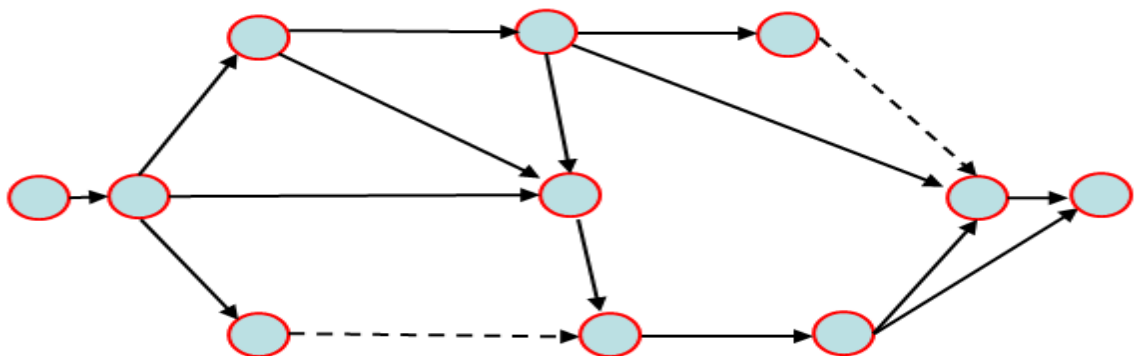
### Sample No. 1

Number the events of the network in proper sequence;



### Assignment No. 1

Number the events of the network in proper sequence;



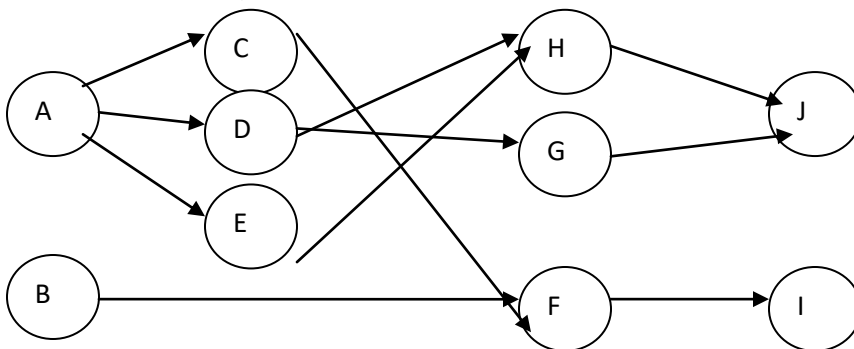


### Example 1

From the following table of information 1. Draw the precedence diagram 2. Find the critical path  
3. Determine the expected duration of the project

Activities	Predecessor	Duration in weeks
A	-	5
B	-	4
C	A	3
D	A	4
E	A	6
F	B,C	4
G	D	5
H	D,E	6
I	F	4
J	G,H	4

1. Precedence diagram



2. Examining the above network diagram we have the following root or path

**path : A,C,F,I=5+3+4+4= 16**

A,D,H,J= 5+4+6+4=19

A,D,G,J=5+4+5+4=18

A.E,H,J=5+6+6+4=21

B,F,I=4+4+4= 12

3. From the above path the highest number is 21 ,thus path A,E,H,J is the critical path which means the longest route. Similarly , the duration of the project is 21 weeks.





Self-Check -1	Written test
---------------	--------------

**Directions:** Write correct answer

1. Write two types of elements of a network diagram? (3 point)
2. Write elements of a network diagram? (3 point)
3. What are the critical path? (4 point)

**Note:** Satisfactory rating – 5 points

Unsatisfactory - below 5 points

### Answer Sheet

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

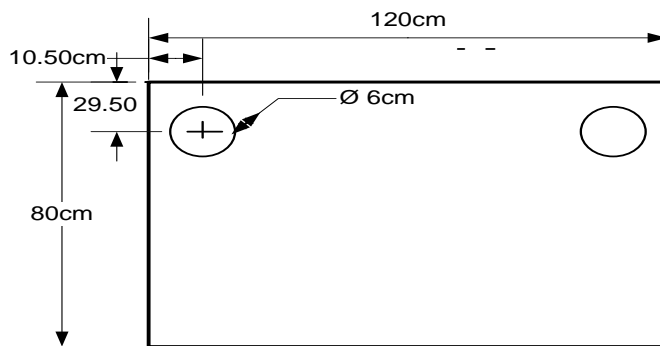
### Answer sheet

- 1.....
- 2.....
- 3.....

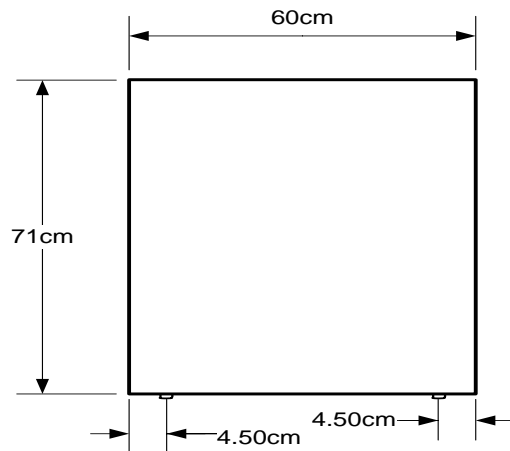


**Working procedures:**

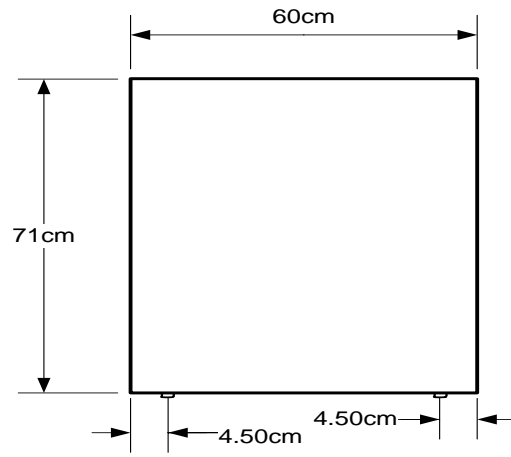
- 1. Prepare the tools and equipment needed**
- 2. Gather and prepare the materials**
- 3. Measure and accurately cut the boards into pieces according to the given design and measurements.**



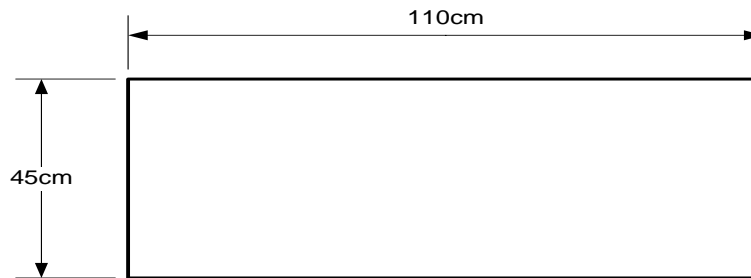
**TOP BOARD**



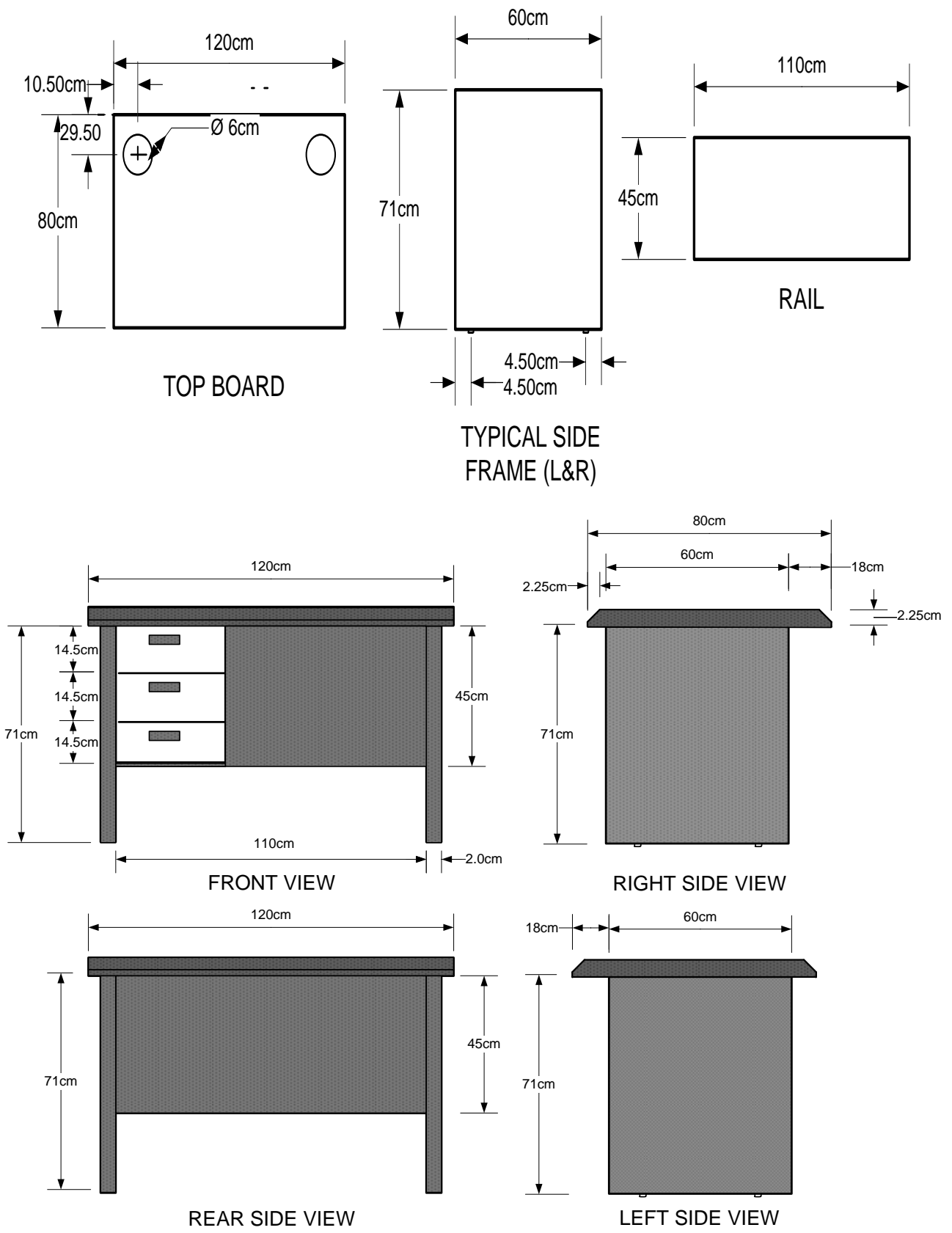
**LEFT SIDE FRAME**



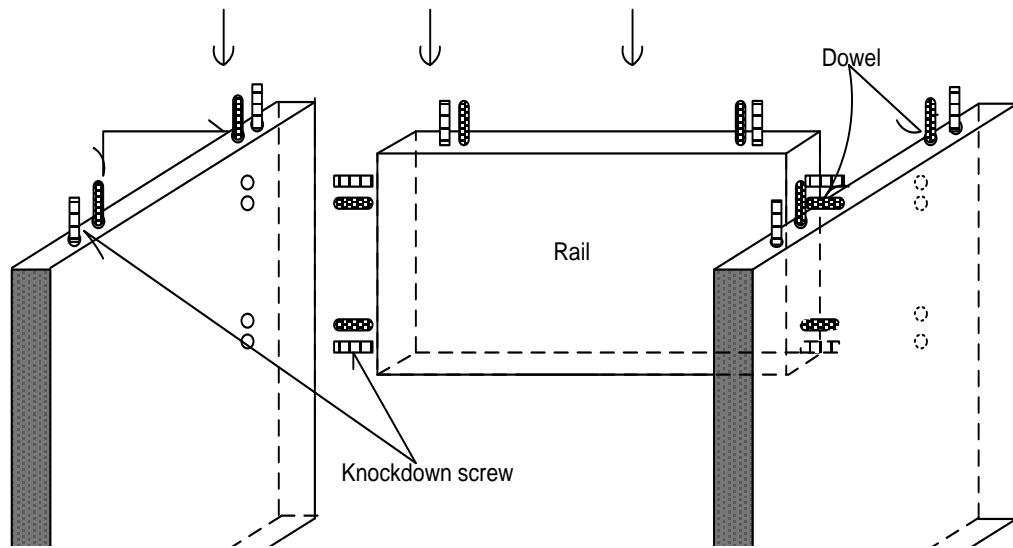
**RIGHT SIDE FRAME**



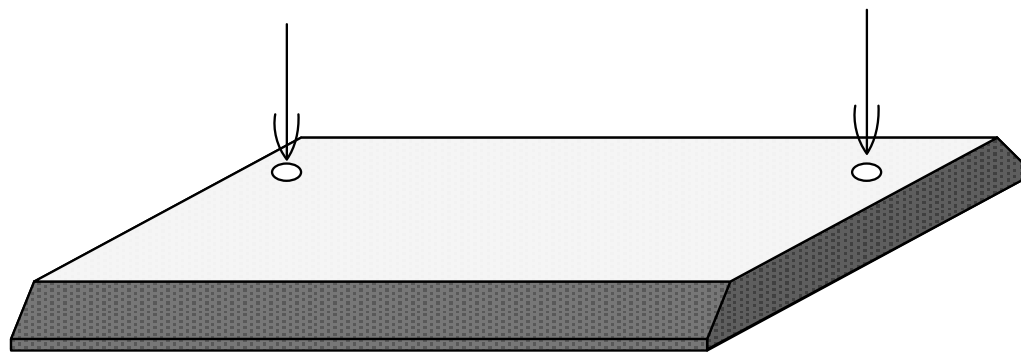
**RAIL**



**4. Locate and bore the placement of the dowels, eccentric screws and foot rest.**

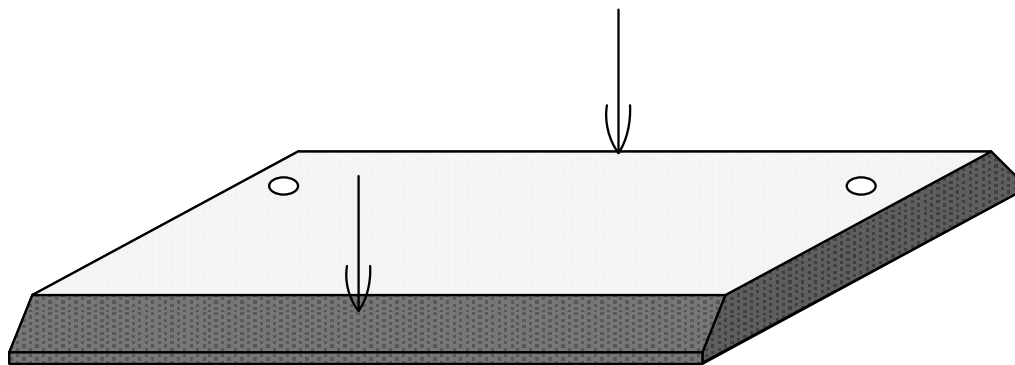


5. Measure and bore the 6cm diameter hole for the installation of "Cable outlet plastic cover" at the top board.



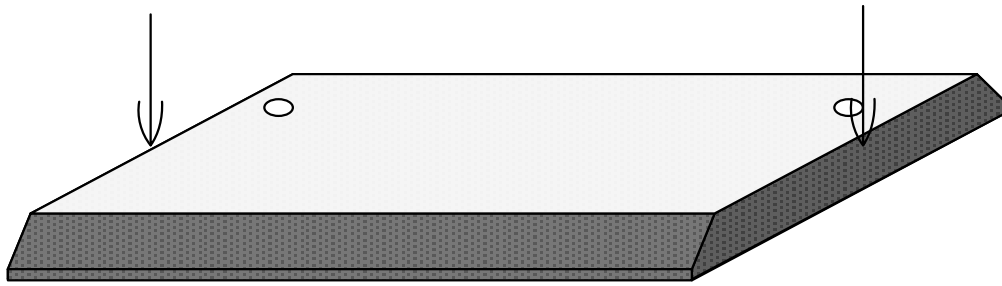
Top Board

6. Chamfer the both length edges of the "Top board".



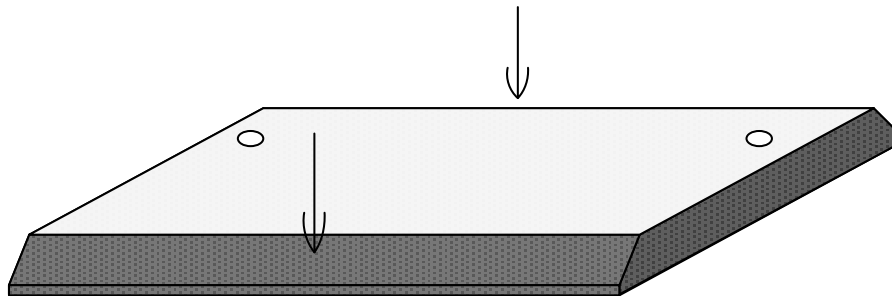
Top Board

7. Install the plastic vinyl at the left and right side of the top board.



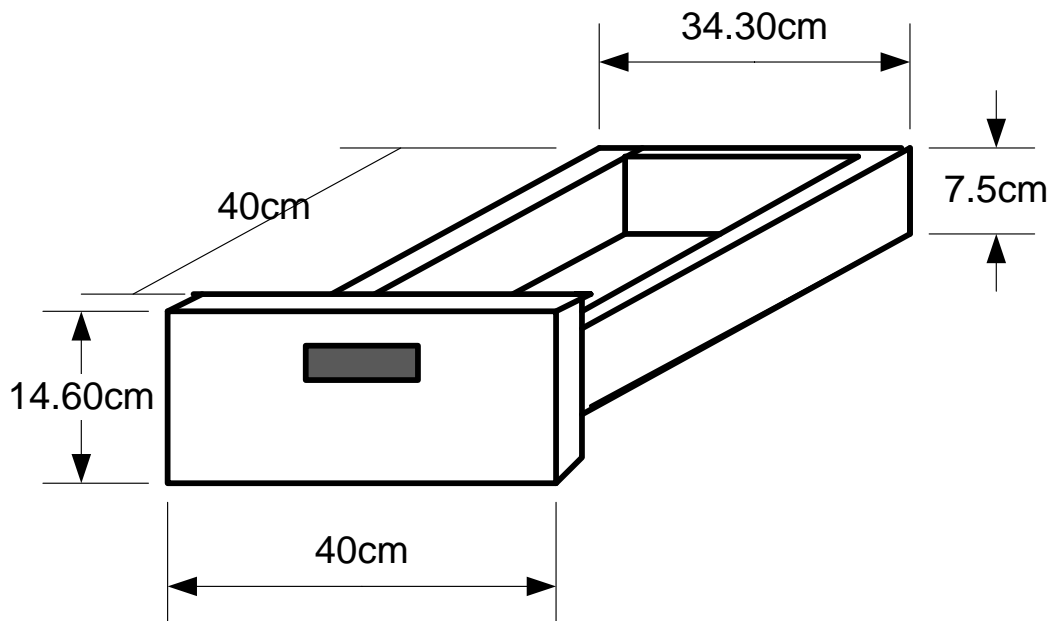
Top Board

8. Paste the rubberized laminates at the front and rear side of the top board.



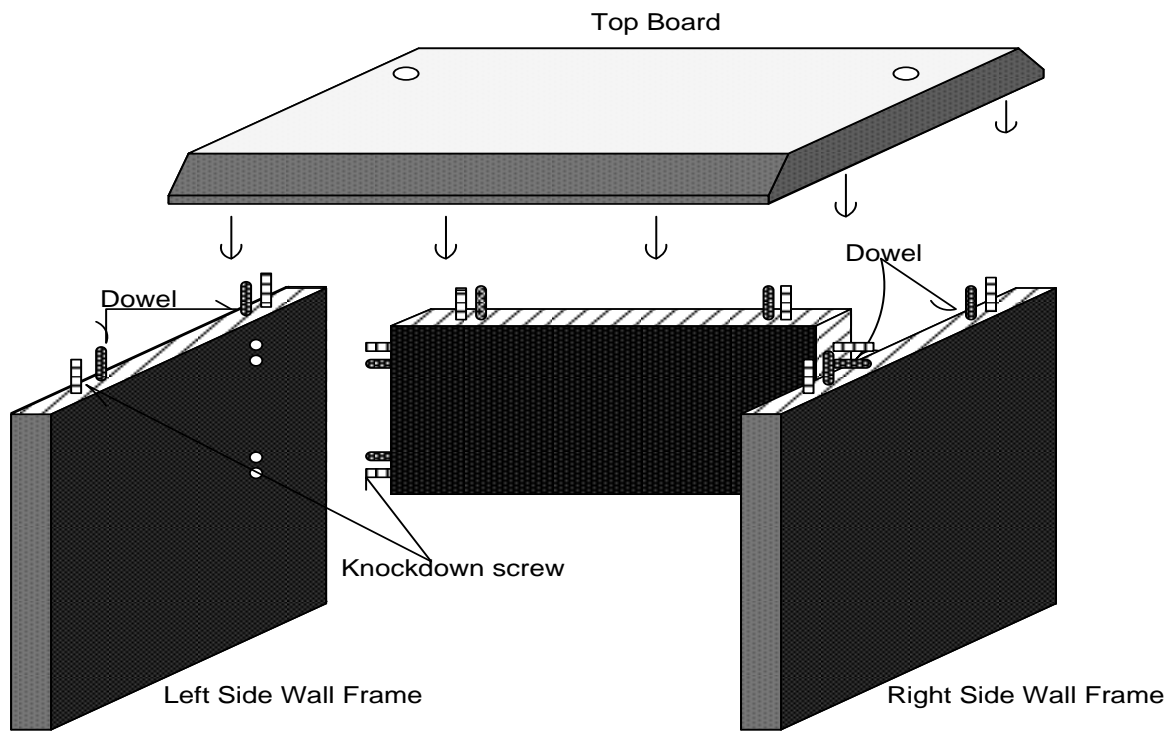
Top Board

9. Construct the drawers according to the specifications. (Refer to the drawing)



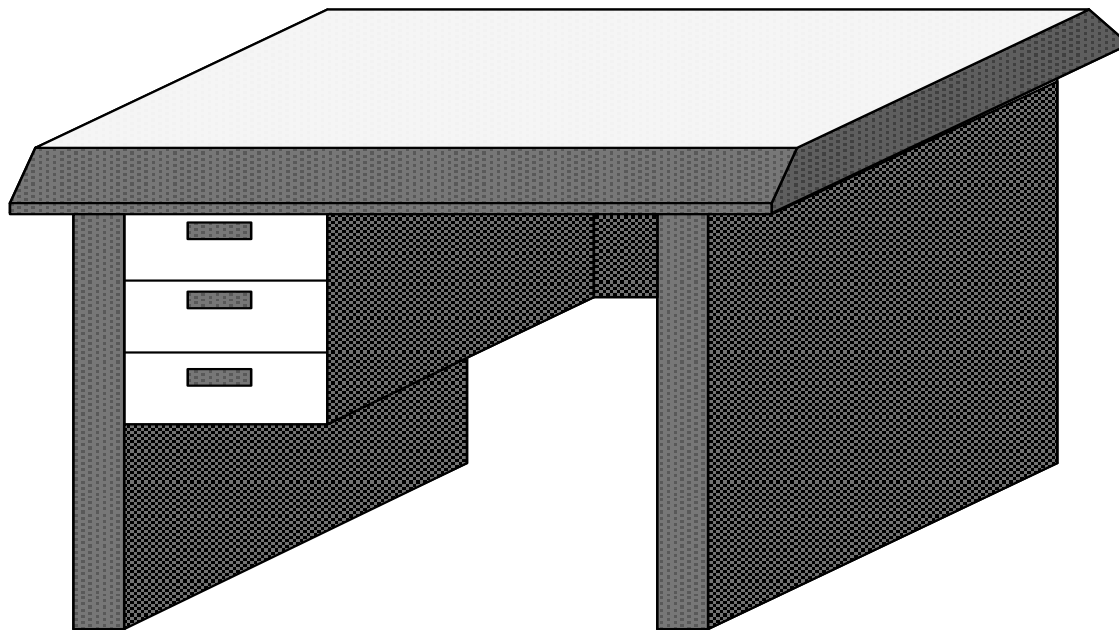
**DRAWER DETAIL**

10. Assemble the project



EXPLORED PARTS

### 11. Finished project



PERSPECTIVE



Self-Check -2

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write working procedures.

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Information Sheet-3	Requiring the documented in accordance with Tools and equipment.
---------------------	--

**Manufacturing support systems:** To operate the production facilities efficiently, a company must organize itself to design the processes and equipment, plan and control the orders and satisfy product quality requirements. The support systems have no direct contact with the product, but they plan and control its progress throughout the factory. The manufacturing support system involves a cycle of information-processing activities that consists of four functions. Requiring the documented in accordance with Tools and equipment.

**List of material needed for the construction of knockdown office table (one-unit)**

No	Item Description/s	Unit	Qty
1	Laminated MDF board (Dirty white color with mahogany design at the back) 25mm thick x 120 x 240cm	piece	1
2	Laminated MDF board (Dirty white color with mahogany design at the back) 20mm thick x 120 x 240cm	piece	1
3	Laminated MDF board 12mm thick	piece	1
4	Laminated MDF board 4mm thick	piece	1
5	Drawer guide 40cm long	piece	3
6	Drawer lock, stainless	piece	1
7	Drawer lock, (Philip) 20mm long	box	1
8	Plastic vinyl	meters	10
9	Laminates 9rubberized) dark gray color. 5mm thick x 5 meters long	meters	5
10	Knockdown screw (joint)	pieces	5
11	Dowel 8mm diameter x 20mm long	bag	1
12	Eccentric bolts, 18mm diameter 50mm long	pcs	10
13	Foot rest (bolt) 10mm diameter	Pieces	6
14	Cable out plastic cover (for table) 6 centimeter diameter	Pieces	2
15	Rugby (mastis)	Bot	1





## TOOLS/EQUIPMENE NEEDED

No	Item Description/s	Unit	Qty
1	Measuring tape	Pcs	2
2	Claw hammer	Pcs	2
3	Screwdriver –Phillips	Set	1
4	Zipper Machine with round over bit	Unit	1
5	Jointer plane or thicknesser	Unit	1
6	Drill press machine	Unit	1
7	Combination circular saw	Unit	1
8	Portable router with bits	Set	1
9	Mortise	Unit	1
10	Portable planer	Unit	1
11	Portable belt sander	Unit	1
12	Portable electric drill with bits	Set	1
13	Back saw	Pcs	1
14	Mallet	Pcs	2
15	Marking gauge	Pcs	2
16	Wood chisel 6mm – 16mm	Set	1
17	Dust mask	Pcs	2
18	Try square	Pcs	2
19	L- square 18cm x 24cm	Pcs	1
20	Pull- push rule, heavy duty	Pcs	2
21	Extension cord, heavy duty	10m	1
22	c- clamp	Pcs	4
23	Bar clamp 150cm	Pcs	4
24	Bar clamp 100cm	Pcs	4
25	Bar clamp 60cm	Pcs	4



Self-Check -3

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write at least four manufacturing board.

**Note: Satisfactory rating - 10 points      Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

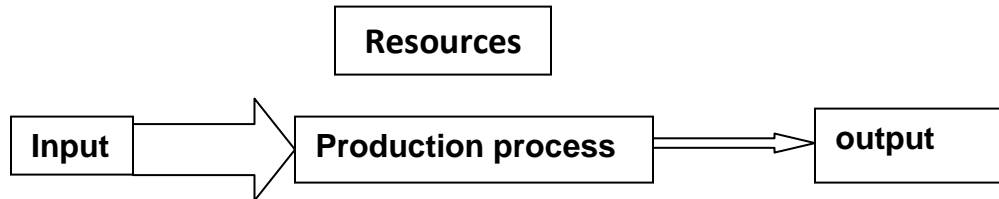
Rating: \_\_\_\_\_



Information Sheet-4	Representing documented and clearly process steps.
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**Representing documented and clearly process steps.**

A “Production System” is a system whose function is to transform an input into a desired output by means of a process (the production process) and of resources. The definition of a production system is thus based on four main elements: the input, the resources, the production process and the output.



Most of the organizations (including non-profit organization) can be described as production systems. These organizations transform (or convert) a set of inputs (such as materials, labor, equipment, energy etc.) in to one or useful outputs. The outputs of a production system are normally called products. These products may be: (a)Tangible goods (b)Intangible services (c)combination of (a) and (b) (Steels, chemicals etc.) (Teaching, health care etc.) (fast food, tailoring etc.)

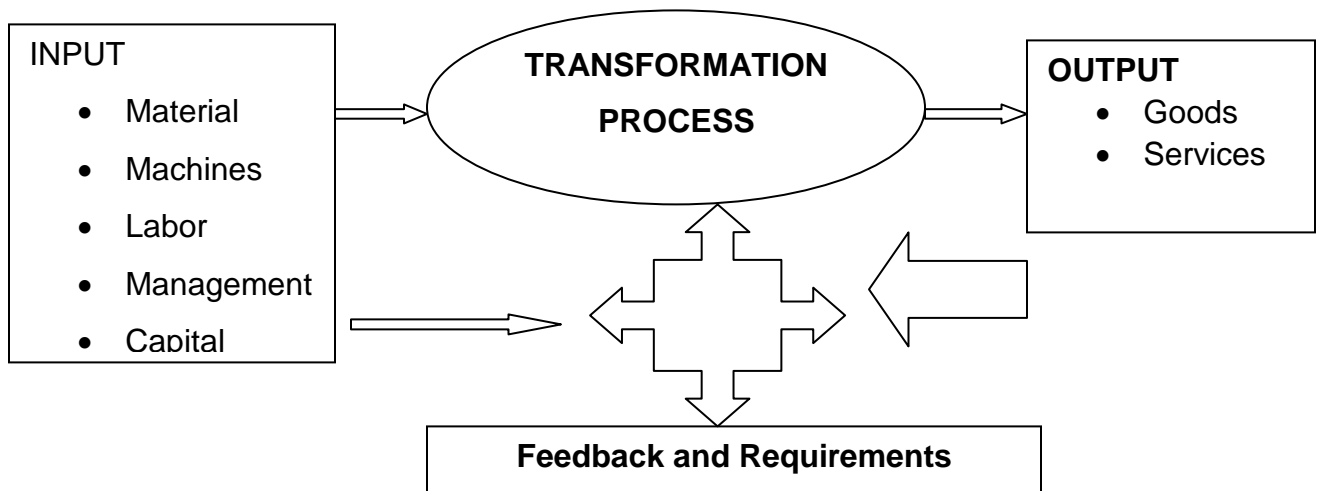


Fig 2.1 A simple block diagram of a production system

Production system refers to manufacturing subsystem that includes all functions required to design, produce, distribute and service a manufactured product. So this system produces goods and/or services on a continuous and/or batch basis with or without profit as a primary objective.

Resources Input-Production Process-Output 8 Production is the basic activity of all organizations and all other activities revolve around production activity. The output of production is the creation of goods and services which satisfy the needs of the customers. In some organization the product is



physical (tangible) good. For example, refrigerators, motor cars, television, toothpaste etc., while in others it is a service (insurance, healthcare etc.).The production system has the following characteristics:

- Production is an organized activity, so every production system has an objective.
- The system transforms the various inputs (men, material, machines, information, energy) to useful outputs (goods and/or services).
- Production system doesn't oppose in isolation from the other organization system such as marketing, finance etc.
- There exists a feedback about the activities which is essential to control and improve system performance. The transformation process involves many activities and operation necessary to change inputs to output. These operations and activities can be mechanical, chemical, inspection and control, material handling operation etc.

### **Models of Production system:**

A model is a representation of reality that captures the essential features of an object/system/process. Three types of models are there such as physical, schematic and mathematical.

- I. Physical model: Replica of a physical object with a change of scale.
  - a) For big/huge structure of physical object: small scale (Ex. solar system)
  - b) For microscopic objects: magnified scale(Ex. Atomic model)
- II. Schematic model: These are 2-D models which represents
  - Price fluctuations with year.
  - Symbolic chart of activities in sequence for a job.
  - Maps of routings
  - Networks of timed events.

The pictorial aspects are useful for good demonstration purposes.

### III. Mathematical model:

Formulas and equations have long being the servants of physical sciences. One can represent the important aspect of a system/problem in mathematical form using variables, parameters and functions. This is called mathematical model .by analyzing and manipulating the mathematical model, we can learn how the real system will behave under various conditions.



## Product vs. services Product

Product	services Product
<ol style="list-style-type: none"> <li>1. Tangible, durable products.</li> <li>2. Output can be inventoried.</li> <li>3. consumption/use takes more time.</li> <li>4. low costumer's involvement.</li> <li>5. long response time.</li> <li>6. Available at regional, national and international market.</li> <li>7. Require large facilities.</li> <li>8. Capital intensive.</li> <li>9. Quality easily measured.</li> <li>10. Demand variable on weekly, monthly, seasonally.</li> </ol>	<ol style="list-style-type: none"> <li>1- Intangible, perishable products.</li> <li>2- Output can't be inventoried.</li> <li>3- Immediate consumption.</li> <li>4- High costumer's involvement.</li> <li>5- Short response time.</li> <li>6- local market.</li> <li>7- Require small facilities.</li> <li>8- Labor intensive.</li> <li>9- Quality not easily measured.</li> <li>10-Demand variable on hourly, daily, weekly basis.</li> </ol>

### Explanations

Manufacturing organization generally transfer tangible inputs or raw materials into some tangible output (ex: steel, refrigerator, toothpaste, soap etc.) Other inputs such as labor skills, management skills, capitals are used as well. Manufacturing organizations perform some chemical /physical processes (such as blending refining, welding, grinding. etc.) to transfer their raw material into tangible products. Service providing organization though transform a set of input into set of output, they don't produce a tangible output.(ex: mail service, library service, restaurant etc.).or provide service(ex: health care, hair care, watch and automobile repair etc.). The service of service providing organization is intangible.

### Various types of Layout:

**Plant layout** means the disposition of the various facilities (equipment, material, manpower etc.) and services of the plant within the area of site located.

### Objectives

- Material handling and transportation is minimized and effectively controlled.
- Bottlenecks and points of congestions are eliminated (by line balancing) so that the raw material and semi-finished goods move fast from one workstation to other.
- Workstations are designed suitable and properly.
- Suitable spaces are allocated to production centers and service centers.
- The movements made by the workers minimized.

Layout can be classified into the following four categories:

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- a) process layout
- b) product layout
- c) Group layout(combination layout)
- d) Fixed position layout

**a. process layout:**

- It is also known as functional layout.
- Here similar machines and services located together Ex. All the lathe machines will be at one place and all milling machines at another place and so on.
- This type of layout generally employed for industries engaged in job-shop production and non-repetitive kind of production.
- When there variety of products manufactured at low volume we prefer this type of layout.
- Ex. furniture manufacturer company, restaurant etc.

**b. Product layout**

- It is also known as line (type) layout
- The flow of product will smooth and logical.
- When the machines and auxiliary services are located according to the processing sequence we prefer this layout.
- It implies that various operations raw material are performed in a sequence and the machines are placed along the product flow line
- The product layout is selected when the volume of production of a product is high such that separate production line to manufacture it can be justified
- Assembly line production or mass production prefer this type layout.
- Ex. Assembly of television sets assembly of computer key-board etc

**c. Group layout:**

- It is the combination of both process and product layout.
- In this type of layout a set of machinery or equipment is grouped together in a section so that each group of machines or equipment is used to perform similar operations to produce a family of components. These machines grouped in to cells.

d. It minimizes the sum of cost of transport and the cost of equipment. Milling shaping Drilling  
Welding Grinding Slotting Boring Fitting Turning Welding



#### e. **Fixed position layout**

- It is also called static product layout in which the physical characteristics of the product dictate as to which type of machine and men are brought to the product.
- This type layout is inherent in ship building, aircraft manufacture and big pressure vessels fabrication.
- In other type layout the product moves past stationary production equipment where as in this case men and equipment are moved to the material at one place and the product is completed at the place where the material lies.



Self-Check -4

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write deferent between product and services .
2. Write input resources
3. Write output resources

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_





Lap test -1	Written test
-------------	--------------

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

1. \_\_\_\_\_ is a method of determining *“What” is going to be done, “How” things are going to be done, “Who” will be doing activities and “How much” activities will cost.*
2. \_\_\_\_\_ a group of individuals who are cooperating willingly and effectively for a common goal.
3. \_\_\_\_\_ a process of directing and facilitating the work of people who are organized for a common purpose.
4. \_\_\_\_\_ is an executive with the most difficult and with the highest degree of responsibility.
5. \_\_\_\_\_ a function of coordinating in a logical order all the activities, persons, machines and materials necessary to complete the project.

## PART II MULTIPLE CHOICE

1. Which of the structural Elements of an Organization.  
A. men B. machine C. materials D. method E. money E. all
2. Major Elements of an Organizational Structure  
A. Distribution of Functions B. Vertical and Horizontal Authority Relationship  
C. Communication and Decision Processes D. Policies E all
3. Is a convenient method for decomposing the project complexity in a rational manner into work packages and elementary activities.  
A. cost break down structure B. work Break down structure  
C. organizational break down structure D. all
4. Describes the amounts of individual resources an existing schedule requires during specific time periods.  
A. resource loading B. resource limited C. resource loading leveling D. scheduling

## PART III: ESSAY

1. Write down Phases of PERT / CPM
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_



**LG #33**

## **LO #3- Identify production requirements and capacities**

### **Instruction sheet**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Obtaining in accordance with workplace procedures.
- Identifying Inventory requirements with workplace procedures
- Proceeding procurement and supply Workplace requirements
- Proceeding workplace Production capacity and constraints
- Identifying and standardizing times in accordance with workplace procedures
- Existing resources and strategies are evolved to fit with it

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:

- Obtaining in accordance with workplace procedures.
- Identifying Inventory requirements with workplace procedures
- Proceeding procurement and supply Workplace requirements
- Proceeding workplace Production capacity and constraints
- Identifying and standardizing times in accordance with workplace procedures
- Existing resources and strategies are evolved to fit with it

### **Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
10. If your performance is satisfactory proceed to the next learning guide,
11. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.



Information Sheet-1	<b>Obtaining in accordance with workplace procedures.</b>
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### **Accordance with workplace procedures**

Implementation simply means carrying out the activities described in your work plan. Project implementation (or project execution) is the phase where *visions* and plans become reality. This is the logical conclusion, after evaluating, deciding, visioning, planning, applying for funds and finding the financial resources of a project.

It is important to take into account that independently of the nature of the project, implementation takes time, usually more than it is planned, and that many external constraints can appear, which should be considered when initiating the implementation *step* .

### **The objectives of the implementation phase**

- Putting the action plan into operation .
- Achieving tangible change and improvements .
- Ensuring that new infrastructure, new institutions and new resources are *sustainable* in every aspect.
- Ensuring that any unforeseen conflicts that might arise during this stage are resolved.
- Ensuring transparency with regard to finances

### **Requirement for starting the implementation Plan**

The basic requirement for starting the implementation process is to have the work plan ready and understood by all the actors involved. Technical and non-technical requirements have to be clearly defined and the financial, technical and institutional frameworks of the specific project have to be prepared considering the local conditions. The working team should identify their strengths and weaknesses (internal forces), opportunities and threats (external forces). The strengths and opportunities are positive forces that should be exploited to efficiently implement a project. The weaknesses and threats are hindrances that can hamper project implementation. The implementers should ensure that they devise means of overcoming them. Another basic requirement is that the financial, material and human resources are fully available for the implementation plan. Other actions need to be taken before work can begin to implement the detailed action plan, including:

- Scheduling activities and identifying potential bottlenecks.

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- Communicating with the members of the team and ensuring all the roles and responsibilities are distributed and understood.
- Providing for project management tools to coordinate the process.
- Ensuring that the financial resources are available and distributed accordingly.

### Tips for Implementing Successful Projects

- Field management staff must make time to establish an atmosphere of candor and trust with partners during implementation so that concerns may be raised (and often resolved) informally.
- Realistic long-term planning of finances is key to the implementation of an action plan.
- A communication *strategy* can be used to raise awareness of the positive benefits for the community,
- At the end of a planning and implementation cycle, a press release is useful to highlight successful stories and announce the publication of a final document.
- Expectations among *stakeholders* and the general public are likely to be high following the participatory approach to the development of the preceding stages of the planning process.

### Advantages

- Implementation gives the opportunity to see the plans become a reality
- Execution of projects allows end-users to have access to better services and living environment

### Six Steps to Implementing a Plan

Remember this article is not about planning. It's about make the plan work. Six steps to success?

#### Step 1 – Somebody has to be responsible

If no one has the responsibility and corresponding authority to make the plan come to life, it's damned from day one. The adage two heads are better than one doesn't apply here - committees are even worse. One specific person must be responsible for seeing the plan through.

#### Step 2 – Develop metrics throughout the plan

It's a long road without measures the chances of successful completion drop off substantially. Mid-course measures become the catalyst for revisiting the plan.

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Without a measure, forward progress becomes objective – a matter of assumption – an opinion. Opinions sway on mood, recent events and convincing arguments. Setting milestones– holds everyone to the straight and narrow. Truly successful companies insist on this type of regular feedback.

### **Step 3 – If issues develop, understand the root causes and make adjustments**

It's not enough to know the plan isn't working. We've got to get to the root cause of the issues. This can be derived by asking – Why, how, what? Let's face it every plan comes with unexpected issues. Unanticipated conditions are part of the business environment – markets change, competitors react, suppliers fail to deliver and new technologies affect the playing field. Rather than lamenting failure or worse yet sticking with a bad plan, we must search for the root causes of the issues. Making wise adjustments to the plan is crucial to long term success.

Ask questions to better understand the situation– things like:

- Why are we falling behind our milestones?
- What has changed since we laid out our plan?
- What must change to get back on track?
- How can we bring other resources into the equation?

Don't think generalities – specifics are the name of the game. Insist on the same from your staff and coworkers. Drill down to the root causes of the issue via investigation.

Jumping back to the real world and a pricing plan – many companies find they struggle to meet the initial goals of their plan. On the surface, a person might just assume the competitive nature of “our business” prohibits implementation. However, deeper drilling may uncover a host of root cause issues. Here is a short list:

- Perception of competitive pushback
- Supply contracts which limit ability to change prices
- Incorrect system data where the prices are not properly maintained
- Packaged deals tying prices of many items together
- Too many product combinations to manage properly

Interviews with companies who have instituted world class pricing plans indicate a willingness to attack each of these root cause issues systematically. For instance, Industrial Supply Magazine's

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Distributor of the Year, Stellar Industrial Supply conducted a series of ongoing employee meetings to combat the competitive pushback issue. They addressed the root issue and pushed their plan over the goal line.

#### **Step 4 – Insist on individual compliance with the plan**

Are there individuals who refuse to follow the plan? Many a great plan fails because a few dissenters stonewall the execution. Whether done in the open or covertly underground, these must be addressed.

Change is difficult and threatens the experienced more than the novice. It's not uncommon for a long-term team member to oppose some aspect of the plan. Except in the most blatant of cases this manifests itself with half-hearted or delayed activities. For instance, they may sheepishly try the plan once and announce failure. This is incredibly frustrating and damaging to morale – particularly in selling situations.

#### **Step 5 – Instruct, educate and coach throughout the plan**

Catastrophe awaits those who ignore the human element. Our plan – no matter how basic – must contain a mechanism for instruction of those involved in execution. As we contemplate the education piece - let's remember; human learning requires repetition. There is a good reason for our repeated expose to the same TV ad or Radio jingle – Madison Avenue has this stuff down to a science.

Launch your plan with an instructional session and repeat that session at points along the way. Provide metric related updates for the group. And, for those who lag behind – provide personalized coaching. Remember – good coaches motivate each person according to that person's personality. Some people need encouragement; others a pep talk and finally the laggards described in step 4 may need a shot of something stronger.

#### **Step 6 – Look to others for implementation tips**

No, this isn't a couched come-on for consulting companies. Implementation tips flow from a number of places – basically anyone who has been down a similar road. Folks like benchmarking partners, distributor trade associations, and business networks. And yes... consultants sometimes fill this role



Self-Check -1

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write implementing plan

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Information Sheet-2	Identifying Inventory requirements with workplace procedures.
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### Functions of industrial enterprise

The major functions of a relatively large industrial firm is represented by the following figure

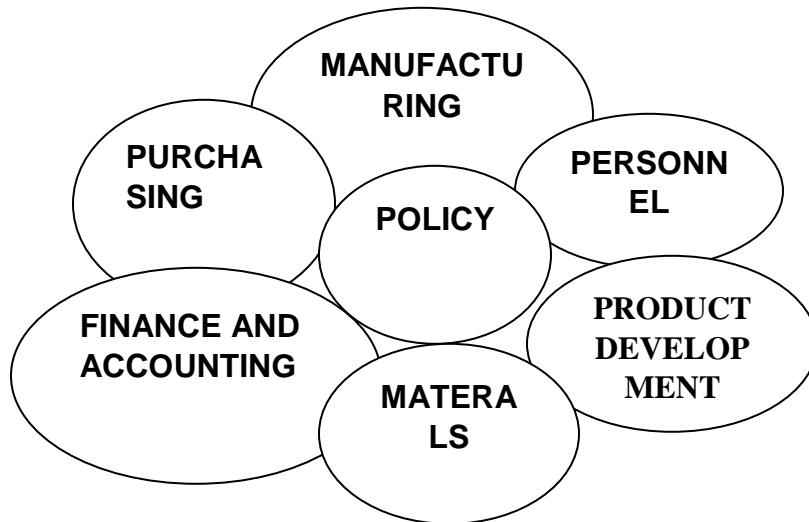


Fig 2.6 of production function a enterprise

The core area of the diagram represents the organization’s policy making group. In a hierarchic triangle, this group would occupy the apex. The overlapping portions of the circle denote the cooperation needed from the two groups in order to establish overall policy. The slope of each function and its relationship to the production process are briefly discussed in the following.

### Manufacturing

A fundamental function of much production system is to produce a physical output. Manufacturing includes the operations and direct support services for making the product operation management is concerned with production scheduling, performance standards, method improvement, quality control, plant layout and material handling. A plant service section handles shipping receiving, storing and transporting raw material parts and tools. The plant engineering group is usually responsible for in-plant construction, maintenance, design of tools and equipment and other problems of mechanical, hydraulic or electrical nature.





## **personnel**

The recruitment and training of the personnel needed to operate the production system are the traditional responsibilities of the personnel function. Along with it, this department takes care health, safety, wage administration of the employees. Labor relation and employee services and benefits are increasingly important.

## **Product development**

Many organizations give major emphasis on product development because the ultimate profit of any organization depends primarily on the nature/quality of product. The product must be customized. A separate section is responsible for this task.

## **Marketing**

Many ideas of product development comes through the marketing function. Selling is the primary interest of marketing. Sales forecasts and estimate of the nature of future demands is also performed by this department. Contact with customers provide feedback about the quality expected from the firm and opinion on how well the products meet quality standard.

## **Finance and accounting**

Internal financing includes reviewing the budgets for operating sections, evaluating of proposed investments for production facilities and preparing balance sheet. Besides these the other responsibilities is to see how well the firm is scoring in the business competition game.

In this business game analogy the accounting functions are collection of cost data for materials direct lab our and overhead. Special reports are prepared regarding scarp, parts and finished goods inventories, pattern of lab our hours and similar data applicable to production activities.

## **Purchasing**

In a narrow sense, purchasing is limited to accounting materials from outside sources. But while carrying out this activity, it requires to investigate the reliability of vendors, type of materials needed, co-coordinating material purchase volume with the requirement as per schedule, discovering new material and process. The purchasing function serves the other functional areas, overlap sometimes with inventory control, material inspection, shipping and receiving, subcontracting and internal transportation.



Self-Check -2

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the major functions of relatively large industrial firm is represented stricter plan

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Information Sheet-3	Proceeding procurement and supply Workplace requirements.
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## **Proceeding procurement and supply**

Material management is defined as the planning, acquiring, storing, moving and controlling of materials as per the requirement of the organization. Materials management is basically related with the smooth flow of materials. The major activities covered under materials management are the anticipation of the materials required in the organization from time-to time. It involves ordering and obtaining materials from the suppliers, introducing the materials to the organization and monitoring the status of materials. It helps to optimize the usage of facilities, personnel and funds and to provide service to the user in the line with the organizational aims. Materials management is the coordination and control of the various material activities. The key material activities are:

### **Purchasing Activities**

It involves mainly identification of materials needs, market research, maintaining materials records etc.

### **Procurement Activities**

It involves material specifications, materials studies, receiving materials etc.

### **Inventory Management**

It involves planning and controlling of materials handling, storing materials and managing material supplies etc.

### **Supply Management**

It involves monitoring in-plant material handling, strategic planning of materials etc.

## **Classification of Manufacturing Materials**

The manufacturing materials can be classified into following categories: →

### **Raw Materials**

It is the materials that the company is required to transform into finished goods. It is very important. The shortage of halts can stop the production and can cause high losses. It is different for different

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industries. As for example, for textile industry the cotton is main input. For automobile industry, the spare parts are very important. →

### **Manufactured Parts**

These parts are the output of the organizations. These are the finished materials built by the company. →

### **Work in Process**

These are semi-finished products found at various stages in the production process.

### **Packaged Materials**

These are materials that are packaged together to prevent damage during transportation and deterioration when they are stored. →

### **MRO Supplies**

These materials are required for maintenance, repairing, and operating supplies used in the manufacturing process regularly for the smooth manufacturing, i.e. soap, lubricating oil, grease, plastic and rubber parts, screw driver, nuts etc. →

### **Loose Materials**

These are materials that are partially fabricated and that should be handled individually.

### **Objectives of Materials Management Department**

The primary objectives of Materials Management department are:

- Low Procurement price
- High inventory turnover
- Low cost of acquisition and possession
- Continuity of supply
- Consistent quality
- Low payroll costs
- Favorable supplier relations
- Maintenance of good records



The secondary objectives of Materials Management are:

- New materials, processes and products
- Economic make or buy decisions
- Standardization
- Product improvement (Khana, 2012)

### **Relationship between Materials Management Department and other Departments**

Materials Management Department plays a very important role in an organization and it must have good relationship with other departments. The departments that are mostly involved are: Production, Engineering design, Quality control, and Finance Department.

#### **Materials Management Department and Production Department**

The materials management department must have good relationship with production department. Materials Management is responsible for the purchase of all materials required by the production department. If the needed materials are not supplied at right time then the production process can halt and generate huge losses. So, for the smooth functioning of the production department, the materials department must be vigilant about the latest requirements.

#### **Materials Management and Engineering Design Department**

If both materials management and engineering design department work together then the much required innovative strategies can be formulated and implemented. Both departments can work together for standardization of materials. The suggestions of the materials management are very important for engineering department.

#### **Materials Management and Quality Control Department**

The selection and rejection of the materials purchased depends upon the parameters set by the quality control department. So, if both the departments have cooperation and cordial relationship then the delay in the purchasing of raw materials can be avoided.

#### **Materials Management and Finance department**

Usually, finance department release fund to materials department for the materials purchased. It is the responsibility of the both departments to clear payments to the suppliers smoothly, without much delay unnecessarily.

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## Risks to be Considered by Purchase Material Manager

The purchase and materials manager must avoid the following consequences:

- Receiving materials before they are required, causing more inventory cost and chance of deterioration in quality;
- Not receiving materials at the time of requirement, causing loss of productivity;
- Incorrect materials take off from drawing and design document;
- Subsequent design changes;
- Damage/loss of items;
- Failure on installation;
- Selection of type of contract for specific material procurement;
- Vender evaluation criteria;
- Pilling up of the inventory and controlling of the same;
- Management of surplus materials; and
- Any one of the above or all of the above, or combinations. (Dey, 2001) 1.13

## Summary

The smooth functioning of the production department depends upon a large extent on the right type of materials purchased at right time at right quality and at right cost. The right cost of materials leads to good saving. It is possible through efficient buying. The purchase manager must be technically skilled, innovative, intelligent, vigilant and efficient in bargaining. Heavy competition has generated the importance of efficient purchasing. For any industrial project, the purchasing is main function that contributes in the timely execution and delivery. The corporate policy indicates the guidance map for purchasing. It includes the purchasing strategies, plans, programmes and goals. The purchasing department must have good coordination with other departments like finance, engineering, production, quality department, etc. The purchasing department is responsible for avoiding any type of over-inventory or under-inventory. The purchasing department helps in the clearance of all the bills of external parties like suppliers, etc. Every organisation must adopt scientific and analytical way of identifying the need and type of materials, right supplier and smooth flow of materials.

## Key Words

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Purchasing Purchasing describes the process of buying. It covers the knowledge of the requirements, identifying and selecting a supplier and negotiating price

### **Procurement**

It is a broader term. It includes purchasing products required for production, stores, traffic, receiving, inspection and salvage.

### **Materials Management**

It includes planning, organizing, communicating, directing and controlling of all those activities mainly concerned with the flow of materials into an organization. Material management views material flows as a system.

### **Logistics Management**

It is the planning and controlling of the flow of raw material in a cost effective manner from the suppliers or point of origin to the manufacturing and then flow of finished goods for consumption in the customers' hands.



Self-Check -3

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is purchasing management? Explain its characteristics..
2. Explain purchasing management concept and enumerate its importance in a construction industry.
3. What is the process of purchasing in a purchase department in Cement Company?
4. Explain different stages in the development of the purchasing function.
5. What is the importance of the materials management?
6. Explain the objectives of the materials management departments.
7. What are the various functions of the materials management? Explain.
8. Describe the duties and responsibilities of the materials manager?
9. What is the concept of materials management? How it is different from purchase management?
10. How will you integrate the various activities of materials management?
11. What types of materials are to be managed by automobile industry?
12. Elaborate the relationship between materials department and other departments?

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



**Legal Aspect of Purchasing Management: An Introduction**

Every institutional purchase is done through a structured legal process. Legal aspects are to be considered while taking a purchasing decision by the purchase agent or purchase manager. The purchasing manager is an agent for the firm. He/she administers the purchasing function so he is responsible for all types of purchase of raw materials/parts, goods and services. He is the actual buyer or purchasing agent on the behalf of the organization. Generally the authorities are delegated to purchasing staff by the management for purchasing. It means that the purchasing staffs are responsible for routine purchases. The other responsibilities of the purchasing managers are defined by the organization policy. The policy generally depends on the nature of the goods purchased, technology of the products, levels of available expertise, levels of involvement of expertise required, the degree of autonomy, centralization of the purchasing function, etc. the purchasing policy must be in written form and clearly communicated to all the purchasing managers. There is no doubt from any side regarding any article or point of the policy. The most important task of the purchasing officer is the representation of the organization in development and negotiation of contracts with third parties. He/she accepts the terms and conditions of all the purchasing of the contract on the behalf of the organization. From legal point of view, the title purchasing agent is used for purchasing manager. Practically purchasing agent and purchasing manager terms are same. The purchasing executives are required to understand all the types of commitment, pre-set financial limits, technicalities, sections, guidelines, terms and conditions for which they are permitted to enter into a contract for public procurement. It is a daily routine to sign purchase orders and contracts committing the organization to the specific terms and conditions of purchase orders and contracts. The purchasing executives must have the knowledge of the legal issues that are likely to arise routinely as part of their jobs, especially Law of Contract, Law of Agency, Law of Sale of Goods Act 1930, Companies act, Taxation Laws, Central Sales Tax 1956 etc. In particular, the purchase manager must know how and when the company may be legally bound and how contracts may be carried out or varied or terminated. Let us discuss how these laws are beneficial for purchase executives/managers.

**Provisions of The Indian Contract Act, 1872 Regarding Purchasing**

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The Indian Contract Act, 1872 is the main source of laws dealing with all types of contracts in India except Jammu & Kashmir. It determines the guidelines through various sections in which promises made by the parties in a contract will be legally binding on them. The purchasing manager enters into a number of contracts everyday on the behalf of the organization. By default each contract covers some rights and duties of the contracting parties. The various provisions of the Indian Contract Act deal with the enforcement of these rights and duties on the parties.

The Act has 266 Sections and has wide scope. It has two parts. Part one covers the General Principles of Law of Contract (Sections 1 to 75). Part two covers special contracts like Indemnity, Guarantee, Bailment & Pledge from Sections 124 to 238. The contracts relating to Partnership are covered in Sections 239 to 266.

Section 2 covers various definitions like what is Offer/Proposal, Promise, Acceptance, Promisor and Promise, Consideration, Agreement (Section 2(e)), Contract (Section 2(h)), Valid Agreement, Void Contract, Voidable Contract etc. The Contact Act 1872 gives knowledge about the various types of contacts to the purchase manager. The types are based on creation, validity, execution and liability.

This law clearly explains about what is Offer (Section 2(a)), the essential elements of an offer, legal rules of valid offer, differentiate between offer and invitation to offer, lapse of an offer, kinds of offer like express offer, implied offer, specific offer, general offer, cross offer, counter offer, standing open and continuous offer etc. Section 2(b) gives an idea about what is Acceptance, the legal rules of Acceptance, general rules as to 5 communication of Acceptance. Capacity to Contact gives detail about the parties which cannot enter into contract like minor, unsound mind (lunatic, idiot, drunken and intoxicated) and person disqualified by law (alien enemy, foreign sovereign, convict, insolvent). Section 2(g) gives detail about Void Agreement.

The laws related to Fraud, Wagering Agreement, Illegal Agreement, Contingent Contact, Performance of Contract, Types of Tender, Discharge of Contract, Remedies for the Breach of Contact, Quasi Contract etc are exclusively covered in the act. The knowledge of this act is must for any purchase manager.

### **Law of Agency and Purchasing**

Law of Agency is exclusively covered in Section 182 in The Indian Contract Act, 1872. The law of agency is an area of commercial law that deals with a set of contractual relationships that involves between agent and principal. “As per the law, an ‘agent’ is a person employed to do any act for



another, or to represent another in dealings with third person. The person for whom such act is done, or who is so represented, is called the 'principal'." (<https://indiankanoon.org>)

The Law of Agency regulates the relationships between: agents and principals called as the principal-agent relationship. The rights and liabilities between a principal and an agent are clearly defined in this law. Under this law, the principal authorizes the agent to work under his or her control and on his or her behalf. Thus, the agent works and negotiates on behalf of the principal or brings him or her and third parties into contractual relationship. The agent performs the duty to undertake the task or tasks specified by the terms of the agency and discharge his duties with care and due diligence.

This law further explains the broad classes of agent, three kinds of authority (actual authority (whether express or implied), apparent authority, and ratified authority) duties of the agents, termination of agent-agency relationships etc. This type of knowledge is must for the purchasing executives.

### **Provisions of Law of Sale of Goods Act, 1930 related to Purchasing**

In 1930, the Sections from 76 to 123 of the Contract Act, 1872 were repealed and a separate act named The Law of Goods Act was formed. According to this Act, contract of sale of goods is contract whereby the seller transfer or agrees to transfer the property in goods to the buyer for a price.

Further, this Act gives distinction between sale and agreement to sell, conditions and warranties, when condition to be treated as warranty, rules to delivery of goods, rights of an unpaid seller, distinction between right of lien and right of stoppage in transit, auction sales etc.

### **Provisions of Law of Carriage of Goods related to Purchasing**

In business, there is a need for carrying goods from one place to another within country or may be outside the country or from one country to another country. The Law of Carriage of Goods is framed for these purposes. Under this act, a contract of carriage is to be entered into. The persons, organizations or associations which carry goods are known as carriers. There are three types of transportation modes: by land, sea or air.

Accordingly, the law relating to carrying of goods is contained in the following enactments:

- In case of carriage of goods by land: The Carriers Act, 1865, The Railways Act, 1989.



- In case of carriage of goods by sea: The (Indian) Bills of Lading Act, 1856, The Carriage of Goods by Sea Act, 1925, The Merchant Shipping Act, 1958, The Marine Insurance Act, 1963.
- In the case of carriage of goods by air: The Carriage by Air Act, 1972.

Further this law gives knowledge about the Contract of Carriage, Classification of Carriers, distinction between a Common Carrier and a Private Carrier, carriage of goods by land, rights of a common carrier, duties of a common carrier, liabilities of a common carrier, carriage of goods by rail, responsibility of a railway administration as a carrier of goods etc. (<http://www.iimm.org>)

Besides the law mentioned above, the purchasing department must have applied knowledge about the following laws: Income Tax Act, Direct Taxes, Indirect Taxes, Service Tax, Property Tax, Duties of Customs including Export Duties, Central Sales Tax Act, Corporation Tax, Taxes on capital value of assets, exclusive of agricultural land, of individuals and companies, taxes on capital of companies, Estate Duty, Taxes on agricultural income, Taxes on luxuries, including taxes on entertainments, amusements, betting and gambling, Stamp duty, etc. Now, the GST Bill, 2016 has been passed by the parliament and some states. The purchasing decision will set drastic changes with the passage and implementation of GST bill in future.

## Public Purchasing or Procurement

Public purchasing is also called Government Purchasing or Government Procurement. Public purchasing can be defined as the procurement of raw materials, parts, goods, services, works, projects, construction etc. by the Government departments, agencies, statutory corporations (e.g. STC, MMTC), public sector undertakings (e.g. HPCL, BPCL, Indian Coal, Indian Oil), municipalities in the Centre and all the states governments within stipulated terms and conditions. It amounts to a great share of the public sector's overall budget.

Public purchasing is subject to special rules in order to secure that goods and services acquired at competitive prices in a transparent and fair way. It usually requires the procuring authority (purchasing executives) to float public tenders if the value of the procurement exceeds certain fixed limit. Public procurement is efficient if it provides value for money, good quality and timely delivery of product/services/works in a transparent, accountable and fair manner. The public procurement system depends upon the procurement laws, rules & regulations, instructions, procurement processes & methods, the organizational structure and the purchasing employees/managers. The Government of India has issued various manuals on policies and procedures for the purchase of



goods/services, procurement of works, employment of consultants, tendering, etc. Major ministries including Defense, Railways, Public Works, Telecommunication and Central Purchase Organization (Directorate General of Supplies and Disposals) have also released particular instructions regarding procurement practices in their sectors.

“When comparing public and private sector procurement it appears that the demands on public procurement are greater and more highly varied than those on private sector procurement. Still, many of the items and services bought and produced in the public sector could be delivered by the private sector, although conditions for the two sectors differ substantially with regard to regulations and transparency.” (Arbjorn & Freytag, 2012).

## **Procurement Process**

The procurement process refers to the steps followed by government departments to purchase goods or services from suppliers/contractors/service providers/bidders. When the value of procuring goods or service is above the fixed limit of the purchasing officers, the requirement of a competitive bidding process is generated. The government department is required to follow certain rules, regulations and guidelines designed to ensure that the goods or services are genuinely purchased from a quality and genuine suppliers/contractors/service providers/bidders within a time frame with transparent and fair process. The general stages of this process are:

### **Pre-tendering**

At this stage, first of all the requirements of the goods or services are assessed then the time frame, mode of tendering and the budget for tender are considered. The guidelines for the tendering are typically considered and followed at this stage.

### **Tendering**

It is a very important stage of tender process. At this stage, the tenders are invited from the competent suppliers/contractors/service providers/bidders. Tenders may be technical bids or financial bids. The sealed tenders are opened at public place following a transparent process. The bids are evaluated and awarded to the lowest supplier/contractor/service provider/bidder who is going to fulfill all terms and conditions.

### **Post-award**



At this stage the goods or services are received as per the order or tender. The samples are taken and checked physically and technically. After getting the quality goods or services, the process of payment is started.

### **Fundamental Principles of Public Buying**

Indian government has given various guidelines which are found in the General Financial Rules, 2005 (GFR) and Delegation of Financial Powers Rules (DFPR). The very fundamental principle of government purchasing is Rule 137, GFR 2005 which states that, “Every authority delegated with the financial powers of procuring goods in public interest shall have the responsibility and accountability to bring efficiency, economy, and transparency in matters relating to public procurement and for fair and equitable treatment of suppliers and promotion of competition in public procurement.”

The procedure to be followed in making public procurement must conform to the following fundamental principles:

#### **Transparency**

The tenders should be invited following a fair, transparent and reasonable procedure. Contracting authorities shall treat all the suppliers/contractors/service provider/ bidders equally and without discrimination. They must act in a transparent and fair manner;

#### **Specifications**

The specifications in terms of quality, quantity, cooler, technology, size, shape, design, type etc. regarding the goods/services to be procured must be clearly spelt out keeping in view the specific needs of the procuring organizations;

#### **Competition**

The healthy environment for competition must be generated among suppliers/contractors/service provider/ bidders; and

#### **Legal Procedures / Guidelines**

The procuring authority must be satisfied that all the guidelines of the manual are strictly followed in all respects.

#### **Tendering: An Introduction**

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Tendering refers to the process whereby the governments invite bids for goods, services, works, various projects that must be submitted within a finite deadline. It is the most important method to manage the qualified suppliers and ensuring a consistent as well as desired quality supply. Such suppliers make a direct contribution to the firm's success. To begin this process, an organization issues a procurement notice in newspapers, official government publications and over the internet for purchasing goods or services. The tenders are generally widely advertised to offer opportunities to a number of suppliers and to encourage healthy competition. It provides a greater pool of offers to select from.

“Tendering is the process of making an offer, bid or proposal or expressing interest in response to an invitation or request for tender. Tendering is the purchasing procedure whereby potential suppliers are invited to make a firm and unequivocal offer of the price and terms which an acceptance shall be the basis of the subsequent contract.” (Okello & Richu , 2016)

### **Terminologies used in Tendering**

Tendering is one of the most important methods of managing supply and to ensure that the best as well as qualified suppliers are selected and to sure that they perform consistently at the designed levels. The terminologies used in tendering are as follows:

#### **RFT/RFP**

It means 'Request for Tender' / 'Request for Proposal'. It is an invitation to submit a tender to enter into the contract with the principal. These documents outline the particular requirements, criteria, and instructions that are to be followed by the tenderer.

#### **Tender**

It is a document submitted by a tenderer in response to RFT/RFP.

#### **Tenderer**

Tenderer is a person/organization who has been invited to submit a tender in response to RFT/RFP.

#### **Tendering Process**

Tendering is a public purchasing procedure whereby potential suppliers (who are agreed on the terms, conditions, rules, regulations and price) are invited to make a firm and unequivocal offer



on the price and terms in which they will supply specified goods, services or works which on acceptance shall be the basis of a subsequent contract. Tendering process consists of the following stages: Prequalification; Invitation to Tenders; Submission and Receipt of Tenders; Opening and Changes to Tender; Evaluation of Tenders; Award of Contract; Notification of Contract Award; Debriefing; Post-Tender Negotiation; and Contracts.

### **e – Tendering**

Tendering is the carrying out of the tendering cycle/process using electronic means such as internet. It is also called online tendering. It is done through websites and through special e – tendering software applications. It is very helpful in saving time.

### **Modes of Tendering**

Broadly, there are three modes of tendering: Open Tendering; Limited/Selective Tendering; and Single/Restricted Tendering. Maximum government departments go for open tendering. Depending on the nature of the required goods, the quantity & value involved and the period of supply, the purchase committee (PC)/technical & purchase committee (T&PC) can adopt limited/selective or single/restricted tendering with the approval from concerned higher authorities.

### **Open Tendering**

In open tendering, all the interested suppliers/contractors/service providers/bidders are invited and free to submit their tenders as per the terms and conditions.

### **Limited/Selective Tendering**

In limited/selective type of tendering, only the relevant approved lists of suppliers /contractors/service providers/bidders are invited to submit tenders. The respective government departments may establish lists of qualified suppliers /contractors/service providers/bidders for particular services or articles. This type of lists is developed in those departments where there is a frequent need to invite tenders for goods, services, works or articles.

### **Single or Restricted Tendering**

In single/restricted type tendering the tenders are invited from only one or a very limited number of suppliers /contractors/service providers/bidders. Single or restricted tender procedures shall only





be used in circumstances when open competitive tendering would not be an effective means of procurement of goods/service/works/projects.

### **Time Frame for Tendering**

Every tender is time bound tender so a fixed time frame is given to the suppliers /contractors/service providers/bidders. The time frame is allowed to the suppliers /contractors/service providers so that they can quote their best possible price. In case of urgency or adequate availability of sources, the time period can be reduced with proper justification and acceptance from authorities. However, it should be ensured that adequate competition exists and fair chances are given to all the interested suppliers 15 /contractors/service providers/bidders to enable them submit their offers in time. Generally, the time frame can be two-three weeks for limited/selective tenders; three weeks for open tenders; and four weeks for global tenders.

### **International Purchasing**

In the time of globalization, the companies have businesses in many countries. The multinational companies (MNCs) have business transactions in many countries. The MNC's acquire valuable resources like man, material, machine, money from all over the world from where they are cheaper. In this scenario, the purchasing or procurement from international market takes important role. In today's global economy, the company can get advantage when the supply base is competitive on a worldwide basis. Successful companies do not limit their sourcing horizons to national boundaries but seek to find, establish and develop sound working relationships with the best suppliers/contractors/bidders all over the world. International purchasing can be a good strategy to beat the competition as the companies are able to procure the raw materials, parts, goods, services at lower cost from markets abroad. It will lowers down the cost of production ultimately. International purchasing cannot be considered a stand-alone process. It must be integrated with the overall purchasing strategies of the company. The purchasing from international market must be aligned with the corporate policy. "Global sourcing, which differs from international buying in scope and complexity, involves proactively integrating and coordinating common items and materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering, and operating locations." (Trent & Monczka, 2003)

### **Rationale behind Purchasing Internationally**

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## **Increasing global Practices**

Globalization is the main reason because of which the business environment is changing in a very fast way. Now, the organizations can buy and sell anywhere in the world. The whole world is like a village. Moreover, all the restrictions, duties of trade are very relaxed for the members of the World Trade Organization (WTO) and the trade among the countries is free and fair. So, in such scenario the importance of purchasing internationally has become very high.

## **Emergence of Internal/IT/Social Media**

The evolution of internet has contributed in international purchasing. Now, the tenders can be floated and invited globally through online.

## **Accessibility of Natural Resources**

Some countries are rich in natural resources and they are providing natural resources of better quality with better deliveries at lower prices. The companies are ready and cashing this phenomenon.

## **Domestic Production and Supply**

Insufficient domestic capacity is also the reason for purchasing internationally.

## **Summary**

While making an institutional/organizational purchase, a set of legal formalities are required. The purchasing executives are required to understand all the types of commitment, pre-set financial limits, sections, guidelines, terms and conditions for which they are permitted to enter into a contract for public procurement. It is a daily routine to sign purchase orders and contracts committing the organization to the specific terms and conditions of purchase orders and contracts. The purchasing executives must have the knowledge of the legal issues that are likely to arise routinely as part of their jobs, especially, Law of Contract, Law of Agency, Law of Sale of Goods Act 1930, Companies act, Taxation Laws, Central Sales Tax 1956 etc. In particular, the purchase manager must know how and when the company may be legally bound and how contracts may be carried out or varied or terminated.

Public purchasing is also called Government Purchasing or Government Procurement.

Public purchasing can be defined as the procurement of raw materials, parts, goods, services, works, projects, construction etc. by the Government agencies of the Centre and all the states within stipulated terms and conditions. It amounts to a great share of the public sector's overall budget. The general stages of procurement process are: Retendering, Tendering and Post-award.



Indian government has given various guidelines for procurement which are found in the General Financial Rules, 2005 (GFR) and Delegation of Financial Powers Rules (DFPR).

Tendering refers to the process whereby the governments invite bids for goods, services, works, various projects that must be submitted within a finite deadline. To begin this process, an organization issues a procurement notice in newspapers, official government publications and over the internet for purchasing goods or services. The terminologies used in tendering are: RFT/RFP, Tender and Tenderer. e – Tendering is the carrying out of the tendering cycle/process using electronic means such as internet. It is also called online tendering. Broadly, there are three modes of tendering: Open Tendering; Limited/Selective Tendering; and Single/Restricted Tendering. Generally, the time frame can be two-three weeks for limited/selective tenders; three weeks for open tenders; and four weeks for global tenders.

In today's global economy, the company can get advantage when the supply base is competitive on a worldwide basis. International purchasing can be a good strategy to beat the competition as the companies are able to procure the raw materials, parts, goods, services at lower cost from markets abroad. It will lower down the cost of production ultimately. International purchasing cannot be considered a stand-alone process. It must be integrated with the overall purchasing strategies of the company. The purchasing from international market must be aligned with the corporate policy. Some countries are rich in natural resources and they are providing natural resources of better quality with better deliveries at lower prices. The companies are ready and cashing this phenomenon. Insufficient domestic capacity is also the reason for purchasing internationally.

## **Keywords**

### **Agent**

An 'agent' in Contract Act (purchasing manager) is a person who is authorized to act on behalf of another called the 'principal' (organization) to create a legal relationship with a third party.

### **Tendering**

Tendering refers to the process whereby the governments invite bids for various projects that must be submitted within a finite deadline.

### **Public Purchasing**

Public purchasing is the acquisition of goods, works, and services by public institutions of Centre and states. It encompasses ministries, departments, agencies, statutory corporations, public sector undertakings and municipalities at all levels of government.



Self-Check -4

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the legal aspect of purchasing management? Illustrate.
2. 'The purchasing manager must have the knowledge of the legal issues that are likely to arise routinely as part of their jobs.' Examine the statement critically.
3. What do you mean by public purchasing? Explain.
4. Elaborate the process of public procurement.
5. Enumerate the fundamental principles of public buying.
6. Give brief introduction of tendering and technical terms used in tendering.
7. Elaborate the tendering process and differentiate between tendering and tendering.
8. What are the modes/types of tendering? Differentiate them.
9. Discuss the concept of international purchasing. What is the rationale behind it? Why should the companies go for it?
10. Explain various provisions of Indian Contract Act, 1872 related to purchasing

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Information Sheet-5	Identifying and standardizing times in accordance with workplace procedures.
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### Functions of production process

Another way to group functions is according to their relative position in a production process. the sequential arrangement is shown in the following

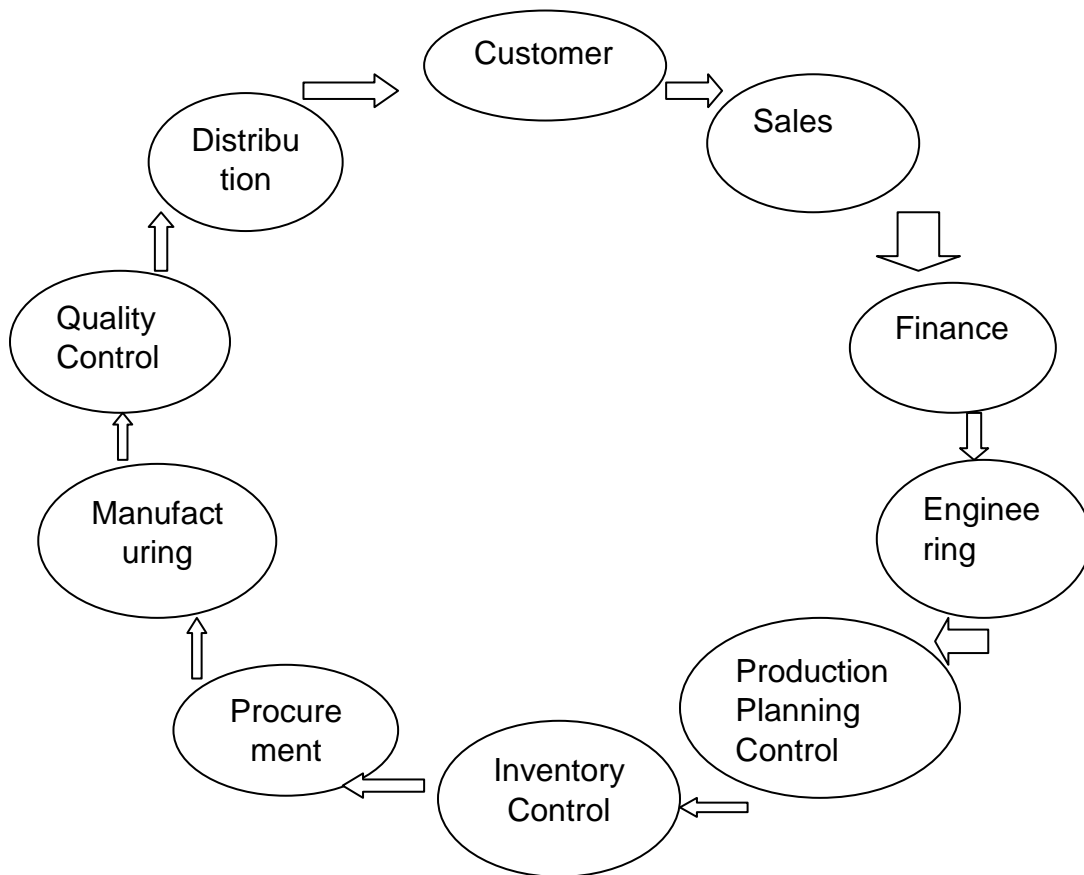


Fig 2.7 functions of production process

### Types of production system:

The production system of a company mainly uses facilities, equipment's and operating methods(called the production system) to produce goods that satisfy customers' demand. The above requirements of a production system depend on the type of product that the company offers and the strategy that it employs to serve its customers. The classification of production system is explained in the table.

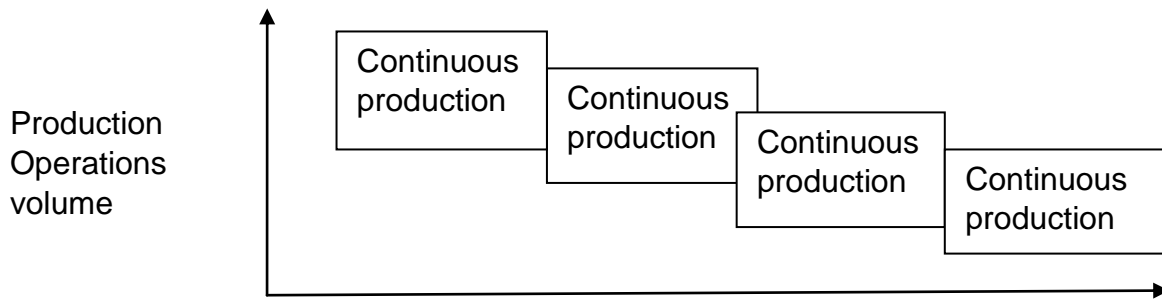


Fig 2.6 Classification of production systems

### Job shop production

- Job shop is appropriate for manufactures of small batches of many different products, each of which is custom designed and requires its own unique set of processing steps or routing through production process.
- The production system in which different types of product follow different sequences through different shops. Ex. Furniture manufacturing company, restaurant, prototype industry.
- Much time is spent waiting for access to equipment. Some equipment overloaded.
- A process technology suitable for a variety of custom designed products in some volume.
- This production system adopts process layout as by this production system we manufacture more variety of products at low product volume.

### Batch production

- A process technology suitable for variety of products in varying volumes.
- Here limited product variety which is fixed for one batch of product. Ex. Bakery shop, medicine shop.
- Within the wide range of products in the facility, several are demanded repeatedly and in large volume.
- This type of production system should be preferred when there is wide variety of products in wide variety of volumes.

### Assembly line (mass) Production

- A process technology suitable for a narrow range of standardized products in high volumes.



- The successive units of output undergo the same sequence of operation using specialized equipment usually positioned along a production line.
- The product variety is fixed here. Ex. Assembly of television sets, assembly of auto, assembly of computer keyboard, cold drinks factory etc.

### **Continuous production**

- A process technology suitable for producing a continuous flow of products.
- The product is highly standardized.
- Material and products are produced in continuous, endless flows, rather than in batches or discrete units.
- Continuous flow technology affords high volume, around-the clock operation with capital intensive, specialized automation.

### **Dimensions of Product Strategies:**

- Product-Positioning
- Product-Repositioning.
- Product-Overlap.
- Product Scope.
- Product-Design.
- Product Elimination.
- New Product.
- Diversification.
- Value-Marketing.

### **Product Positioning: The Procedure**

1. Analyze product attributes that are salient to Customers.
2. Examine the distribution of these attributes among different segments. 20
3. Determine the optimal position for the product in regard to each attribute, taking into consideration the position occupied by existing brands.
4. Choose an overall position for the product (based on overall match between product attributes and their distribution in the population and the position of existing brands) Product

### **Positioning Strategy**

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- Definition: Placing a brand in that part of the market where it will have a favorable reception compared with competing brands.
- For Ex The marketers of “Liril” soap wants the people to think “Liril” when they think soap. The marketers of “Colgate” want the consumers to think “Colgate” when they think toothpaste etc.

### Objective

- To position the product in the market so that it stands apart from competing brands. (b) To position the product so that it tells customers what you stand for, what you are, and how you would like customers to evaluate you. In the case of positioning multiple brands: •
  - a) To seek growth by offering varied products in differing segments of the market. •
  - b) To avoid competitive threats to a single brand •

**Requirements:** Use of marketing mix variables, especially design and communication efforts.

- Successful management of a single brand requires positioning the brand in the market so that it can stand competition from the toughest rival and maintaining its unique position by creating the aura of a distinctive product.
- Successful management of multiple brands requires careful positioning in the market so that multiple brands do not compete with nor cannibalize each other. Thus it is important to be careful in segmenting the market and to position an individual product as uniquely suited to a particular segment through design and promotion.
- Expected Results:
  - Short term success
  - Meet as much as possible the needs of specific segments of the market
  - Limit sudden changes in sales.
  - Make customers faithful to the brands.

### Product Re-positioning Strategy

- **Definition:** Reviewing the current positioning of the product and its marketing mix and seeking a new position for it that seems more appropriate.
- **Objectives:** (a) To increase the life of the product. (b) To correct an original positioning mistake.





• **Requirements:** –

- If this strategy is directed toward existing customers, repositioning is sought through promotion of more varied uses of the product.
- If the business unit wants to reach new users, this strategy requires that the product be presented with a different twist to the people who have not been favorably inclined toward it. In doing so, care should be taken to see that, in the process of enticing new customers, current ones are not alienated.
- If this strategy aims at presenting new uses of the product, it requires searching for latent uses of the product, if any. Although all products may not have latent uses, there are products that may be used for purposes not originally intended. •

**Expected Results:**

- Among existing customers: increase in sales growth and profitability.
- Among new users: enlargement of the overall market, thus putting the product on a growth route, and increased profitability.
- New product uses: increased sales, market share, and profitability.

**Product Overlap Strategy**

- **Definition:** Competing against one’s own brand through introduction of competing products, use of private labeling, and selling to original-equipment manufacturers.
- **Objectives:** Product overlap strategies can include selling similar goods in different markets, regions or international countries. For example, a company may sell widgets and cogs; both offer extremely similar consumer benefits. However, the company may sell widgets in the United States and cogs in Canada. •
  - a) To attract more customers to the product and thereby increase the overall market.
  - b) To work at full capacity and spread overhead.
  - c) To sell to competitors; to realize economies of scale and cost reduction.

**Requirements:**

- a) Each competing product must have its own marketing organization to compete in the market.
- b) Private brands should not become profit drains.
- c) Each brand should find its special niche in the market. If that doesn’t happen, it will create confusion among customers and sales will be hurt.



**d)** In the long run, one of the brands may be withdrawn, yielding its position to the other brand

**Expected Results:**

- Increased market share.
- Increased growth.

**Product Scope Strategy**

- **Definition:** The product-scope strategy deals with the perspectives of the product mix of a company. The product-scope strategy is determined by taking into account the overall mission of the business unit. The company may adopt a single-product strategy, a multiple-product strategy, or a system-of-products strategy.
- **Objectives:**
  - ✓ Single product: to increase economies of scale by developing specialization.
  - ✓ Multiple products: to cover the risk of potential obsolescence of the single product by adding additional products
  - ✓ System of products: to increase the dependence of the customer on the company's products as well as to prevent competitors from moving into the market. •

**Requirements:**

- a)** Single product: company must stay up-to-date on the product and even become the technology leader to avoid obsolescence.
- b)** Multiple products: products must complement one another in a portfolio of products.
- c)** System of products: company must have a close understanding of customer needs and uses of the products.

**Expected Results:** Increased growth, market share, and profits with all three strategies. With system-of-products strategy, the company achieves monopolistic control over the market, which may lead to some problems with the Justice Department, and enlarges the concept of its product/market opportunities.

**Product Design Strategy**

- **Definition:** The product-design strategy deals with the degree of standardization of a product. The company has a choice among the following strategic options: standard product, customized product, and standard product with modifications.
- **Objectives:**
  - ✓ Standard product: to increase economies of scale of the company.

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- ✓ Customized product: to compete against mass producers of standardized products through product-design flexibility.
- ✓ Standard product with modifications: to combine the benefits of the two previous strategies.
- ✓ Requirements:
- ✓ Close analysis of product/market perspectives and environmental
- ✓ Changes, especially technological changes.

### **Expected Results:**

- ✓ Increase in growth, market share, and profits. In addition, the
- ✓ third strategy allows the company to keep close contacts with the market and
- ✓ Gain experience in developing new standard products.

### **Product Elimination Strategy**

- Definition: Cuts in the composition of a company's business unit product portfolio by pruning the number of products within a line or by totally divesting a division or business
- **Objectives: –**
  - ✓ To eliminate undesirable products because their contribution to fixed cost and profit is too low,
  - ✓ Eliminate Products that its future performance looks grim, or because they do not fit in the business's overall strategy.
  - ✓ The product elimination strategy aims at shaping the best possible mix of products and balancing the total business.
  - ✓ Requirements:
  - ✓ No special resources are required to eliminate a product or a division.
  - ✓ However, because it is impossible to reverse the decision once the elimination

### **Requirements: –**

- No special resources are required to eliminate a product or a division.
- An in-depth analysis must be done to determine
  - a) the causes of current problems; •
  - b) The possible alternatives, other than elimination, that may solve problems (e.g., Are any improvements in the marketing mix possible?);
  - c) The repercussions that elimination may have on remaining products or units.

### **Expected Results:**

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- In the short run, cost savings from production runs, reduced
- inventories, and in some cases an improved return on investment can be
- Expected. In the long run, the sales of the remaining products may increase because more efforts are now concentrated on them.

### New Product Strategy •

- **Definition:** A set of operations that introduces (a) within the business, a product new to its previous line of products; (b) on the market, a product that provides a new type of satisfaction. Three alternatives emerge from the above: product improvement/modification, product imitation, and product innovation.
- **Objectives:** To meet new needs and to sustain competitive pressures on existing products. In the first case, the new-product strategy is an offensive one; in the second case, it is a defensive one.
- **Requirements:** A new-product strategy is difficult to implement if a “new product development system” does not exist within a company. Five components of this system should be assessed:
  - ✓ Corporate aspirations toward new products
  - ✓ Organizational openness to creativity.
- **Requirements:** A new-product strategy is difficult to implement if a “new product development system” does not exist within a company. Five components of this system should be assessed:
  - ✓ Environmental favor toward creativity
  - ✓ Screening method for new ideas, and Evaluation process
- **Expected Results:** Increased market share and profitability.
  - ✓ are now concentrated on them.

### Diversification Strategy

- **Definition:** Developing unfamiliar products and markets through:
  - ✓ Concentric diversification (products introduced are related to existing ones in terms of marketing or technology),
  - ✓ Horizontal diversification (new products are unrelated to existing ones but are sold to the same customers)
  - ✓ Conglomerate diversification (products are entirely new).

**Objectives:** Diversification strategies respond to the desire for:

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- ✓ Growth when current products/markets have reached maturity,
- ✓ Stability by spreading the risks of fluctuations in earnings,
- ✓ Security when the company may fear backward integration from one of its major customers,
- ✓ Credibility to have more weight in capital markets.

● **Requirements:** In order to reduce the risks inherent in a diversification strategy, a business unit should:

- ✓ Diversify its activities only if current product/market opportunities are limited.
- ✓ Have good knowledge of the area in which it diversifies.
- ✓ Provide the products introduced with adequate support.
- ✓ Forecast the effects of diversification on existing lines of products.
- ✓ Expected Results:
  - ✓ Increase in sales.
  - ✓ Greater profitability and flexibility

### Value Marketing Strategy

- **Definition:** The value-marketing strategy concerns delivering on promises made for the product or service. These promises involve product quality, customer service, and meeting time commitments.
- **Objectives:** Value-marketing strategies are directed toward seeking total customer satisfaction. It means striving for excellence to meet customer expectations.
- Requirements:
  - a) Examine customer value perspectives.
  - b) Design programs to meet customer quality, service, and time requirements.
  - c) Train employees and distributors to deliver on promises.
- **Expected Results:** This strategy enhances customer satisfaction, which leads to customer loyalty, and, hence, to higher market share. This strategy makes the firm less vulnerable to price wars, permitting the firm to charge higher prices and, thus, earn higher profits.



Self-Check -5

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write dimensions of production strategies

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Information Sheet-6	Existing resources and strategies are evolved to fit with it.
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### **resources and strategies are evolved to fit with it**

Under this outcome Prescriptive and Performance requirements, nature and scope of work are discussed

#### **Prescriptive requirements**

- **Prescriptive requirement is** a building code that specifies construction requirements according to particular materials and construction methods, rather than to performance criteria. Same as a specification code. See performance code.

A prescriptive provision sets out a rigid specification for compliance. include

- ✓ detail relating to materials and quality of work,
- ✓ quality assurance,
- ✓ nominated subcontractors,
- ✓ provision of site access/facilities and costs

#### **Performance requirements**

- **Performance requirements are** a building code that specifies construction requirements according to performance criteria rather than to specific building materials, products, or methods of construction. See specification code, and prescriptive code . Performance-based provision sets out the performance required or the objective to be achieved without prescribing how it is to be achieved. include

- ✓ standards of work,
- ✓ work schedules and
- ✓ milestones

#### **Quality Assurance**

Quality assurance in construction can be defined simply as making sure the quality of construction is what it should be

**Quality Assurance:** The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled.

- provides a documented process by which quality commitments are met
- establishes a benchmark
- is systematic and reproducible



- provides a mean of continuous improvement

### **What is the scope of work?**

Disputes regarding scope of work are often the basis of construction claims. Scope of work is defined as the extent of a contractor's responsibility to perform certain contract work. To determine the scope of work, the contractor may have to look to other contract documents – plans and specifications, contracts with others – and to industry standards (building codes, etc.)

The scope of work issues between the owner and the general contractor differ from the scope of work issues between the general contractor and subcontractors. The general contractor must be sure that all of the scope of work is contracted to subcontractors, and that there is no overlapping scope of work issues.

Questions regarding scope of work should be resolved in the written contract. Scope of work references should be detailed in the contract. If detailed specifications are available, refer to the specifications in designating scope of work





Self-Check -6

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

2. A prescriptive provision sets out a rigid specification for compliance. include

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Lap test -1	Written test
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

6. \_\_\_\_\_ is a method of determining *“What” is going to be done, “How” things are going to be done, “Who” will be doing activities and “How much” activities will cost.*
7. \_\_\_\_\_ a group of individuals who are cooperating willingly and effectively for a common goal.
8. \_\_\_\_\_ a process of directing and facilitating the work of people who are organized for a common purpose.
9. \_\_\_\_\_ is an executive with the most difficult and with the highest degree of responsibility.
10. \_\_\_\_\_ a function of coordinating in a logical order all the activities, persons, machines and materials necessary to complete the project.

## PART II MULTIPLE CHOICE

5. Which of the structural Elements of an Organization.  
A. men B. machine C. materials D. method E. money E. all
6. Major Elements of an Organizational Structure  
A. Distribution of Functions B. Vertical and Horizontal Authority Relationship  
C. Communication and Decision Processes D. Policies E all
7. Is a convenient method for decomposing the project complexity in a rational manner into work packages and elementary activities.  
A. cost break down structure B. work Break down structure  
C. organizational break down structure D. all
8. Describes the amounts of individual resources an existing schedule requires during specific time periods.  
A. resource loading B. resource limited C. resource loading leveling D. scheduling

## PART III: ESSAY

1. Write down Phases of PERT / CPM

- d. \_\_\_\_\_
- e. \_\_\_\_\_
- f. \_\_\_\_\_



**LG #34**

**LO #4- Prepare schedule for production of a component/part**

**Instruction sheet**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Scheduling in accordance is Production of component.
- Proceeding quality management Schedule

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to:

- Scheduling in accordance is Production of component.
- Proceeding quality management Schedule

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets”
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.



Information Sheet-1	Scheduling in accordance is Production of component.
---------------------	--

## Production capacity and constraints

**Monitoring** is the routine process of data collection and measurement of progress toward program objectives.

**Evaluation** is the use of social research methods to systematically investigate a achievement of a program's results

## What is the purpose monitoring and evaluation plan ?

- Improve program implementation
  - ✓ Data on program progress and implementation
  - ✓ Improve program management and decision making
- Inform future programming
- Inform stakeholders
  - ✓ Accountability (donors, beneficiaries)
  - ✓ Advocacy

## Who needs, uses monitoring and evaluation plan Information?

To Improve program implementation...

- Managers

To Inform and improve future programs

- Donors
- Governments
- Technocrats

Inform stakeholders

- Donors
- Governments
- Communities
- Beneficiaries

## Who conducts monitoring and evaluation plan?

Program implementer

Stakeholders

Beneficiary

## How to carry out monitoring and evaluation plan? Key Features

1. Program Framework: Analyze and systematically lay out program elements

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2. Identify key elements to monitor and evaluate.
3. Determine and describe the measures to be used for monitoring and evaluation
4. Develop M&E Framework and action plans, including data collection and analysis, reporting and dissemination of findings.

### **Program Framework**

- Systematic lay out of the program elements and path showing what the program plans to: do .....achieve!

### **Monitoring and evaluations plan Questions**

- **Monitoring questions**
  - ✓ What is being done?
  - ✓ By whom?
  - ✓ Target population?
  - ✓ When?
  - ✓ How much?
  - ✓ How often?
  - ✓ Additional outputs?
  - ✓ Resources used? (Staff, funds, materials, etc.)
- **Evaluation Questions?**
  - ✓ Is the content of the intervention or the activity being delivered as planned?
  - ✓ Does the content of the intervention or the activity reflect the requisite standards?
  - ✓ Have the intervention achieved the expected results?

### **Indicators: Definition**

- Markers that help to measure change by showing progress towards meeting objectives
- Observable, measurable, and agreed upon as valid markers of a less well-defined concept or objective
- Indicators differ from objectives in that they address specific criteria that will be used to judge the success of the project or program.

### **Type and Level of Each Indicator**

- Type
  - ✓ Input/Process (Monitoring)
  - ✓ Outcome / Impact (Evaluation)
- Level
  - ✓ Global level



- ✓ Country level
- ✓ Program level

### What Is a Good Indicator?

- Valida: measures the effet It Is suppose to mesure
- Repliable: Givres sème résulte if mesure in the sème waw
- Précise: Is opérationnelle définie So people are clean about white Theys are measuring
- Timely: Can be mesure at. an intervalle That Is appropriâtes to the level of change expected
- Comparable: Can be compared across different target groups or project approaches

### Criteria for Indicator Selection

- Consistent with project design—measure the desired result
- Useful—contributes to project design, management, and evaluation
- Available
- Affordable

### Standard Indicators

Where possible, a project should select standard indicators.

- They have been tested for validity and reliability.
- They allow comparison between projects or sites.

### Monitoring and Evaluation Plan

- The plan is a managerial tool that specifies the schedule, resources, responsibilities, for your monitoring and evaluation work plan activities (data collection, data quality control, reporting, dissemination and use of data)
- Note:
  - ✓ The plan should specify the time points when evaluations will be carried out, for example: Midterm, and End term.
  - ✓ Outcome/Impact evaluation is reserved for large longer term programs that can make impact at public health status level.
  - ✓ Your plan should include activities to monitor and evaluate the implementation, as planned, of the monitoring and evaluation plan.



## Inventory-

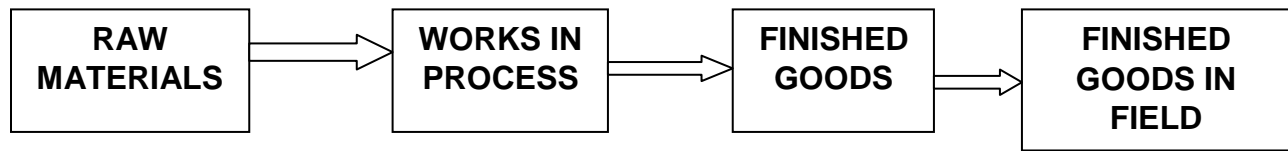
A physical resource that a firm holds in stock with the intent of selling it or transforming it into a more valuable state

Inventory System- A set of policies and controls that monitors levels of inventory and determines what levels should be maintained, when stock should be replenished, and how large orders should be

### **Types of Inventories**

- Raw Materials
- Works-in-Process
- Finished Goods
- Distribution Inventory
- Supplies: Maintenance, Repair and Operating (MRO)

### **Inventory Positions in the Supply Chain**



### **Reasons for Inventories**

- ✓ Improve customer service
- ✓ Economies of purchasing
- ✓ Economies of production
- ✓ Transportation savings
- ✓ Unplanned shocks (labor strikes, natural disasters, rush in demand, etc.)
- ✓ To maintain independence of supply chain



Self-Check -1

Written Test

**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

- 1. Who conducts monitoring and evaluation plan?**
- 2. How to carry out monitoring and evaluation plan?**

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_





### Project management

A project is an interrelated set of activities that has a definite starting and ending point and those results in a unique product. That means projects are not repetitive. Few examples of projects are:

1. Constructing a bridge, dam, highway or building.
2. Producing an airplane, missile or large machine.
3. Introducing a new product.
4. Installing a large computer system.
5. Redesigning the layout of plant or office.
6. Construction of a ship.
7. Fabrication of a steam boiler.
8. Maintenance of major equipment's/Plants.
9. Commissioning of a power plant/factory.
10. Conducting National Election.

### Basic steps in project management

Managing a project, regardless of its size and complexity, requires identifying every activity to be undertaken and planning when each activity must begin and end in order to complete the overall project on time. Typically, all projects involve the following steps:

1. Describe the project.
2. Develop a network model.
3. Insert time estimates.
4. Analyze the model.
5. Develop the project plan.
6. Periodically assess the progress of the project and repeat steps 2-6 as needed.

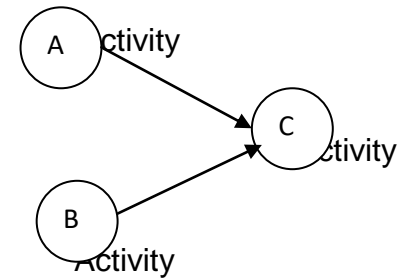
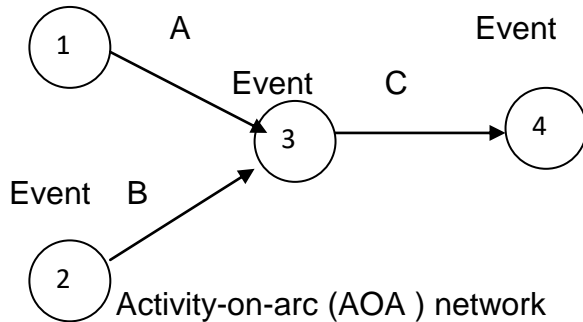
**Network:** A network is the graphical representation of the project activities arranged in a logical sequence and depicting all the interrelationships among them.



## Terminologies used in Network diagram:

1. Activity: An activity means work/job. It is a time consuming process. It is represented by an arrow in the network diagram (AOA system).
2. arrow in the network diagram (AOA system).

Event



3. Event: An event is a specific instant of time marks the start and end of an activity.
4. Critical path: It is the sequence of activities which decides the total project duration.
5. Duration (d): Duration is the estimated or actual time required to complete a task or an activity.
6. Total project time: Time to complete the project. In other words, it is the duration of critical path.
7. Earliest start time (E): It is the earliest possible time at which an activity can start. It is calculated by moving from 1st to last event in the network diagram.
8. Latest start time (Li): It is the latest possible time by which an activity can start.
9. Earliest finish time (Ej): It is the last event time of the head event. It is calculated by moving backward in the network diagram.
10. Latest finish time (Lj): It is the last event time of the head event. It is calculated by moving backward in the network diagram.
11. Float/Slack: Slack is with reference to an event and Float is with reference to an activity.
12. Free float: (Latest Finish Time – Earliest Start Time) – Activity duration.

Rules for Network Construction:

The following are the primary needs for constructing Activity on Arc (AOA) network diagram.

1. The starting event and ending event of an activity are called tail and head event respectively.
2. The network should have a unique starting node. (tail event)
3. The network should have a unique completion node. (head event)
4. No activity should be represented by more than one are ( → ) in the network.

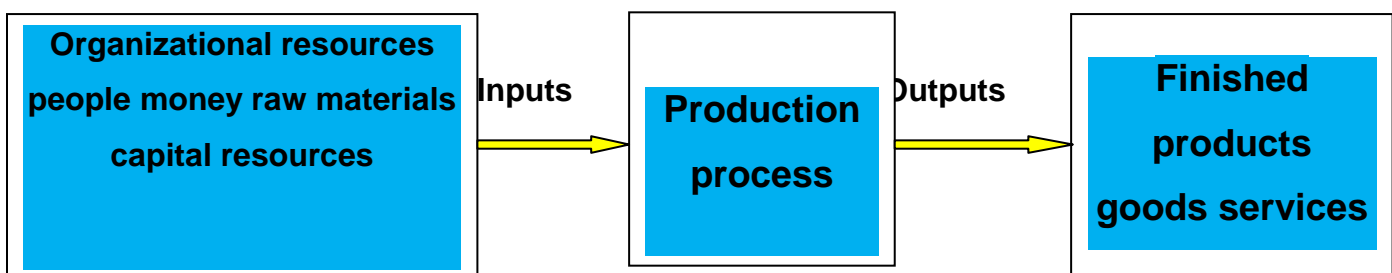
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5. No two activities should have the same starting node and same ending node.
  6. Dummy activity is an imaginary activity indicating precedence relationship only. Duration of dummy activity is zero.
  7. The length of the arrow bears no relationship to the activity time.
  8. The arrow in a network identifies the logical condition of dependence.
  9. The direction of arrow indicates the direction of workflow.
  10. All networks are constructed logically or based on the principle of dependency.
  11. No event can be reached in a project before the completion of precedence activity.
  12. Every activity in the network should be completed to reach the objective.
  13. No set of activities should form a circular loop.
- Management is defined as the process of the basic four functions of management. these are:
    - ✓ Planning
    - ✓ Organizing
    - ✓ Leading/directing
    - ✓ Controlling

**This are called the four functions of management.**

- The primary challenge faced by organizations and managers today is to creatively solve business problems. The principles of management are guidelines using which managers can tackle business challenges.
- The principles of management have been categorized into the four major functions of planning, organizing, leading, and controlling popularly known as the P-O-L-C framework.



**Figure 1.1 Transformation organizational resources into finished products through the production process**



## Planning

**Planning** involves tasks that must be performed to attain organizational goals, outlining how the tasks must be performed, and indicating when they should be performed.

### Six Key Managerial Competencies

- A. Communication Competency
- B. Planning and Administration competency
- C. Teamwork Competency
- D. Strategic Action Competency
- E. Global Awareness competency
- F. Self-Management competency

### Types of managers.

- Managers can be classified into two ways
  - 1. By their level in the organization
    - ✓ First level
    - ✓ Middle level
    - ✓ Top level
  - 2. By the range of organizational activities for which they are responsible.
    - ✓ General
    - ✓ Functional

### First line managers:

- Who are responsible for the work of operating employees
- They do not supervise other managers
- They are the lowest level in organizational. Hierarchy.
- They are managers of the firing line where most of concrete organizational task are performed.
- First line managers are often called *supervisors*
- They are mainly concerned with
  - ✓ Planning day to day work
  - ✓ Keeping a watch on workers performance
  - ✓ Assignment of jobs
  - ✓ Sending report to superiors and etc.....



- They may be office managers, Forman, chief clerks.....

### **Middle level managers:**

- Who are responsible to direct the activities of lower level managers and sometimes extends to supervise operating employees.
- Their principal task is to direct the activities that implement organizational policies
- They balance the demand of superiors with the capacity of subordinates.
- They may include:
  - ✓ *Department heads,*
  - ✓ *branch managers,*
  - ✓ *work managers*
- They establish organizational policies and strategies
- They guide the organization's interaction with its environment.

### **Functional managers:**

- These are managers who are responsible for only one organizational activity. like
  - ✓ Marketing
  - ✓ Sales
  - ✓ Finance
- The people and activities headed by a functional manager are engaged in a common set of activities.

### **General managers:**

- operation of a company, a subsidiary, or more complex division which may have one or more functional units
- *Function is simply a collection of similar activities.*

for example, the marketing function commonly consists of promotion, sales, distribution etc.....

### **Quality procedures**



Figure 1. Quality Procedures

After reviewing the meaning and importance of a procedure and understanding the link between a procedure and a process we are going to discuss the quality procedures. The procedures include the following components:

- **A quality manual:**-A document defining the scope of the quality management system, a general presentation of the organization activities, its organizational structure, a general description of the main process, a description of the relation between the working process and the quality management system (as shown below), a list of all procedures in the organization Control of documents. Specification of the process of controlling documents that is included under the quality management system. The requirements are specified in this article. In the procedure you must define how to achieve the requirements.
- **Control of records:**-Specification of the process of controlling your records that are included under the quality management system. The requirements are specified in this article. In the procedure you must define how to achieve the requirements. This procedure will include or refer to a list of all documentation included in the quality management.
- **Internal audits:**-A procedure specifying how the internal audit should be performed within the organization.
- **Control of nonconformity:**-Procedure specifying how one should handle nonconformity when he detects it.
- **Corrective action:**-A procedure specifying how one implements a corrective action.
- **Preventive action** :-a procedure specifying how one implements a preventive action

Note:-These procedures are based on ISO 9001 Standard requirements.



Self-Check -2

Written Test

**Directions: Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.**

1. Draw the diagram of Quality Procedures and discuss each component?(6pt)
2. Write at least five component of Quality Procedures?(5pt)
3. Write at list three continent to include Working procedures?(3pt)

**Note: Satisfactory rating - 10 points**

**Unsatisfactory - below 10 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_



Lap test -1	Written test
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

11. \_\_\_\_\_ is a method of determining *“What” is going to be done, “How” things are going to be done, “Who” will be doing activities and “How much” activities will cost.*
12. \_\_\_\_\_ a group of individuals who are cooperating willingly and effectively for a common goal.
13. \_\_\_\_\_ a process of directing and facilitating the work of people who are organized for a common purpose.
14. \_\_\_\_\_ is an executive with the most difficult and with the highest degree of responsibility.
15. \_\_\_\_\_ a function of coordinating in a logical order all the activities, persons, machines and materials necessary to complete the project.

## PART II MULTIPLE CHOICE

9. Which of the structural Elements of an Organization.  
A. men B. machine C. materials D. method E. money E. all
10. Major Elements of an Organizational Structure  
A. Distribution of Functions B. Vertical and Horizontal Authority Relationship  
C. Communication and Decision Processes D. Policies E all
11. Is a convenient method for decomposing the project complexity in a rational manner into work packages and elementary activities.  
A. cost break down structure B. work Break down structure  
C. organizational break down structure D. all
12. Describes the amounts of individual resources an existing schedule requires during specific time periods.  
A. resource loading B. resource limited C. resource loading leveling D. scheduling

## PART III: ESSAY

1. Write down Phases of PERT / CPM

- g. \_\_\_\_\_
- h. \_\_\_\_\_
- i. \_\_\_\_\_





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2. <http://www.transparencyindia.org/pdf>  
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