

All best for my students.

Wishes are not only to pass in exams but to succeed in life.

I believe my students to create a better tomorrow.



-PJ

MATERIALS MANAGEMENT



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Material management

Syllabus

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UNIT I

Material management

According to Bailey and Farmer "materials management is defined as the management of flow of materials into an organization to the point where these materials are converted into the firms and product"

Functions of material management

The function of the material management are broadly divided into the following areas-
Planning and sourcing:

Planning is the essence of any project. material planning is a part of production planning. for an effective inventory control production plans should be converted into material plan.

Budgeting:

A.K.Datta says budgets are plans of action quantified in money terms for some future period in time. budgets serves the following purpose
planning the activities of various departments.
fixation of objectives and targets of all such activities of the department.
application of correctives so as to help in achieving the objective and targets.

Researching and analysing:

Researching helps in visualising and underlying possibilities within the economy and hence comes out with future vision, forecasting future problems with near certainty and offers possible solutions to solve them systematically and scientifically with hope to get a result on expected lines.

Indenting and procuring

Purchasing is a function of procuring goods and services from source external to the organization. the purchase can be materials, supplies machine tool etc.

Receiving storing preserving

When goods arrive they are sent to the receiving stores and contents are physically verified against the details provided in the purchase order. after receiving they are sent to storage and the numbers are entered in the ledger or bin card. preservation involves maintenance of material to retain their shape and quality.

Accounting and controlling

It is the process of recording details of stock movement and balance in terms of financial values.it is recommended to be followed by the store department.

Inventory control

It is the operation of continuously arranging receipts and issue in such a way so as to ensure that stock balance in quantity or value adequate to support the current rate of consumption at all times with due regard to economy

Issuing and dispatching

This is the process of receiving indents, picking the items required and handing them over to users or dispatching them to customers.

Disposing

Materials which are unusable scraps or obsolete or far in excess of requirements have to be profitably disposed off. The defective material should be corrected to make them usable.

Objective of material handling

- To ensure an uninterrupted production by maintaining a steady flow of materials.
- To purchase materials of right quantity, in the right quality, at the right time, from the right source and at the right price
- To be alive to the changes in the market in respect of new products.
- To improve the quality of manufactured goods by the use of better raw materials or components
- To ensure to increase the competitiveness of goods manufactured
- To aim to reduce the price
- To save foreign exchange through import substitution.

Importance of material management.

The importance of material management cannot be over emphasized in the complex industrial world. It affects not only a particular industry but the entire economic activity of a whole nation

- Material contributes to the quality of the end product
- The amount spent on materials is increasing in relation to the expenditure on other inputs.
- Materials form an important aspects of current assets in any organization.
- Conservation of material and their availability for prosperity is one of the social responsibilities of business.
- Materials form the largest single expenditure item in most of the manufacturing organization
- They usually represent 50-60 percent of the total cost of final products.
- Reduction in the material costs by about 5% is always possible through an efficient material management.

UNIT II

Inventory control

It is the operation of continuously arranging receipts and issues in such a way so as to ensure that stock balance in quantity or value adequate to support the current rate of consumption at all times with due regards to economy.

Replenishment of stock:

The (Inventory) replenishment is an operation that consists in making the stock full again in order to avoid stock-out. Replenishment is typically initiated by a backorder passed to a supplier or to a manufacturer, possibly sent through EDI

MRP

MRP refers to material requirement planning. It is an integral part of production planning. For effective inventory control, production plans are converted into materials plans.

Material planning technique is divided into two groups. They are

- Material planning technique for direct material
 - Material planning technique for indirect material
- further material planning technique for direct material in turn may be further divided into two sub groups
- Techniques for high value materials
 - Techniques for low value materials
- MRP is a technique for determining the quality and timing for the acquisition of dependent demand items needed to satisfy master production schedule requirements.

Procedural steps in MRP

Determine the gross requirement of the finished products:
the gross requirement is the aggregate quantity from three sources.

- Period wise quantity from the three sources
- Period wise pending sales order on hand
- Management's decision to alter the quantities derived.

Determine the net requirement of the finished products:

The gross requirement obtained in the step 1 are adjusted by the available inventory of the products to obtain the net requirement. This is the net requirement = gross requirement - inventory available.

Develop master production schedule:

The gross requirement for each time period as determined in step 2, a master production schedule is prepared. Master production schedule is the key in MRP

Explode the bill of material and determine gross requirement:

For each assembly, a structured bill of materials is available and it contains the information to identify each item of the assembly and the quantity required per assembly of which is a part. Screen out the B and C category of items which were explained previously.

Determine the net requirement of items:

The gross requirement of the items obtained in step 4 important adjusted for the stock on hand and stock on order.

Adjustment requirement for scrap allowance:

Scrap and waste need to be accounted for during manufacturing so that their exact number will be available for assembly.

Schedule planned for order:

Once the quantity of an item is determined, the next logical step is to schedule it.

Explode the next level:

As mentioned in step 4, the entire assembly is not exploded at one time but it is done level by level after all previous steps have been completed.

Aggregate requirement and determine order quantity.

Some of the items may be common to the number of assemblies and at various level.

Write and place the planned orders.

After the requirement of each item have been determined, their purchase order/work orders can be taken in the form of a computer print out.

Maintain the schedule.

A written order is no assurance that the product will be delivered on time, regular follow up is necessary, expediting may be required to be done in some cases until the products is ready to be delivered to the customer.

Objectives of MRP

- Inventory reduction
- Reduction in production and delivery lead time
- Realistic commitments
- Increased efficiency

ABC analysis

The principle of control by the impotence and exception or selective control as applied to inventories and the techniques of group is termed as ABC analysis or classified which is said to be as Always Better Control

Procedure for implementing abc analysis

- Classify the items of inventories
- Determine the expected use in units over a given period
- Determine the price unit of each item
- Determine the total cost of each item by multiplying the expected units by its unit price
- Rank the items in accordance with the total cost allotting first rank to the items with highest total cost and so on.
- Find out the total number of units
- Calculate the % of the total costs of each item to total cost of all items
- Combine items on the basis of their relative value to form three categories-A,B and C
- Describe cut-off points and methods of control.
- Tag the inventory with A, B,C classification and record these classification i the items inventory master control.

Merits of ABC analysis

- By concentrating on A class items, the material manager is able to control inventories and show visible results in a short span of time.
- By controlling the A class items and doing a proper inventory analysis, obsolete stocks are automatically pinpointed.
- Many organization has claimed that the ABC analysis has helped in reducing their critical costs and result in better planning and improved inventory turnover.
- ABC analysis has to be restored because equal attention to A B C items are not worthwhile and would be expensive.

- Concentrating on all items is likely to have a diffused effect on all the items irrespective of their priorities.

Demerits of ABC analysis

- ABC analysis in order to be fully effective should be carried out with standardization and codification
- ABC analysis is based on grading the items according to the importance of performance of the item like vital, essential and described analysis.
- Some items through negligible in monetary value may be very vital for running the plant, demanding constant attention.
- The result of the ABC analysis have to be reviewed periodically and updated.
- It is a common experience that a characteristic class item like diesel oil in firm will become the most high-value item during a power crisis
- ABC is a powerful tool or approach in the direction of cost reduction as it helps to control items with selective approach.

FBN analysis

The classification takes into account the pattern of issues from stores. The three letters stand for Fast-moving, Slow-moving and Non-moving, items classified as S and N requires attention. Especially N items requires more attention. There may be several reason why an item has got into N category. There may have been a change in technology or change in the specification or a particular spare part.

EOQ

The economic order quantity refers to the quantity ordered to be purchases at the lowest total cost. This is the most economical purchase quantity which maintains a balance between two opposing costs of procurement and carrying.

Basic assumption of EOQ

- Annual carrying costs per unit and costs per unit can be accurately estimated and are the only relevant costs. This assumption really requires that all cost information must be known with certainty, which is rarely possible.
- Annual demand can be estimated and is linearly consumed by consumers. This assumption requires the annual demand estimate to be known with certainty.
- Average inventory level is the order quantity Q divided by 2, this assumption requires that only an amount of Q inventory can be available. If a safety stock is left over from a previous period, then average inventory would be greater than Q/2.
- With demand linear and certain, there need not be any stock-out costs, this assumption basically prohibits the stocking out of inventory as costs are almost associated with being unable to meet a customer's demand requirement. If stock outs are not possible, there will be no stock out costs.
- There are no quantity discounts on large orders
- Lead time is known, fixed and discounts and independent of demand
- Inventory has one stock point, stock point is a location of inventory.

EBQ

Economic Batch Quantity (EBQ) is a formula for calculating the quantity of inventory that a company should order in cases where the resupply is gradual e.g. when the company produces its own inventory and takes a while to complete production. Think of a company assembling vehicles.

UNIT III

Purchasing

According to Alford and Beary "Purchasing is the process of materials, supplies, machines tools and services required for the equipment, maintenance and operation of a manufacturing plant".

Purchase order

The purchase order is a Advantage contractual documents that should be clear and unambiguous

The purchase order should carry out the following

- Full name and address of originating company
- Full name and address of receiving company
- Indenting number
- Quantity of product and amount of service required.
- Full description of type, style, grade or other means of identification
- Delivery schedule
- Cost allocation
- Purchasers signature and standing in the organization
- Reference to any certification or conformity to requirement.

All purchases orders issued shall be entered in the purchase order progression register. the register shall have the following columns.

- Serial number
- Purchase order number and date
- Value of the purchase order
- Name of the supplier
- Due date of delivery
- Number of items
- Important license, number date and delivery
- Letter of credit number and validity
- Date of order acknowledgement
- Dispatch details
- Receipt details
- Payment details.

Purchase parameters

Scientific purchasing is governed by eight well-known parameters called basic elements of scientific purchasing or also principles of purchasing or simple 8 R's of buying

- Right quantity
- Right quality

- Right price
- Right time
- Right source
- Right transportation
- Right procedures
- Right contact.

Different method of purchasing

Different methods of purchasing can be classified according to the demand and conditions in the market which are as follows

Hand to hand purchase:

Purchase are made to cover immediate requirement.

Advantage

- Lower inventory investment
- Low carrying cost

Disadvantage

- Comparatively higher price due to urgencies
- loss of quantity discounts

Scheduled purchasing:

Purchase covering annual requirement placed with the supplier

Advantage

- Both buyer and seller enjoy saving from regularity of production and smaller inventories.
- Buyer is assured of supply of goods

Market purchasing

Purchases made when the prices are low.

Advantage

- It results in lower purchase price
- Greater margin of profit on finished goods.

Disadvantage

- The entire needs of production requirement may be served
- Inventory holding charges are considerably higher.

Speculative purchasing

Buying of item in large quantity to sell at higher price during speculation period.

Advantage

- Earning of speculation profit

Disadvantage

- Storage prob
- Risk of obsolescence

Contract purchasing

Purchases made on contract

Advantage

- Buyers company is assured of regular purchases despite market fluctuation
- Terms of contact are favourable to the parties involved

Blanket order

Purchases of variety of items from single source

Tender purchasing

Usually government and public sectors undertakes these kinds of purchasing.

Advantage

- Single tool to select qualified supplier
- Eliminates favouritism and patronage

Disadvantage

- Costly and time consuming

Seasonal purchasing

Refers to buying of annual requirement of an item during a season

Group purchasing

Buying of items of trivial value in single purchase order

Sub-contracting

Hiring of another firm to perform some of the manufacturing operations or to furnish eratin parts and subassemblies to be incorporated into the end product.

Purchase by requirement

Purchases made whenever necessary and only small quantity is purchases

Just in time purchase

It aims in eliminating waste in the purchase process.

Purchase procedure

- Indenting purchase requirement
- Scrutinizing purchase indents
- Market study and selection of source of supply
- Order preparation and placing
- Order acknowledgement
- Follow up and expediting
- Extension of delivery period
- Cancellation of order and penalty
- Receiving material
- Inspection of goods
- Storage and record keeping
- Scrutiny of the invoice and payment.

Import purchase procedure

The following are the steps involved in import purchase

- Need identification
- Inspection depth study
- Source development/supplier selection
- Negotiation
- Import license
- Contract
- Opening of letter of credit
- Follow up on shipment
- Shipping and insurance
- Arrival of documents
- Acceptance /payment of documents
- Clearance formalities
- Port clearance
- Receipt and accounting.

Responsibilities of purchase department of purchases manager

- Selecting the right suppliers
- Obtaining material at the best price
- Following up with suppliers
- Enquiring complaints both from suppliers and user department
- Obtaining technical information and advice on materials
- Establishing orders for materials on suppliers
- Specifying mode of delivery and transportation
- Inventory control
- Sales of scrap, surplus and salvaging
- Assist inspection pricing
- Verifying invoice presented by suppliers
- Ensuring delivery of good in right time.

Price forecasting Techniques:

Fundamental price analysis is based on the notion that the underlying supply/demand conditions in a given market ultimately determine price. Since the futures market is attempting to discover prices that will balance supply and demand in some future time period, there is uncertainty in initially establishing an equilibrium price. The market may be "shocked" by new information, resulting in traders' changing their assessments of what the equilibrium price will be in the future. Fundamental analysis is attempts to both anticipate changes in supply/demand information, and to evaluate the direction and range of price movement resulting from new information.

Fundamental analysis may be simple (intuitive), or complicated (using quantitative statistical or mathematical models). In both cases, analysts are attempting to assess price implications of economic variables including:

- 1) seasonal use patterns
- 2) seasonal supply patterns

- 3) prices of substitute goods
- 4) prices of complementary goods
- 5) market structure

Intuitive analysis uses a basic understanding of economic principles to hypothesize about price changes. Quantitative analysis combines knowledge of economic theory with mathematics and statistics to establish explicit relationships between economic variables and price

UNIT IV

Store keeping

Store keeping is a service function which deals with the physical storage of goods under the custodianship of a person called store keeper or store controller

Material handling

Raymond A Kulwiesc defines "Materials handling is a system or combination of methods facilities labour and equipment for moving, packaging and storing the materials to most specific objectives"

Scope of store keeping

- Exercising control on quantity of materials received
- Storage and protection of materials against damage
- Issuing materials against properly authorized materials requisition slips.
- Maintenance of adequate stock of materials to serve production needs.
- Arranging for inspection of materials received.
- Keeping inventory investment within desired limits.
- Carrying out of stock verification in accordance with the procedure laid down by the management.

Importance of material handling

- It accounts for about 15 to 25% of the total cost of production.
- Increased productivity of labour
- Increased production capacity of the plant
- Full utilization of plant capacity
- Saving in man hours
- Reduction in inventory
- Clean shop floors enabling smooth and efficient functioning of factory
- Reduction in fatigue of workers

Objectives of material handling

- Selection of machines/equipment and plants layout to minimize material handling requirement
- Selection of appropriate, efficient and safe material handling equipment
- Prevention of damage to materials
- Safety in material handling through improvement in working conditions

- Increase the productive capacity of the production facilities and enhancing productivity

Benefits of scientific storekeeping

- Scientific stock controls loss due to accumulation of inventories
- Efficient stores issues reduce time in production and increased profit
- Periodic review detects obsolete and non-moving items and helps organization in getting rid of unprotected inventory
- Follow up with purchase helps to avoid stock outs and consequently the production loss
- Proper record keeping provides exact picture of inventory in stores to top management.

Material tagging

- Tagging
- Labelling
- Writing or painting
- Embossing
- Etching and stamping
- Color coding
- Batching

Types of stores

There are five types of stores

- Receiving stores
- Main store
- Warehousing
- Special store
- Scrap yard

Receiving store:

It performs activities necessary to exercise control on quality and quantity of purchased materials before they are accepted and taken into stock.

They are subdivided into

Inward store keeps all incoming materials until they are accepted and taken to stock.

Quarantine store temporarily stock materials which were under disputes and require suppliers certification.

Rejection store contains rejected materials until they are sent to suppliers.

Main store:

It performs activities concerning storage and issue of accepted materials and maintenance of records. they can be either centralized or decentralized.

They are further divided into

Crib store: To store cutting tools, hand tools and measuring tools which are used on daily basis.

Finished product store: To stock parts of plant and machinery.

Sub store: To stock bar stock, casting and forging which requires lot of space and can be stocked in areas open to sky.

Warehouse:

It performs activities concerning receipts, packaging, dispatch of finished goods to different destination and handling of connected papers and documents.

Special store:

It performs activities of receipt, storage and issue of special materials.

It is subdivided into

Bonded store: To store materials that are hypothecated to banks.

Statutory store: To store materials such as kerosene, diesel and other petroleum products.

Temperature controlled store: To stock perishable items such as meat, fish, milk, vegetables, fruits or goods like rubber and rubber parts, active ingredients like antibiotics and vitamins which require temperature controlled store rooms.

Scrap yard:

It performs activities of receipt, segregation and storage of different types of scrap.

Responsibilities of store keeper

Recipient of goods

- Receiving the incoming goods
- Assist unloading operation
- Count verify
- Check the damage or shortage, prepare report
- Fill goods inward register
- Complete vendor consignment notes
- Inspect or arrange for inspection and complete inspection speedily
- Prepare goods rejection memo
- Send goods to stores and other documents to respective departments

Stores office

- Ensure all storage facilities are in proper working condition
- Ensure good house
- Keeping report
- Check bin cards and renew it
- Ensure steady flow of goods
- Clear waste packaging
- Check and count before issue
- Make sure that rules and regulation relating to physical custody and prevention of stores are followed

Safety and security measures followed in stores department

Accidents

Accidents can cause damage to materials, machines or facilities and injure or death to men. The worst is a fire accident where the entire premises can be completely gutted. Some common accidents are:-

- Materials falling from the racks due to inadequacy of space
- Slipping on oil, grease or even water spillage
- Falling off while climbing to reach the upper shelves
- Injury from corrosive acids

The following are some of the security measures followed in stores.

Closure of stores daily and custody of keys

Closure of stores should be properly supervised. Store keys must be numbered and registered. During off duty time keys should be kept under lock and key under the supervisor of a responsible person of the watch and ward.

Theft by outsiders

To eliminate theft by outsiders, the entire factory should have a compound wall or high barbed wire fencing. The number of windows, glass shutters and open ventilators should be as minimal as possible.

Pilferage of employees

Pilferage refers to the gradual removal of materials in small quantities by the employees of the company.

The following steps help to prevent pilferage

- Only authorised person should be allowed to enter the store
- Items liable to pilferage should be monogrammed with the company names or marked with specific identification details before taking them to store.
- Surprise check for stores
- Store staff should be physically checked

Malpractice by the store staff

Outgoing trucks, trolleys, parcels should be thoroughly checked gate pass should be issued to take materials out of the company indemnity bonds or bank security must be taken from store employee

Prevention of fire

Fire is an accident caused by chemical reaction between combustible materials and oxygen. Possible causes of fire are careless handling, improper storage and disposal of flammable materials, open electrical circuits causing circuits, smoking by staff and clients in the store

Menace of rodents and termites

If menace of rodents is observed the store should be fumigated and rat poison traps should be kept. For termites, white ants and fungi, suitable pesticides and fungicides should be sprayed.

Factors for a good store room layout:-

Nature of material: Heavy and bulk materials demand specific attention in movement and handling and may call for their placement near the user department to minimize movement and may be placed on the ground floor for easy handling.

The volume of materials: The store room should provide sufficient space on the ground and in the racks or shelf for the materials to be stored at a time

Floor and air space: While planning a layout available floor and ceiling space should be utilised to the maximum

Flexibility and expansion: Since expansion and changes are necessary the layout of the store should provide for future expansion and flexibility

Protection: Since protection is an important objective of store keeping the materials should be placed in a manner that it minimize the loss of materials against theft, pilferage etc

Proper illumination and ventilation: The store should be illuminated either naturally or artificially lighting.

Principles of good storage location and layout.

- Economy in cost of transportation
- Approachability by rail/road transportation
- Efficient service
- Reduced fire risks
- Safety and security
- Minimization of risk of spoilage and deterioration
- Flexibility for further expansion
- Overall integration of factors

Functions and responsibility of store keeper

- Identification of all materials stores
- Receipt of incoming goods
- Inspection of all receipts
- Storage and prevention
- Material handling
- Packing
- maintenance of stock records
- Issue and dispatch
- Store accounting
- Inventory control
- Stock taking
- Salvaging

Advantage of centralised store

- Inventory can be minimum
- Better control is possible
- Delivery at single point decrease transportation cost
- Opportunities of standardisation are improves
- Unnecessary duplication of records can be avoided

Disadvantage of centralised store room

- Extra handling of materials involved and more staffs will be required for transportation
- If the system is not well organised there can be severe shortage at work place causing unnecessary interruption in production
- More internal documents may become necessary
- In case of fire, the risk is greater as the entire stock can be lost.

Principles of materiel handling

- Planning principle
- Material flow principle
- Simplification principle
- Safety principle
- Flexibility principle
- Motion principle
- Maintenance principle
- Obsolescence principle
- Performance principle

UNIT V

Factors determining vendors

- Price
- Discount received
- Maintenance of specification
- Compliance with other specification
- Promptness of delivery
- Freight and delivery charges
- Installation cost
- Service
- Market information
- Credit terms
- Employee training
- Adjustment policies
- Cost reduction suggestion
- Inventory plans
- Financial position.

Advantages of value analysis

- High quality (value) is maintained
- All round efficiency is achieved by eliminating waste of various types
- Saving in cost signify the managerial effectiveness
- New ideas are generated and incorporated
- Areas requiring attention and improvement are pointed out
- A mean for evaluating alternatives and quantifying intangible is provided
- Motivates employees to come out with creative ideas which in turn provides immense job satisfaction.

Ways of improving buyers-sellers relationship

- Courtesy
- Disclosure
- Impartiality
- Lead time
- Mutual understanding
- Payments
- Personal visits

Guidelines for maintaining good buyer-seller relationship

From the buyer

- Recognising and appreciate the need of supplies
- Keep number of rush orders to its minimum eliminate them if possible
- Visit periodically the suppliers plant
- Assess the weakness and strength of suppliers
- Allow sufficient lead time

From the supplier

- Acknowledgement the orders received promptly
- Maintain shipment schedule
- Abide by specification and instruction
- Send all dispatch papers promptly
- Remove the rejected materials promptly

Stages involved in selection of appropriate sources

Survey stage

All the informations are evaluated on the basis of prima facie information or through advertisement, catalogue, brochures etc

Enquiry stage

The vendor may be asked to furnish information in standard enquiry form and this may be followed by a plant.

Negotiation and selection

Those vendors who has passed enquiry stage can be called for negotiation to discuss business possibilities.

Experience stage

At this stage the buyer evaluates the performance of the vendor. the objective is to improve the performance in areas such as quality, delivery time etc.

Quality

This is judged by rejection rate of the materials supplied by the vendor if the rate of rejection is high which mean the vendor is not good enough.

Delivery

If the delivery is not as per schedule, similar problems can raise

Sample approval

On satisfactory assessment, the samples obtained are evaluated dimension, material etc

Assistance to vendor

The suppliers are to be provided with special tools, jigs, fixtures and gauge on a selective basis

Motivation to vendors

Vendors are to be encouraged to diversify their line of activity form their initial orientation.

Vendor-vendor get together

Meeting enhances mutual trust and cooperation, besides highlighting the status of business order schedule, price and quality.

Source of information on potential vendors

- Trade registration and direction
- Trade ejournal
- Telephone directories
- Suppliers catalogue
- Trade exhibition and fairs
- Salesmen
- Company personnel
- Supplier information
- Purchase department of other companies
- Filing of mail-advertisement
- Local purchasing management association
- Public vendors

Stages involves in value analysis

The following are the phases involved in value analysis

Organisational phase

In the first phase a value analysis study is constituted. a product is selected and defined. The term examines in detail the product and its components to understand their nature thoroughly.

Information phase

After familiarising, a functional analysis is carried out to determine the functions and use the products and its components.

Innovative phase

This is the creative phase concerned with the generation of new alternative to replace or remove the existing one

Evaluation phase

Each alternative is analysed and most promising ones are selected.

Choice analysis
At this stage report is prepared, this report contains a summary of the study, conclusions and specific proposals.

Implementation phase
The chosen alternatives is put into use with the help of program and action plans developed in advance.

Review phase
The program of value analysis changes is continuously monitored and followed up.

Type of values

Use value
Use value represents the purpose for which the product is designed and manufactured. It may be defined as the properties and qualities which makes it useful and enable it to accomplish work or useful services.

Esteem value
It may be defined as the properties or features of a product which would cause a customer want to own. It represents the attractive feature of the product.

Cost value
It means the total cost required to manufacture a product in case of manufactured items, it refers to the cost of production and if obtained from outside.

Exchange value
It refers to the properties which would enable the owner of such a product to exchange it for something else. The exchange value is equal to sale value.

Time value
The value of a product here is determined predominantly by the time of available of the product or service.

Place value
Value of an item or service depends upon the availability at the place where it is required.