

Developments in the Business Environment

BASIC CONCEPTS AND FORMULAE

1. TOTAL QUALITY MANAGEMENT

TQM is a systematic process for identifying and implementing solution & prioritized opportunities for improvement.

The TQM approach highlights the need for a customer oriented approach to management reporting, eliminating some of our more traditional reporting practices. Performance measurement and quality improvement are not the sole domain of manufacturing industry, but detailed applications of the new management accounting practices to the professional service environment.

1.1 Six C's Of TQM

- i) *Commitment*
- ii) *Culture*
- iii) *Continuous improvement.*
- iv) *Co-operation*
- v) *Customer focus*
- vi) *Control*

2. ACTIVITY BASED COST MANAGEMENT (ABM)

The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Cost Management (ABM). ABM is a discipline that focuses on the efficient and effective management of activities as the route to continuously improving the value received by customers. ABM utilizes cost information gathered through ABC. It determines what drives the activities of the organization and how these activities can be improved to increase the profitability.

2.1 Core Areas In Activity Based Cost Management

- **Cost Object**—It is an item for which cost measurement is required e.g. a product or a customer.
- **Cost Driver**—It is a factor that causes a change in the cost of an activity.

There are two categories of cost driver:

- **Resource Cost Driver**—It is a measure of the quantity of resources consumed by an activity. It is used to assign the cost of a resource to an activity or cost pool.
- **Activity Cost Driver**—It is a measure of the frequency and intensity of demand, placed on activities by cost objects. It is used to assign activity costs to cost objects.

2.2 Stages In Activity Based Costing

These stages are:

- i) Identification of the activities that have taken place in the organisation.
- ii) Assigning costs to cost pool for each activity.
- iii) Spreading of support activities across the primary activities.
- iv) Determining cost driver for each activity.
- v) Assigning the costs of activities to products according to product demand for activities.

2.3 Value-added activities (VA): The value-added activities are those activities which are necessary for the performance of the process. Such activities represents work that is valued by the external or internal customer. The customers are usually willing to pay (in some way) for the service. For example polishing a furniture by a manufacturer dealing in furniture is value added activity.

2.4 Non-value-added activities (NVA) : The NVA activity represents work that is not valued by the external or internal customer. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. Non-value added activities create waste, result in delay of some sort, add costs to the products or services and for which the customer is not willing to pay. Moving materials and machine set up for a production run are examples of NVA activities.

2.5 Business Application of ABM

- (i) *Cost reduction*
- (ii) *Activity Based Budgeting*
- (iii) *Business process re-engineering*
- (iv) *Benchmarking*

(v) *Performance measurement*

3. ACTIVITY BASED BUDGETING (ABB)

Activity-based budgeting is a process of planning and controlling the expected activities for the organisation to derive a cost-effective budget that meets forecast workload and agreed strategic goals. An activity-based budget is a quantitative expression of the expected activities of the firm, reflecting management's forecast of workload and financial and non-financial requirements to meet agreed strategic goals and planned changes to improve performance.

3.1 Key Elements of ABB

- (i) type of work/activity to be performed;
- (ii) quantity of work/activity to be performed; and
- (ii) cost of work/activity to be performed.

4. TARGET COSTING

It can be defined as "a structured approach to determining the cost at which a proposed product with specified functionality and quality must be produced, to generate a desired level of profitability at its anticipated selling price". It is an important part of a comprehensive management process aimed at helping an organization to survive in an increasingly competitive environment. In this sense the term "target costing" is a misnomer:

4.1 Features of Target Costing System

1. Target costing is viewed as an integral part of the design and introduction of new products
2. For any given product, a target selling price is determined using various sales forecasting techniques.
3. Integral to setting the target selling price is the establishment of target production volumes, given the relationship between price and volume.
4. The next stage of the target costing process is to determine cost reduction targets.
5. It should be noted that a fair degree of judgement is needed where the allowable cost and the target cost differ.
6. The total target is broken down into its various components, each component is studied and opportunities for cost reductions are identified. These activities are often referred to as *value engineering*

(VE) and *value analysis* (VA).

4.2 Problems with Target Costing

1. The development process can be lengthened to a considerable extent since the design team may require a number of design iterations before it can devise a sufficiently low-cost product that meets the target cost and margin criteria.
2. A large amount of mandatory cost cutting can result in finger-pointing in various parts of the company, especially if employees in one area feel they are being called on to provide a disproportionately large part of the savings.
3. Representatives from number of departments on the design team can sometimes make it more difficult to reach a consensus on the proper design

4.3 Most Useful Situations for Target Costing

Target costing is most useful in situations where the majority of product costs are locked in during the product design phase. This is the case for most manufactured products, but few services.

4.4 Impact of Target Costing on Profitability

Target costing improves profitability in two ways.

1. It places such a detailed continuing emphasis on product costs throughout the life cycle of every product that it is unlikely that a company will experience runaway costs;
2. It improves profitability through precise targeting of the correct prices at which the company feels it can field a profitable product in the marketplace that will sell in a robust manner.

5. LIFE CYCLE COSTING

CIMA defines life cycle costing as the practice of obtaining over their life time, the best use of physical asset at the lowest cost of entity.

Life cycle costing is different to traditional cost accounting system which report cost object profitability on a calendar basis i.e. monthly, quarterly and annually. In contrast life cycle costing involves tracing cost and revenues on a product by product bases over several calendar periods.

5.1 Phases in the Life Cycle of a Product

The life cycle of a product consists of four phases viz.,
Introduction;

1. Growth
2. Maturity
3. Saturation
4. Decline

5.2 Characteristics of Product Life Cycle

The major characteristics of product life-cycle concept are as follows :

- (i) The products have finite lives and pass through the cycle of development, introduction, growth, maturity, decline and deletion at varying speeds.
- (ii) Product cost, revenue and profit patterns tend to follow predictable courses through the product life cycle.
- (iii) Profit per unit varies as products move through their life cycles.
- (iv) Each phase of the product life-cycle poses different threats and opportunities that give rise to different strategic actions.
- (v) Products require different functional emphasis in each phase-such as an R&D emphasis in the development phase and a cost control emphasis in the decline phase.
- (vi) Finding new uses or new users or getting the present users to increase their consumption may extend the life of the product.

6. VALUE CHAIN ANALYSIS

Value chain analysis requires a strategic framework or focus for organising internal and external information, for analysing information, and for summarising findings and recommendations. Because value chain analysis is still evolving, no uniform practices have yet been established. However, borrowing recent concepts from strategists and organisation experts, three useful strategic frameworks for value chain analysis are

6.1 Steps in the Value Chain Analysis

The way the value chain approach helps these organisations to assess competitive advantage includes the use of following steps of analysis :

- (i) **Internal cost analysis** :organisations use the value chain approach to

identify sources of profitability and to understand the cost of their internal processes or activities. The principal steps of internal cost analysis are:

1. Identify the firm's value-creating processes.
 2. Determine the portion of the total cost of the product or services attributable to each value-creating process.
 3. Identify the cost drivers for each process.
 4. Identify the links between processes.
 5. Evaluate the opportunities for achieving relative cost advantage.
- (ii) **Internal differentiation analysis** — to understand the sources of differentiation (including the cost) within internal value-creating processes; and
- (iii) **Vertical linkage analysis** — to understand the relationships and associated costs among external suppliers and customers in order to maximise the value delivered to customers and to minimise cost.
- (iv) **Core Competencies Analysis** — Core competencies should tie together the portfolio of end products and help a firm excel in dominating its industry. Core competencies need to be continually validated. In the early 1970s, Timex held half of the global market for watches with its core competence in low-cost management of precision manufacturing. By the mid-1970, the watch industry moved to digital technology, making Timex's core competence irrelevant.

7. COST CONTROL AND COST REDUCTION

7.1 Cost Control

Cost Control involves continuous comparisons of actual with the standards or budgets to regulate the former. Standards or budgets once set up are not attended during the period or until some mistakes are discovered in standards.

7.2 Cost reduction

Cost reduction is the achievement of real and permanent reduction in unit cost of products manufactured. It, therefore, continuously attempts to achieve genuine savings in cost of production distributing, selling and administration. It does not accept a standard or budget as or fined. It rather challenges the standards/budgets continuously to make improvement in them. It attempts to excavate, the potential savings buried in the standards by continuous and

planned efforts. Cost control relax that dynamic approach, it usually dealt with variances leaving the standards intact.

8. COMPUTER -AIDED MANUFACTURING

Computer-aided manufacturing process is carried out by a range of machinery together with its concomitant software. Maximum elements of CAM are computer numerical control (CNC) and robotics.

CNC machines are programmable machine tools. These are capable of performing a number of machining tasks, e.g. cutting, grinding, moulding, bending etc. Human operators will tire and are error prone. CNC machines are able to repeat the same operation continuously in identical manner, with high accuracy level.

9. JUST IN TIME

A complete JIT system begins with production, includes deliveries to a company's production facilities, continues through the manufacturing plant, and even includes the types of transactions processed by the accounting system. Most important in JIT system is to ensure receiving of products/spare parts/materials from its suppliers on the exact date and at the exact time when they are needed in order to reduce excessive inventory in stock.

9.1 Steps in JIT

- Evaluation of supplier by purchase staff in regards to quality of supply and reliability.
- Visit of supplier site and inspection of supply quality there to ensure quality and time etc
- A small cluster of machines are operated who can monitor each output part from machine to machine within the cell and can immediately identify defective output
- Empowered workforce are allowed to stop their machines when they see a problem and take all action for immediate resolution of the bulk of performance problems.

9.2 Reduction of following inventory costs though JIT :

- Interest cost related to the debt that funds the inventory investment
- Cost of inventory that becomes obsolete over time
- Cost of rent for inventory storage facilities
- Cost of all equipment used in the warehouse

- Cost of warehouse utilities
- Cost of warehouse employees
- Cost of insurance needed to cover the possible loss of inventory

9.3 Backflushing in a JIT System

Backflushing requires no data entry of any kind until a finished product is completed. At that time the total amount finished is entered into the computer system, which multiplies it by all the components listed in the bill of materials for each item produced. This yields a lengthy list of components that should have been used in the production process and which is subtracted from the beginning inventory balance to arrive at the amount of inventory that should now be left of hand. Back the entire production process. Given the large transaction volumes associated with JIT, this is an ideal solution to the problem.

10. MANUFACTURING RESOURCES PLANNING

It is a part of production operation system. In early 1960's a material acquisition plan was first introduced known as Material Requirement Plan (MRP-I). MRP-2 is latest all-round development of that plan.

10.1 Objective of material requirement planning:

- i) Determine for final products namely, what should be produced and at what time.
- ii) Ascertaining the required units of production of sub-assemblies.
- iii) Determining the requirement for materials based on an up-to-date bill of materials file (BOM).
- iv) Computing inventories, WIP, batch sizes and manufacturing and packaging lead times.
- v) Controlling inventory by ordering bought-in components and raw materials in relation to the orders received or forecast rather than the more usual practice of ordering from stock-level indicators.

11. SYNCHRONOUS MANUFACTURING

It has been defined as: an all-encompassing manufacturing management philosophy that includes a consistent set of principles, procedures, and techniques where every action is evaluated in terms of the common global goal of the organization.

11.1 Principles Associated With Synchronous Manufacturing

1. Do not focus on balance idle capacities; focus on synchronizing the production flow.
2. The marginal value of time at a bottleneck resource is equal to the throughput rate of the products processed by the bottleneck.
3. The marginal value of time at a non-bottleneck resource is negligible.
4. The level of utilization of a non-bottleneck resource is controlled by other constraints within the system.
5. Resources must be utilized, not simply activated.
6. A transfer batch may not, and many times should not, be equal to the process batch.
7. A process batch should be variable both along its route and over time.

12. BUSINESS PROCESS RE-ENGINEERING

Business process re-engineering involves examining business processes and making substantial changes in the day to day operation of the organization. It involves the redesign of work by changing the activities.

12.1 Aim of Business Process Re-Engineering

The aim of business process re-engineering is to improve the key business process in an organization by focusing on

- (a) simplification,
- (b) cost reduction,
- (c) improved quality and
- (d) enhanced customer satisfaction

14. THROUGHPUT ACCOUNTING

Throughput Accounting (TA) is a method of performance measurement which relates production and other costs to throughput. Throughput accounting product costs relate to usage of key resources by various products. It assumes that a manager has a given set of resources available and these have been efficiently used to process purchased materials and components to generate sales revenue. The cost of all other is deemed at least time related rather than fixed.

Throughput is influenced by:

- Selling price

- Direct purchase price
- Usage of direct materials
- Volume of throughput.

14.1 Constraints on Throughput

- the existence of an uncompetitive selling price
- the need to deliver on time to particular customers
- the lack of product quality and reliability
- the lack of reliable materials suppliers
- the existence of shortage of production resources.

15. THEORY OF CONSTRAINTS

The theory of constraint focuses its attention on constraints and bottlenecks within the organization which hinder speedy production. The main concept is to maximize the rate of manufacturing output i.e. the throughput of the organisation. This requires to examine the bottlenecks and constraints.

15.1 Bottlenecks

A bottleneck is an activity within the organisation where the demand for that resource is more than its capacity to supply. A constraint is a situational factor which makes the achievement of objectives/throughput more difficult than it would otherwise be.

15.2 Constraints

Constraints may take several forms such as lack of skilled employees, lack of customers orders or the need to achieve a high level of quality product output. Using above definition, therefore, a bottleneck is always a constraint but a constraints need not be a bottleneck.

15.3 Idea of theory of constraints (TOC)

The theory of constraints (TOC) describes methods to maximize operating income under bottleneck situation. The objective of TOC is to increase throughput contribution while decreasing investments and operating costs. TOC considers a short run time and assumes that operating costs are fixed costs.

The three measurements:

1. Calculate Throughput contribution = sale - direct materials cost of the

goods sold.

2. Investments = Sum of materials costs in direct materials, work – in – process, and finished goods inventories; R & D costs; and costs of equipment and buildings.
3. Operating costs equal all costs of operations (other than direct materials) incurred to earn throughput contribution. Operating costs include salaries and wages, rent utilities, and depreciation.

The important concept behind TOC is that the production rate of the entire factory is set at the pace of the bottleneck resource. Hence, in order to achieve the best result TOC emphasises the importance of removing bottlenecks or limiting factor.

THE IMPACT OF CHANGING ENVIRONMENT ON COST AND MANAGEMENT ACCOUNTING

Question 1

How has the composition of manufacturing costs changed during recent years? How has this change affected the design of cost accounting systems?

Answer

Traditionally, manufacturing companies classified the manufacturing costs to be allocated to the products into (a) direct materials. (b) direct labour and (c) indirect manufacturing costs. In the present day context, characterised by intensive global competition, large scale automation of manufacturing process, computerization and product diversification to cater to the changing consumer tastes and preferences has forced companies to refine their costing systems to provide better measurement of the overhead costs used by different cost objects. Accordingly, manufacturing costs are classified in to three broad categories as under:

1. *Direct cost:* As many total costs relating to cost objects as feasible are classified into direct cost. The objective is to trace as many costs as possible in to direct and to reduce the amount of costs classified into indirect because the greater the proportion of direct costs the greater the accuracy of the cost system.
2. *Indirect cost pools:* Increase the number of indirect cost pools so that each of these pools is more homogeneous. In a homogeneous cost pool, all the costs will have the same cause-and-effect relationship with the cost allocation base.
3. Use cost-and-effect criterion for identifying the cost allocation base for each indirect cost pool.

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The change in the classification of manufacturing costs as above has led to the development of Activity Based Costing (ABC). Activity Based Costing refines a costing system by focusing on individual activities as the fundamental cost objects. An activity is an event, task or unit of work with a specified purpose as for example, designing, set up, etc. ABC system calculates the costs of individual activities and assigns costs to cost objects such as products or services on the basis of the activities consumed to produce the product or provide the service.

TOTAL QUALITY MANAGEMENT

Question 2

Carlton Ltd. makes and sells a single product; the unit specifications are as follows:

<i>Direct Materials X</i>	<i>:</i>	<i>8 sq. metre at ₹ 40 per square metre</i>
<i>Machine Time</i>	<i>:</i>	<i>0.6 Running hours</i>
<i>Machine cost per gross hour</i>	<i>:</i>	<i>₹ 400</i>
<i>Selling price</i>	<i>:</i>	<i>₹ 1,000</i>

Carlton Ltd. requires to fulfil orders for 5,000 product units per period. There are no stock of product units at the beginning or end of the period under review. The stock level of material X remains unchanged throughout the period.

Carlton Ltd. is planning to implement a Quality Management Programme (QPM). The following additional information regarding costs and revenues are given as of now and after implementation of Quality Management Programme.

<i>Before the implementation of QMP</i>	<i>After the implementation</i>
<i>1. 5% of incoming material from suppliers scrapped due to poor receipt and storage organisation.</i>	<i>1. Reduced to 3%.</i>
<i>2. 4% of material X input to the machine process is wasted due to processing problems.</i>	<i>2. Reduced to 2.5%</i>
<i>3. Inspection and storage of Material X costs Re. 1 per square metre purchased.</i>	<i>3. No change in the unit rate</i>
<i>4. Inspection during the production cycle, calibration checks on inspection equipment vendor rating and other checks cost ₹2,50,000 per period</i>	<i>4. Reduction of 40% of the existing cost.</i>
<i>5. Production Qty. is increased to allow for the downgrading of 12.5% of the production units</i>	<i>5. Reduction to 7.5%</i>

at the final inspection stage. Down graded units are sold as seconds at a discount of 30% of the standard selling price.

- | | |
|--|---|
| <p>6. <i>Production Quantity is increased to allow for return from customers (these are replaced free of charge) due to specification failure and account for 5% of units actually delivered to customer.</i></p> <p>7. <i>Product liability and other claims by customers is estimated at 3% of sales revenue from standard product sale.</i></p> <p>8. <i>Machine idle time is 20% of Gross machine hrs used (i.e. running hour = 80% of gross/hrs.).</i></p> <p>9. <i>Sundry costs of Administration, Selling and Distribution total – ₹6,00,000 per period.</i></p> <p>10. <i>Prevention programme costs ₹2,00,000</i></p> | <p>6. <i>Reduction to 2.5%</i></p> <p>7. <i>Reduction to 1%.</i></p> <p>8. <i>Reduction to 12.5%.</i></p> <p>9. <i>Reduction by 10% of the existing.</i></p> <p>10. <i>Increase to ₹6,00,000.</i></p> |
|--|---|

The Total Quality Management Programme will have a reduction in Machine Run Time required per product unit to 0.5 hr.

Required:

- (a) Prepare summaries showing the calculation of (i) Total production units (pre inspection), (ii) Purchase of Materials X (square metres), (iii) Gross Machine Hours.*
- (b) In each case, the figures are required for the situation both before and after the implementation of the Quality Management Programme so that orders for 5,000 product units can be fulfilled.*

Prepare Profit and Loss Account for Carlon Ltd. for the period showing the profit earned both before and after the implementation of the Total Quality Programme.

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Answer

(a)

		Existing		After TQM Programme
i.	Total production units (Preinspection)			
	Total sales requirements	5,000		5,000
	Specification losses 5%	250	2.5%	125
		5,250		5,125
	Downgrading at inspection	750		416
	$\frac{12.5}{87.5} \times 5,250$		$\frac{7.5}{92.5} \times 5,125$	
	Total units before inspection	6,000		5,541
ii	Purchase of material 'X' (Sq Mtr)			
	Material required to meet pre inspection production requirement 6,000 × 8 SqMtr	48,000 SqMtr	5,541 × 8 SqMtr	44,328 SqMtr
	Processing loss $\frac{4}{96} \times 48,000$	2,000		1,137
			$\frac{2.5}{97.5} \times 44,328$	
	Input to the process	50,000		45,465
	Scrapped material $\frac{5}{95} \times 50,000$	2,632		1,406
			$\frac{3}{97} \times 45,465$	
	Total purchases	52,632		46,871
iii	Gross Machine Hours			
	Initial requirements 6,000 × 0.6	3,600	5,541 × 0.5	2,771
	Idle time $\frac{20}{80} \times 3,600$	900	$\frac{12.5}{87.5} \times 2,771$	396
	Gross time	4,500		3,167

(b) Profit and loss statement

	₹		₹
Sales revenue 5,000 Units ´ ₹ 1,000	50,00,000		50,00,000
Sales downgraded 750 Units ´ ₹ 700	5,25,000	416 Units ´ ₹ 700	2,91,200
	55,25,000		52,91,200
Costs:			
Material 52,632 Sq Mtr ´ ₹ 40	21,05,280	46,871 Sq Mtr ´ ₹ 40	18,74,840
Inspection and storage costs 52,632 Sq Mtr ´ Re 1	52,632	46,871 Sq Mtr ´ ₹ 1	46,871
Machine cost 4,500 Hrs ´ ₹ 400	18,00,000	3,167 Hrs ´ ₹ 400	12,66,800
Inspection and other cost	2,50,000	2,50,000 ´ 60%	1,50,000
Product liability (3% ´ 50,00,000	1,50,000	1% ´ 50,00,000	50,000
Sundry cost of selling, distribution and administration.	6,00,000	6,00,000 ´ 90%	5,40,000
Preventive programme cost	2,00,000		6,00,000
	51,57,912		45,28,511
Net profit	3,67,088		7,62,689

Question 3

What are the essential requirements for successful implementation of TQM?

Answer

Commitment: Quality improvement must be everyone's job. Clear commitment from the top management, steps necessary to provide an environment for changing attitudes and breaking down barriers to quality improvement must be provided. Support and training for this must be extended.

Culture: Proper training must be given to effect changes in culture and attitude.

Continuous Improvement: Recognition of room for improvement continually as a process, and not merely a one-off programme.

Cooperation: Must be ensured by involving employees by resorting to mutually agreeable improvement strategies and associated performance measures.

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Customer Focus: Perfect service with zero defectives with satisfaction to end user whether external customer or internal customer.

Control: Documentation, procedures and awareness of current practices ensure checking deviation from the intended course of implementation.

Question 4

Discuss the benefits accruing from the implementation of a Total Quality Management programme in an organization.

Answer

The benefits accruing from the implementation of a Total Quality Management programme in an organisation are:

- (i) There will be increased awareness of quality culture in the organization.
- (ii) It will lead to commitment to continuous improvement.
- (iii) It will focus on customer satisfaction.
- (iv) A greater emphasis on team work will be achieved.

Question 5

TQ Ltd. implemented a quality improvement programme and had the following results:

	2007	2008
	(Figures in ₹000)	
Sales	6,000	6,000
Scrap	600	300
Rework	500	400
Production inspection	200	240
Product warranty	300	150
Quality training	75	150
Materials inspection	80	60

You are required to:

- (i) *Classify the quality costs as prevention, appraisal, internal failure and external failure and express each class as a percentage of sales.*
- (ii) *Compute the amount of increase in profits due to quality improvement.*

Answer

(i) Classification of Quality Costs

	2007	% of sales	2008	% of sales
	Figures ₹'000			
Sales	<u>6,000</u>		<u>6,000</u>	
Prevention				
Quality training	<u>75</u>	1.25	<u>150</u>	2.5
Appraisal				
Product Inspection	<u>200</u>		<u>240</u>	
Materials Inspection	<u>80</u>		<u>60</u>	
	<u>280</u>	4.67	<u>300</u>	5
Internal Failure				
Scrap	<u>600</u>		<u>300</u>	
Rework	<u>500</u>		<u>400</u>	
	<u>1100</u>	18.33	<u>700</u>	11.67
External Failure				
Product warranty	<u>300</u>	5	<u>150</u>	<u>2.5</u>
	<u>1755</u>	29.25	<u>1300</u>	<u>21.67</u>

- (ii)** Cost reduction was effected by 7.58% (29.25 – 21.67) of sales, which is an increase in profit by ₹ 4,55,000.

Question 6

What are the critical success factors for the implementation of a "Total Quality Management" programme?

Answer

Critical success factors of TQM:

- Focus on customer needs.
- Everyone in the organisation should be involved.
- Focus on continuous improvement.
- Design quality in product and production process.

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- Effective performance measurement system.
- Rewards and performance measurements should be renewed.
- Appropriate training and education to everyone to understand the aim of TQM.

Question 7

Explain four P's of quality improvement principles.

Answer

The Four P's quality improvement principles are as below:

1. *People*: It will quickly become apparent that some individuals are not ideally suited to the participatory process. Lack of enthusiasm will be apparent from a generally negative approach and a tendency to have prearranged meeting which coincide with the meetings of TOM teams.
2. *Process*: The rhetoric and inflexibility of a strict Deming approach will often have a demotivating effect on group activity.
3. *Problem*: Experience suggests that the least successful groups are those approaching problems that are deemed to be too large provide meaningful solutions within a finite time period.
4. *Preparation*: A training in the workings of Deming- like processes is an inadequate preparation for the efficient implementation of a quality improvement process.

ACTIVITY BASED COST MANAGEMENT

Question 8

ABC electronics makes audio player model 'AB 100'. It has 80 components. ABC sells 10,000 units each month at ₹ 3,000 per unit. The cost of manufacturing is ₹ 2,000 per unit or ₹ 200 lakhs per month for the production of 10,000 units. Monthly manufacturing costs incurred are as follows:

	(₹ Lakhs)
Direct material costs	100.00
Direct manufacturing labour costs	20.00
Machining costs	20.00
Testing costs	25.00
Rework costs	15.00
Ordering costs	0.20
Engineering costs	<u>19.80</u>
	<u>200.00</u>

Labour is paid on piece rate basis. Therefore, ABC considers direct manufacturing labour cost as variable cost.

The following additional information is available for 'AB 100'

- (i) Testing and inspection time per unit is 2 hours.
- (ii) 10 per cent of 'AB 100' manufactured are reworked.
- (iii) It currently takes 1 hour to manufacture each unit of 'AB 100'
- (iv) ABC places two orders per month for each component. A different supplier supplies each component.

ABC has identified activity cost pools and cost drivers for each activity. The cost per unit of the cost driver for each activity cost pool is follows:

Manufacturing Activity	Description of activity	Cost driver	Cost per unit of cost driver
1. Machine costs	Machining components	Machine hours of capacity	₹ 200
2. Testing costs	Testing components and finished products. (Each unit of 'AB 100' is tested individually)	Testing hours	₹ 125
3. Rework costs	Correcting and fixing errors and defects	Units of 'AB 100' reworked	₹ 1,500 per unit
4. Ordering costs	Ordering of components	Number of orders	₹ 125 per order
5. Engineering costs	Designing and managing of products and processes	Engineering hours	₹ 1,980 per engineering hour

Over a long-run horizon, each of the overhead costs described above vary with chosen cost drivers. In response to competitive pressure ABC must reduce the price of its product to ₹ 600 and to reduce the cost by at least ₹ 400 per unit. ABC does not anticipate increase in sales due to price reduction. However, if it does not reduce price it will not be able to maintain the current sales level.

Cost reduction on the existing model is almost impossible. Therefore, ABC has decided to replace 'AB 100' by a new model 'AB 200', which is a modified versions of 'AB 100'. The expected effect of design modifications are as follows:

- (i) The member of components will be reduced to 50.

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- (ii) Direct material costs to be lower by ₹ 200 per unit.
- (iii) Direct manufacturing labour costs to be lower by ₹ 20 per unit.
- (iv) Machining time required to be lower by 20 per unit.
- (v) Testing time required to be lower by 20 per cent.
- (vi) Rework to decline to 5 per cent.
- (vii) Machining capacity and engineering hours capacity to remain the same.

ABC currently out sources the rework on defective units.

Required:

- (i) Compare the manufacturing cost per unit of 'AB 100' and 'AB 200'.
- (ii) Determine the immediate effect of design change and pricing decision on the operating to apply to 'AB 200'.

Ignore income tax, Assume that the cost per unit of each cost driver for 'AB 100' continues to apply to 'AB 200'.

Answer

- (i) **Comparison of manufacturing cost per unit.**

	Audio Player Model	
	'AB 100'	'AB 200'
	₹.	₹.
Direct material cost	1,000.00	800.00
Direct manufacturing labour cost	200.00	180.00
Machining costs	200.00	160.00
Testing costs	250.00	200.00
Rework costs	150.00	75.00
Ordering costs	2.00	1.25
Engineering costs	<u>198.00</u>	<u>198.00</u>
Total manufacturing cost per unit	<u>2,000.00</u>	<u>1,614.25</u>

Working notes for audio player model 'AB 200'

- (i) Machining hours and cost: Machining hours = (1 hour–0.20 hours) or 0.80 hours
Machining cost is 0.80 hours × ₹ 200 or ₹ 160
- (ii) Testing hours and cost: Testing hours = 2 hours × (1 hour – 0.20) or 1.60 hours.

Testing cost is 1.60 hours × ₹ 125 or ₹ 200

(iii) Rework cost per unit:

Rework units = 5% × 10,000 units or 500 units. Rework cost = 500 units × ₹ 1,500 or ₹ 7,50,000. Rework cost per unit ₹ 7,50,000 / 10,000 units or ₹ 75 per unit.

(iv) Ordering cost:

No. of orders per month 50 components × 2 orders = 100

Ordering cost per month 100 orders × ₹ 125 per order = ₹ 12,500

Ordering cost per unit = ₹ 12,500 / 10,000 units = ₹ 1.25 per unit.

(v) It is assumed that total available engineering hours will be used for manufacturing 'AB 200' model of audio player.

(ii) **Effect of design change and pricing decision on operating income of ABC.**

(₹ Lakhs)

Revenue loss on 10,000 units		(40)
(₹ 10,000 units × ₹ .400)		
Saving in cost:		
Direct material costs	20.00	
(₹ 200 × 10,000 units)		
Direct manufacturing labour costs	2.00	
(₹ 20 × 10,000 units)		
Rework costs	<u>7.50</u>	<u>29.50</u>
(5% × 10,000 units × ₹ 1,500)		
Net effect on operating income		<u>(10.50)</u>

Conclusion:

Operating income per month will be reduced by ₹10.50 Lakhs.

Effects of reduction in components, machining time, and testing time will not have any immediate effect, because it is difficult to adjust the available facilities in ordering department, machining department and testing department.

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Question 9

XYZ Ltd. manufactures four products, namely A, B, C and D using the same plant and process. The following information relates to a production period:

Product	A	B	C	D
Output in units	720	600	480	504
Cost per unit:	₹	₹	₹	₹
Direct Material	42	45	40	48
Direct labour	10	9	7	8
Machine hours per unit	4 hrs.	3 hrs.	2 hrs.	1 hr.

The four products are similar and are usually produced in production runs of 24 units and sold in batches of 12 units. Using machine hour rate currently absorbs the production overheads. The total overheads incurred by the company for the period is as follows:

	₹.
Machine operation and Maintenance cost	63,000
Setup costs	20,000
Store receiving	15,000
Inspection	10,000
Material handling and dispatch	2,592

During the period the following cost drivers are to be used for the overhead cost:

Cost	Cost driver
Setup cost	No. of production runs
Store receiving	Requisition raised
Inspection	No. of production runs
Material handling and dispatch	Orders executed

It is also determined that:

- Machine operation and maintenance cost should be apportioned between setup cost, store receiving and inspection activity in 4:3:2.
- Number of requisition raised on store is 50 for each product and the no. of order executed is 192, each order being for a batch of 12 of a product.

Required:

- (a) Calculate the total cost of each product, if all overhead costs are absorbed on machine hour rate basis.
- (b) Calculate the total cost of each product using activity base costing.
- (c) Comment briefly on differences disclosed between overhead traced by present system and those traced by activity based costing.

Answer

(a) Total cost of different products (overhead absorption on Machine hour basis)

	A	B	C	D
	₹ .	₹ .	₹ .	₹ .
Direct material	42	45	40	48
Direct labour	10	09	07	08
Overhead	72	54	36	18
Cost of production per unit	124	108	83	74
Out put in unit	720	600	480	504
Total cost	89,280	64,800	39,840	37,296

Machine hours $(720 \div 4 + 600 \div 3 + 480 \div 2 + 504 \div 1) = 6,144$ hours.

Rate per hour = $\frac{\text{₹ } 1,10,592}{6,144 \text{ hours}} = \text{₹ } 18$ per hour.

(b) Activity based costing system

		Set up	Store receiving	Inspection
Machine operation and maintenance cost of ₹ 63,000 to be distributed in the ratio of 4: 3: 2.		28,000	21,000	14,000
Cost	₹ Drivers	No	Cost per unit of driver (₹)	
Set up	48,000 Production runs	96	500	
Store receiving	36,000 Requisitions raised	200	180	
Inspection	24,000 Production runs	96	250	
Material handling and disp	2,592 Orders	192	13.50	

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Production Run for A (720/24) = 30 ; B (600/24) = 25 ; C (480/24) = 20 ; D (504/24) = 21.

	A (₹)	B (₹)	C (₹)	D (₹)
Direct material	30,240	27,000	19,200	24,192
Direct labour	7,200	5,400	3,360	4,032
Setup	15,000	12,500	10,000	10,500
Store receiving	9,000	9,000	9,000	9,000
Inspection	7,500	6,250	5,000	5,250
Material handling and dispatch	810	675	540	567
Total cost	69,750	60,825	47,100	53,541
Per unit cost	96.875	101.375	98.125	106.23

(c)

	A	B	C	D
Cost per unit (a)	124	108	83	74
Cost per unit (b)	96.88	101.38	98.13	106.23
Difference	(27.12)	(6.62)	15.13	32.23

The total overheads which are spread over the four products have been apportioned on different bases, causing the product cost to differ substantially: in respect of product A and D a change from traditional machine hour rate to an activity system may have effect on price and profits to the extent that pricing is based on cost plus approach.

Question 10

During the last 20 years, KL Ltd's manufacturing operation has become increasingly automated with Computer-controlled robots replacing operators. KL currently manufactures over 100 products of varying levels of design complexity. A single plant wise overhead absorption rate, based on direct labour hours, is used to absorb overhead costs.

In the quarter ended March, KL's manufacturing overhead costs were:

	(₹000)
Equipment operation expenses	125
Equipment maintenance expense	25
Wages paid to technicians	85

Wages paid to Store men	35
Wages paid to despatch staff	40
	310

During the quarter, the company reviewed the Cost Accounting System and concluded that absorbing overhead costs to individual products on a labour hour absorption basis is meaningless. Overhead costs should be attributed to products using an Activity Based Costing (ABC) system and the following was identified as the most significant activities:

- (i) Receiving component consignments from suppliers
- (ii) Setting up equipment for production runs
- (iii) Quality inspections
- (iv) Despatching goods as per customer's orders.

It was further observed that in the short-term KL's overheads are 40% fixed and 60% variable. Approximately, half the variable overheads vary in relating to direct labour hours worked and half vary in relation to the number of quality inspections.

Equipment operation and maintenance expenses are apportioned as:

- Component stores 15% , manufacturing 70% and goods dispatch 15%

Technician's wages are apportioned as:

- Equipment maintenance 30% , set up equipment for production runs 40% and quality inspections 30%

During the quarter:

- (i) a total of 2000 direct labour hours were worked (paid at ₹12 per hr.)
- (ii) 980 components consignments were received from suppliers
- (iii) 1020 production runs were set up
- (iv) 640 quality inspections were carried out
- (v) 420 orders were dispatched to customers.

KL's production during the quarter included components R, S and T. The following information is available:

	Component R	Component S	Component T
Direct labour Hrs worked	25	480	50

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Direct Material	₹1,200	₹2,900	₹1,800
Component Consignments Recd.	42	24	28
Production runs	16	18	12
Quality Inspections	10	8	18
Orders (goods) despatched	22	85	46
Quantity produced	560	12,800	2,400

Required:

- (1) Calculate the unit cost of R, S and T components, using KL's existing cost accounting system.
- (2) Explain how an ABC system would be developed using the information given. Calculate the unit cost of components R, S and T using ABC system.

Answer

- (1) Single factory direct labour hour overhead rate = $\frac{₹ 3,10,000}{2,000} = ₹ 155$ per direct labour hour

Computation of unit cost (existing system)

	R (₹)	S(₹)	T(₹)
Direct labour cost @ ₹ 12 per hour	300	5,760	600
Direct material	1,200	2,900	1,800
Overheads(direct labour hours × ₹ 155 per hour	3,875	74,400	7,750
	5,375	83,060	10,150
Quantity Produced (No)	560	12,800	2,400
Cost per unit	9.60	6.49	4.23

- (2) ABC system involves the following stages,
 1. Identifying the major activities that take place in an organisation.
 2. Creating a cost pool /cost centre for each activity
 3. Determining the cost driver for each activity
 4. Assigning the cost of activities to cost objects (e.g. products, components, customers etc)

The most significant activities have been identified e.g. receiving components consignments from suppliers, setting up equipment for production runs, quality inspections, and despatching orders to customers. The following shows the assignment of the costs to these activities,

(₹ ,000)

	<i>Receiving supplies</i>	<i>Set ups</i>	<i>Quality inspection</i>	<i>Despatch</i>	<i>Total</i>
Equipment operation expenses	18.75	87.50		18.75	125.00
Maintenance	3.75	17.50		3.75	25.00
Technicians wages initially allocated to Maintenance(30% of ₹ 85,000= ₹ 25,500 and then reallocated on same basis on maintenance)	3.83	17.85		3.82	25.50
Balance of technicians wages allocated to set ups and quality inspections		34.00	25.50		59.50
Stores wages - Receiving	35.00				35.00
Despatch wages - Despatch				40.00	40.00
	61.33	156.85	25.50	66.32	310.00

Note: Equipment operation expenses and Maintenance allocated on the basis 15%,70% and 15% as specified in the question.

The next stage is to identify the cost drivers for each activity and establish cost driver rates by dividing the activity costs by a measure of cost driver usage for the period. The calculations are as follows:-

Receiving supplies ($\frac{₹ 61,330}{980}$) = ₹ 62.58 per component.

Performing set ups ($\frac{1,56,850}{1,020}$) = ₹ 153.77 per set up

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Despatching goods ($\frac{66,320}{420}$) = ₹ 157.93 per despatch

Quality inspection ($\frac{25,500}{640}$) = ₹ 39.84 per quality inspection

Finally, costs are assigned to components based on their cost driver usage. The assignments are as follows,

	R (₹)	S (₹)	T (₹)
Direct labour	300	5,760	600
Direct materials	1,200	2,900	1,800
Receiving supplies	2,628.36	1,501.92	1,752.24
Performing set ups	2,460.32	2,767.86	1,845.24
Quality inspections	398.40	318.72	717.12
Despatching goods	3,474.46	13,424.05	7,264.78
Total costs	10,461.54	26,672.55	13,979.38
No of units produced	560	12,800	2,400
Cost per unit	18.682	2.08	5.82

For components, the overhead costs have been assigned as follows,

(Component R)

Receiving supplies (42 receipts at ₹ 62.58)

Performing set ups (16 production runs at ₹ 153.77)

Quality inspections (10 at ₹ 39.84)

Despatching goods (22 at ₹ 157.93).

Question 11

Give two examples for each of the following categories in activity based costing:

- (i) Unit level activities
- (ii) Batch level activities
- (iii) Product level activities
- (iv) Facility level activities.

Answer

Examples:

- | | |
|-----------------------------|---|
| (i) Unit level activities | (i) Use of indirect materials
(ii) Inspection or testing of every item produced or say every 100 th item produced
(iii) Indirect consumables |
| (ii) Batch level activities | (i) Material ordering
(ii) Machine set up costs
(iii) Inspection of products—like first item of every batch |
| (iii) Product level | (i) Designing the product
(ii) Producing parts to a certain specification
(iii) Advertising costs, if advertisement is for individual products |
| (iv) Facility level | (i) Maintenance of buildings
(ii) Plant security
(iii) Production manager's salaries
(iv) Advertising campaigns promoting the company |

Question 12

"Cost can be managed only at the point of commitment and not at the point of incidence. Therefore, it is necessary to manage cost drivers to manage cost." Explain the statement with reference to structural and executional cost drivers.

Answer

A firm commits costs at the time of designing the product and deciding the method of production. It also commits cost at the time of deciding the delivery channel (e.g. delivery through dealers or own retail stores). Costs are incurred at the time of actual production and delivery. Therefore, no significant cost reduction can be achieved at the time when the costs are incurred. Therefore, it is said that costs can be managed at the point of commitment. Cost drivers are factors that drive consumption of resources. Therefore, management of cost drivers is essential to manage costs. Structural cost drivers are those which can be managed by effecting structural changes. Examples of structural cost drivers are scale of operation, scope of operation (i.e. degree of vertical integration), complexity, technology and experience

or learning. Thus, structural cost drivers arise from the business model adopted by the company. Executional cost drivers can be managed by executive decisions, examples of executional cost drivers are capacity utilization, plant layout efficiency, product configuration and linkages with suppliers and customers. It is obvious that cost drivers can be managed only at the point of structural and operating decisions, which commit resources to various activities.

Question 13

What is the fundamental difference between Activity Based Costing System (ABC) and Traditional Costing System? Why more and more organisations in both the manufacturing and non-manufacturing industries are adopting ABC?

Answer

In the traditional system of assigning manufacturing overheads, overheads are first allocated and apportioned to cost centres (production and support service cost centres) and then absorbed to cost objects (e.g. products). Under ABC, overheads are first assigned to activities or activity pools (group of activities) and then they are assigned to cost objects. Thus, ABC is a refinement over the traditional costing system. Usually cost centres include a series of different activities. If different products create different demands on those activities, the traditional costing system fails to determine the product cost accurately. In that situation, it becomes necessary to use different rates for different activities or activity pools.

The following are the reasons for adoption of ABC by manufacturing and non-manufacturing industries:

- (i) Fierce competitive pressure has resulted in shrinking profit margin. ABC helps to estimate cost of individual product or service more accurately. This helps to formulate appropriate marketing / corporate strategy.
- (ii) There is product and customer proliferation. Demand on resources by products / customers differ among product / customers. Therefore, product / customer profitability can be measured reasonably accurately, only if consumption of resources can be traced to each individual product / customer.
- (iii) New production techniques have resulted in the increase of the proportion of support service costs in the total cost of delivering value to customers. ABC improves the accuracy of accounting for support service costs.
- (iv) The costs associated with bad decisions have increased substantially.
- (v) Reduction in the cost of data processing has reduced the cost of tracking resources consumption to large number of activities.

Question 14

Biscuit Ltd. Manufactures 3 types of biscuits, A, B and C, in a fully mechanised factory. The company has been following conventional method of costing and wishes to shift to Activity Based Costing System and therefore wishes to have the following data presented under both the systems for the month.

Inspection cost	₹ p.m.	73,000
Machine – Repairs & Maintenance	₹ p.m.	1,42,000
Dye cost	₹ p.m.	10,250
Selling overheads	₹ p.m.	1,62,000

	Product A	B	C
Prime cost (₹ per unit)	12	9	8
Selling price (₹ per unit)	18	14	12
Gross production (units/production run)	2,520	2,810	3,010
No. of defective units / production run	20	10	10
Inspection:			C
No. of hours / production run	3	4	4
Dye cost / production run (₹.)	200	300	250
No. of machine hours / production run	20	12	30
Sales – No. of units / month	25,000	56,000	27,000

The following additional information is given:

- (i) No accumulation of inventory is considered. All good units produced are sold.
- (ii) All manufacturing and selling overheads are conventionally allocated on the basis of units sold.
- (iii) Product A needs no advertisement. Due to its nutritive value, it is readily consumed by diabetic patients of a hospital. Advertisement costs included in the total selling overhead is ₹83,000.
- (iv) Product B needs to be specially packed before being sold, so that it meets competition. ₹54,000 was the amount spent for the month in specially packing B, and this has been included in the total selling overhead cost given.

You are required to present productwise profitability of statements under the conventional system and the ABC system and accordingly rank the products.

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Answer

		A	B	C	Total
(i)	Sales Units	25,000	56,000	27,000	1,08,000
	Selling price/unit	18	14	12	
(ii)	Sales Value (₹ .)	4,50,000	7,84,000	3,24,000	15,58,000
(iii)	Prime Cost Overhead	12	9	8	
(iv)	No. of units/run	2,520	2,810	3,010	
(v)	Prime Cost ₹ .	3,02,400	5,05,800	2,16,720	
(vi)	Gross Margin (ii - v)	1,47,600	2,78,200	1,07,280	5,33,080

	Total	A	B	C
Inspection Cost	73,000	15,000	40,000	18,000
$\frac{73,000}{146} \times 30/80/36$ respectively				
Machine Maintenance	1,42,000	40,000	48,000	54,000
$\frac{1,42,000}{710} \times 200/240/270$ respectively				
Dye Cost	<u>10,250</u>	<u>2,000</u>	<u>6,000</u>	<u>2,250</u>
Sub Total	<u>2,25,250</u>	<u>57,000</u>	<u>94,000</u>	<u>74,250</u>
Selling Overhead Advertisement	83,000	-	56,000	27,000
$\frac{83,000}{56,000 + 27,000} \times 56/27$ respectively				
Other Overheads	25,000	5,787	12,963	6,250
$\frac{25,000}{108} \times 25/56/27$ respectively				
Packing			<u>54,000</u>	
Sub Total Selling Overhead	<u>1,62,000</u>	<u>5,787</u>	<u>1,22,963</u>	<u>33,250</u>

Workings:

	A	B	C	Total
Gross Production/unit /run (1)	2,520	2,810	3,010	

Defectives/run (2)	20	10	10	
Good units / run (3)	2,500	2,800	3,000	
Sales (Goods units)(4)	25,000	56,000	27,000	
No. of runs (5)	10	20	9	
Gross Production (6) = (1) × (5)	25,200	56,200	27,090	
Prime Cost / unit (7)	12	9	8	
Prime Cost (8) (₹)	3,02,400	5,05,800	2,16,720	10,24,920
Inspection hours/run (9)	3	4	4	
Inspection hours (10) = (9) × (5)	30	80	36	146
M/c hours / run (11)	20	12	30	
M/c hours (12) = (1) × (5)	200	240	270	710
Dye Cost/run (13)	200	300	250	
Dye cost (14) (13) × (5)	2,000	6,000	2,250	10,250

Conventional Accounting System

	Total	A	B	C
Sales – units / Production (good units)	1,08,000	25,000	56,000	27,000
Gross Margin (₹)	5,33,080	1,47,600	2,78,200	1,07,280
Production overheads (₹)	2,25,250	52,141	1,16,797	56,313
Selling Overhead (₹)	1,62,000	37,500	84,000	40,500
Sub-Total Overhead (₹)	3,87,250	89,641	2,00,797	96,813
Net profit (₹)	1,45,830	57,959	77,403	10,467
Ranking		II	I	III

Activity Based System

	A	B	C
Sales – units / Production (good units)	25,000	56,000	27,000
Gross Margin (₹)	1,47,600	2,78,200	1,07,280
Production overheads (₹)	57,000	94,000	74,250
Selling Overhead (₹)	5,787	1,22,963	33,250

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Sub-Total Overhead (₹)	62,787	2,16,963	1,07,500
Net profit (₹)	84,813	61,237	(220)
Ranking	I	II	III

Question 15

A company manufactures three types of products namely P, Q and R. The data relating to a period are as under:

	P	Q	R
Machine hours per unit	10	18	14
Direct labour hours per unit @ ₹20	4	12	8
Direct Material per unit (₹.)	90	80	120
Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overheads is ₹6 per hour.

The company proposes to use activity based costing system and the activity analysis is as under:

	P	Q	R
Batch size (units)	150	500	1,000
Number of purchase orders per batch	3	10	8
Number of inspections per batch	5	4	3

The total production overheads are analysed as under:

Machine set up costs	20%
Machine operation costs	30%
Inspection costs	40%
Material procurement related costs	10%

Required:

- Calculate the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.
- Calculate the cost per unit of each product using activity based costing principles.

Answer

- (i) Cost per unit using traditional method of absorbing all production overheads on the basis of machine hours:

<i>Products</i>	<i>P</i>	<i>Q</i>	<i>R</i>
	₹.	₹.	₹.
Direct materials	90	80	120
Direct labour (4:12:8 hours) ₹20	80	240	160
Production Overheads (10:18:14 hours) ₹6	<u>60</u>	<u>108</u>	<u>84</u>
Cost per unit	<u>230</u>	<u>428</u>	<u>364</u>

- (ii) 1. Cost per unit of each product using activity based costing:

<i>Products</i>	<i>P</i>	<i>Q</i>	<i>R</i>	<i>Total</i>
A. Production (units)	3,000	5,000	20,000	
B. Batch size (units)	150	500	1000	
C. Number of batches [A ÷ B]	20	10	20	50
D. Number of purchase order per batch	3	10	8	
E. Total purchase orders [C × D]	60	100	160	320
F. Number of inspections per batch	5	4	3	
G. Total inspections [C × F]	100	40	60	200

2. Total Production overhead

A. Machine hours per unit	10	18	14
B. Production units	3,000	5,000	20,000
C. Total machine hours [A × B]	30,000	90,000	2,80,000

Total machine hours = 4,00,000

Total production overheads = 4,00,000 × ₹6 = ₹24,00,000.

3. Cost driver rates:

<i>Cost Pool</i>	<i>%</i>	<i>Overheads</i>	<i>Cost Driver</i>	<i>Cost Driver Rate</i>
		₹.	Units	₹
Set up	20%	4,80,000	50	9,600 per set up

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Inspection	40%	9,60,000	200	4,800 per inspection
Purchases	10%	2,40,000	320	750 per purchase
Machine hours	30%	7,20,000	4,00,000	1.80 per Machine Hour

4. Cost per unit of P, Q and R:

Products	P	Q	R
Production (units)	3,000	5,000	20,000
	₹.	₹.	₹.
Direct Materials (90:80:120)	2,70,000	4,00,000	24,00,000
Direct Labour (80:240:160)	2,40,000	12,00,000	32,00,000
Overheads:			
Machine related costs @ ₹1.80/hour (30,000:90,000:2,80,000)	54,000	1,62,000	5,04,000
Set-up costs @ ₹9600 / set up (20 : 10 : 20)	1,92,000	96,000	1,92,000
Inspection costs @ ₹4800 / inspection (100 : 40 : 60)	4,80,000	1,92,000	2,88,000
Purchase related costs @ ₹750 / purchase (60 : 100 : 160)	45,000	75,000	1,20,000
Total costs	12,81,000	21,25,000	67,04,000
Cost per unit (Total cost , units)	427.00	425.00	335.20

Question 16

A bank offers three products, viz., Deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget:

Activity	Present Cost (₹.)	Estimation for the budget period
(i) ATM Services:		
(a) Machine maintenance	4,00,000	(all fixed, no change)
(b) Rents	2,00,000	(fully fixed; no change)
(c) Currency Replenishment	1,00,000	(expected to double during budget)

Cost	period)
	7,00,000 (This activity is driven by no. of ATM transactions)
(ii) Computer Processing	5,00,000 (Half this amount is fixed and no change is expected) (The variable portion is expected to increase to three times the current level). This activity is driven by the number of computer transactions.
(iii) Issuing Statements	18,00,000 Presently, 3 lac statements are made. In the budget period, 5 lac statements are expected; For every increase of one lac statement, one lac rupees is the budgeted increase (this activity is driven by the number of statements)
(iv) Computer Inquiries	2,00,000 Estimated to increase by 80% during the budget period. (This activity is driven by telephone minutes).

The activity drivers and their budgeted quantifies are given below:

	Deposits	Loans	Credit Cards
No. of ATM Transactions	1,50,000	-	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts, and 14,000 Credit Card Accounts.

You are required to:

- Calculate the budgeted rate for each activity.
- Prepare the budgeted cost statement activity wise.
- Find the budgeted product cost per account for each product using (i) and (ii) above.

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Answer

Budget Cost Statement

Activity	Activity Cost (₹) (Budgeted)	Activity Driver	No. of Units of Activity Driver (Budget)	Activity Rate (₹)	Deposits	Loans	Credit Cards
1. ATM Services	8,00,000	ATM Transaction	2,00,000	4	6,00,000	-	2,00,000
2. Computer Processing	10,00,000	Computer Transaction	20,00,000	0.50	7,50,000	1,00,000	1,50,000
3. Issuing Statements	20,00,000	No. of Statements	5,00,000	4.00	14,00,000	2,00,000	4,00,000
4. Customer Inquiries	3,60,000	Telephone Minutes	7,20,000	0.50	1,80,000	90,000	90,000
Budgeted Cost	41,60,000				29,30,000	3,90,000	8,40,000
Units of product as estimated in the budget period					58,600	13,000	14,000
Budgeted Cost per unit of the product					50	30	60

Working Notes:

- (i) ATM $4,00,000 + 2,00,000 + 2 \times 1,00,000 = 8,00,000$
- (ii) Computer $5,00,000$ (Fixed = 2,50,000) Variable = 10,00,000
 $2,50,000$ increase to 3 times = 7,50,000
- (iii) Issuing Statements $2,00,000 + 80\% \times 2,00,000 = 2 + 1.6 = 3,60,000.$

Question 17

The following are Product Nova Shaft's data for next year budget:

Activity	Cost Driver	Cost Driver volume/year	Cost Pool
Purchasing	Purchase orders	1,500	₹ 75,000
Setting	Batches produced	2,800	₹ 1,12,000
Materials handling	Materials movements	8,000	₹ 96,000
Inspection	Batches produced	2,800	₹ 70,000
Machining costs	Machine hours	50,000	₹ 1,50,000

Purchase orders	25
Output	15,000 units
Production batch size	100 units
Materials movements per batch	6
Machine hours per unit	0.1

Required:

- (i) Calculate the budgeted overhead costs using activity based costing principles.
- (ii) Calculate the budgeted overhead costs using absorption costing (absorb overhead using machine hours).
- (iii) How can the company reduce the ABC for Product Nova Shaft?

Answer

(i) Computation of the activity based overheads

Step 1: Compute cost per unit of cost driver = Cost pool / cost driver volume

Activity	Cost Driver	Cost Pool (a)	Cost driver volume/yr (b)	Cost/Unit of cost driver (a)/(b)
Purchasing	Purchase orders	₹ 75,000	1,500	₹ 50/purchase order
Setting	Batches produced	₹ 112,000	2,800	₹ 40/batch
Materials handling	Material movements	₹ 96,000	8,000	₹ 12/movement
Inspection	Batches produced	₹ 70,000	2,800	₹ 25/batch
Machining	Machine hours	₹ 150,000	50,000	₹ 3/machine hour

Step 2: Compute the volume of cost drivers consumed by Product Nova Shaft

Purchase orders (given) = 25
 Batches = 15,000/100 = 150
 Materials movement = 150 batches × 6 = 900
 Machine hours = 15,000 units × 0.1 = 1,500

Step 3: Compute the Activity Based Overheads Cost for Product Nova Shaft

Activity	Cost Driver	Costing Rate / Cost Driver Unit ₹ .		
Purchasing	Purchase orders	50	25 order × ₹ 50	₹ 1,250

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Setting	Batches produced	40	150 batches × ₹ 40	₹ 6,000
Material handling	Material movements	12	900 movement × ₹ 12	₹ 10,800
Inspection	Batches produced	25	150 batches × ₹ 25	₹ 3,750
Machining	Machine hours	3	1,500 hours × ₹ 3	<u>₹ 4,500</u>
				₹ 26,300

(ii) Computation of budgeted overheads costs for Product Nova Shaft using absorption costing

Budgeted overheads = (₹ 75,000 + ₹ 96,000 + ₹ 112,000 + ₹ 70,000 + ₹ 150,000) = ₹ 503,000

Budgeted absorption cost/machine hour = ₹ 503,000 / 50,000 = ₹ 10.06

Budgeted machining hours for Product Nova Shaft = 1,500

Budgeted absorbed overhead = 1,500 × ₹ 10.06 = ₹ 15,090

(iii) Ways in which the company can reduce the ABC for product Nova Shaft:

- Reduce the number of batches by increasing the batch size which will then reduce the setting up overhead, materials handling and inspection costs.
- Reduce the number of purchase orders
- Innovate ways of speeding up production so that the machining hours are reduced

Question 18

X Ltd. is engaged in the production of four products: A, B, C and D. The price charged for the four products are ₹ 180, ₹ 175, ₹ 130 and ₹ 180 respectively, Market research has indicated that if X Ltd can reduce the selling prices of its products by ₹ 5, it will be successful in getting bulk orders and gain a significant share of market of those products. The company's profit markup is 25 per cent on cost of the product. The relevant information of products are as follows:

Products	A	B	C	D
Output in units	600	500	400	600
Cost per unit:				
Direct material (in ₹.)	40	50	30	60
Direct labour (in ₹.)	28	21	14	21
Machine hours (per unit)	4	3	2	3

The four products are usually produced in production runs of 20 units and sold in batches of 10 units. The production overhead is currently absorbed by using a machine hour rate, and the total of the production overheads for the period has been analysed as follows:

	(₹)
Machine department costs	52,130
Setup costs	26,250
Stores receiving	18,000
Inspection/Quality Control	10,500
Material handling and dispatch	23,100

The cost drivers to be used for the overhead costs are as follows:

Cost	Cost drivers
Setup costs	Number of production runs
Store receiving	Requisitions raised
Inspection/Quality control	Number of production runs
Materials handling and dispatch	Order executed

The number of requisitions raised in the stores was 100 for each product and the number of orders executed was 210, each order being for a batch of 10 units of a product.

You are required:

- (i) To compute the target cost for each product.
- (ii) To compute total cost of each product using activity based costing.
- (iii) Compare target cost and activity based cost of each product and comment whether the price reduction is profitable or not.

Answer

- (i) The target cost of each product after reduction is computed as follows:

Product	Present Price (₹)	Proposed Price (₹)	Target Cost (₹) (with 25% Margin)
A	180	175	140
B	175	170	136
C	130	125	100
D	180	175	140

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(ii) Statement showing cost/unit of Driver as per ABC

Cost	Amount	Driver	No.	Cost/unit of Driver
Set-ups	26,250	Production runs	105*	₹ 250.00
Stores receiving	18,000	Requisition	400**	₹ 45.00
Inspection/Quality	10,500	Production runs	105	₹ 100.00
Handling/Dispatch	23,100	Orders	210	₹ 110.00
Machine Department	52,130	Machine Hrs.	6,500	₹ 8.02

* Production runs = $(600/20) + (500/20) + (400/20) + (600/20) = 105$

** Requisitions = 100 for each product or 400 total

Machine hours = $2,400 + 1,500 + 800 + 1,800 = 6,500$ hours.

Statement showing Total Cost and Cost Per Unit as per ABC

Item	A	B	C	D
	₹	₹	₹	₹
Direct Material	24,000	25,000	12,000	36,000
Direct Labour	16,800	10,500	5,600	12,600
Set-up	7,500	6,250	5,000	7,500
Stores receiving	4,500	4,500	4,500	4,500
Inspection/Quality	3,000	2,500	2,000	3,000
Handling/Dispatch	6,600	5,500	4,400	6,600
Machine Dept. Cost	19,248	12,030	6,416	14,436
Total Cost	81,648	66,280	39,916	84,636
Output (Units)	600	500	400	600
Cost per unit	136.08	132.56	99.79	141.06

(iii) Comparison of Actual Cost and Target Cost

Cost	A	B	C	D
	₹	₹	₹	₹
Actual	136.08	132.56	99.79	141.06
Target	140.00	136.00	100.00	140.00
Difference	(-) 3.92	(-) 3.44	(-) 0.21	(+) 1.06

Comment:

The total actual cost of A, B and C product is less than the target cost so there is no problem in reducing the cost of these product by ₹ .5 from the present price. It will increase the profitability of the company but the cost of D is slightly more than the target cost, it is therefore, suggested that the company should either control it or redesign it.

VALUE CHAIN ANALYSIS

Question 19

What is the concept of 'Value-chain' and why is it important for Cost Management?

Answer

Value chain is the linked set of value creating activities from the basic raw materials and components sources to the ultimate end use of the product or service delivered to the customer.

The six business functions contained in the value chain are (i) Research and Development, (ii) Design (iii) Production (iv) Marketing (v) Distribution and (vi) Customer service.

The objective of value chain is to serve as means of increasing the customer satisfaction and managing costs effectively. Coordination of the individual parts of the value chain activities creates conditions to improve customer satisfaction in terms of cost efficiency, quality and delivery. A firm which performs value chain activities more efficiently and at a lower cost than its competitors will be able to gain competitive advantage. The following methodology should be adopted.

1. The firm should identify the industry value chain and then assign costs, revenues and assets to value activities.
2. Diagnose the cost drivers regulating each value activity.
3. Develop sustainable cost advantage either by controlling cost drivers better than competitors or by reconfiguring the chain value.

By analyzing costs, revenues and assets in each activity systematically a company can achieve low cost. Thus value chain helps managers in deciding how to apply the organization's valuable physical and human resources to each linked process so as to achieve cost effectiveness.

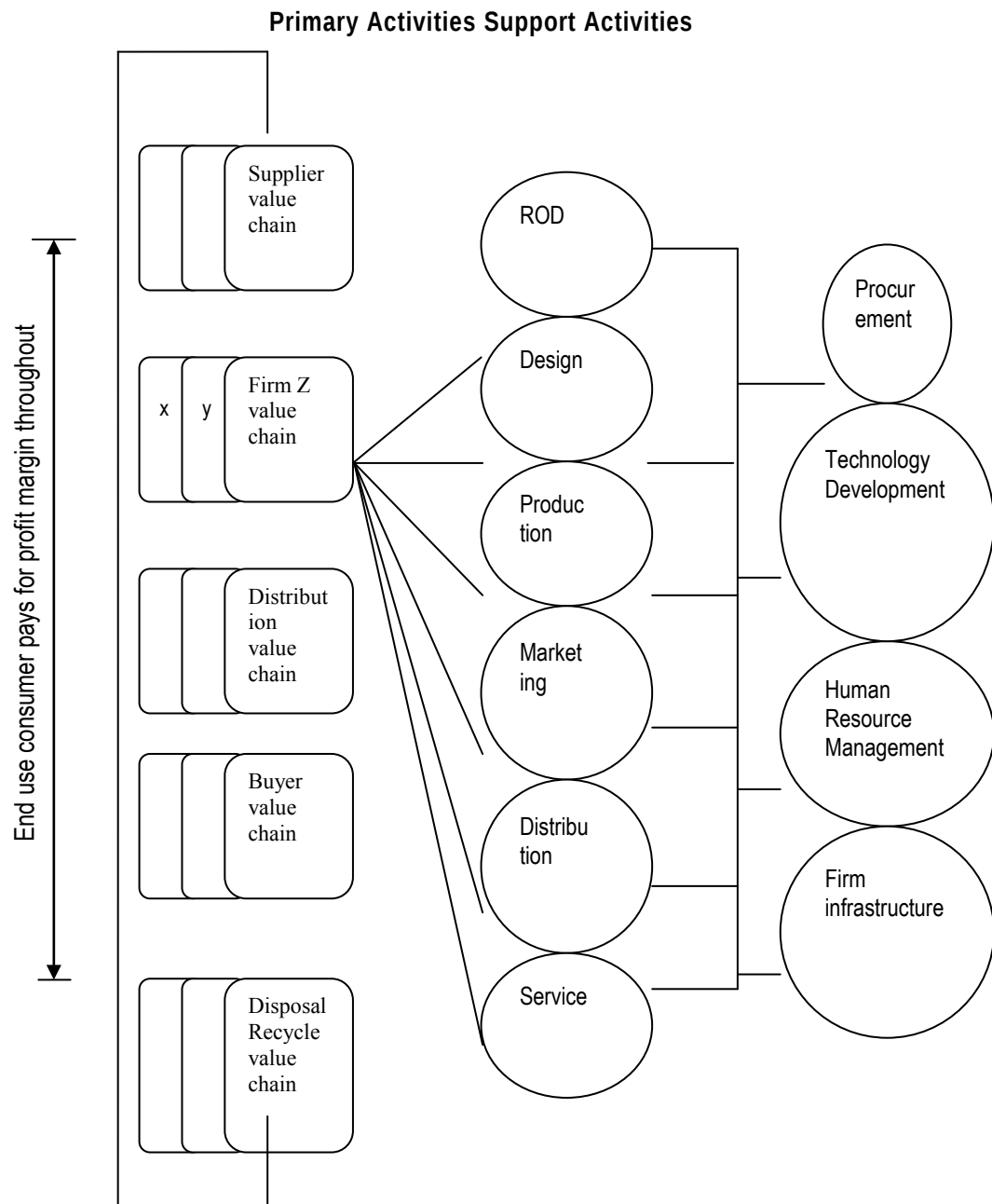
Question 20

Explain with a diagram the value chain activities within the firm with suitable classifications under primary and support activities and also the industry value chain indicating what the end use consumer pays for.

Answer

Industry Value Chain
the firm

Value Chain Activities within



Question 21

How can value analysis achieve cost reduction?

Answer

Value analysis can do cost reduction in the following manner:

- By identifying and removing unnecessary components in a product which had utility earlier.
- By introducing component substitution at a lesser cost without affecting the quality of the product.
- By simplifying the product design.
- By introducing alternative methods with less cost but improved efficiency.

Question 22

Define the term 'value-chain'. Mention three 'useful strategic frameworks of the value-chain analysis.

Answer

Value chain is the linked set of value-creating activities all the way from basic raw material sources for component suppliers through to the ultimate end-use product or service delivered to the customer. Porter's described the value chain as the internal processes or activities a company performs "to design, produce, market, deliver and support its product". He further stated that "a firm's value chain and the way it performs individual activities are a reflection of its history, its strategy, its approach of implementing its strategy, and the underlying economics of the activities themselves". The business activities are classified in to primary activities and support activities.

Primary activities are those activities which are involved in transforming the inputs in to outputs, delivery and after sales service. Support activities are intended to support the primary activities like for example procurement, human resources management, etc.

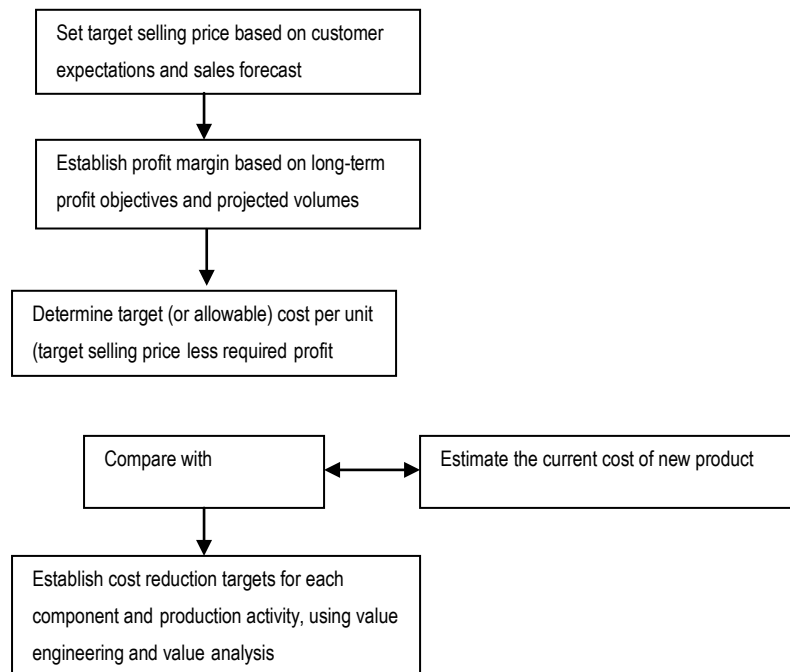
Three useful strategic frameworks for value chain analysis are:

- Industry structure analysis;
- Core competencies; and
- Segmentation analysis.

TARGET COSTING LIFE CYCLE COSTING

Question 23

List the steps involved in target costing process with the help of a block diagram.

Answer**Target Costing Process****Question 24**

What is Target Costing? It is said that implementation of the target costing technique requires intensive marketing research. Explain why intensive marketing research is required to implement target costing technique.

Answer

Target cost is the difference between estimated selling price of a proposed product with specified functionality and quality and the target margin. This is a cost management technique that aims to produce and sell products that will ensure the target margin. It is an integral part of the product design. While designing the product, the company needs to understand what value target customers will assign to different attributes and different aspects of quality. This requires use of techniques like value engineering and value analysis. Intensive marketing research is required to understand customer preferences and the value they assign to each attribute and quality parameter. This insight is required to be developed must before the product is introduced. The company plays within the space between the maximum attributes and quality that the company can offer and the minimum acceptable to target customers.

Therefore in absence of intensive marketing research, the target costing technique cannot be used effectively.

Question 25

Discuss, how target costing may assist a company in controlling costs and pricing of products.

Answer

Target costing may assist control of costs and pricing of product as under:

- (i) Target costing considers the price that ought to be charged by a company to achieve a given market share.
- (ii) Target costing should take life cycle costs in to consideration.
- (iii) If there is a gap between the target cost and expected cost, ways and means of reducing or eliminating it can be explored.
- (iv) The target cost may be used for controlling costs by comparison.

Question 26

What is total-life-cycle costing approach? What is it important?

Answer

Total life cycle costing approach:

Life cycle costing estimates, tracks and accumulates the costs over a product's entire life cycle from its inception to abandonment or from the initial R & D stage till the final customer servicing and support of the product. It aims at tracing of costs and revenues on product by product basis over several calendar periods throughout their life cycle. Costs are incurred along the product's life cycle starting from product's design, development, manufacture, marketing, servicing and final disposal. The objective is to accumulate all the costs over a product life cycle to determine whether the profits earned during the manufacturing phase will cover the costs incurred during the pre and post manufacturing stages of product life cycle.

Importance:

Product life cycle costing is important for the following reasons:

- (i) When non-production costs like costs associated with R & D, design, marketing, distribution and customer service are significant, it is essential to identify them for target pricing, value engineering and cost management. For example, a poorly designed software package may involve higher costs on marketing, distribution and after sales service.

- (ii) There may be instances where the pre-manufacturing costs like R & D and design are expected to constitute a sizeable portion of life cycle costs. When a high percentage of total life cycle costs are likely to be so incurred before the commencement of production, the firm needs an accurate prediction of costs and revenues during the manufacturing stage to decide whether the costly R & D and design activities should be undertaken.
- (iii) Many costs are locked in at R & D and design stages. Locked in or Committed costs are those costs that have not been incurred at the initial stages of R & D and design but that will be incurred in the future on the basis of the decisions that have already been taken. For example, the adoption of a certain design will determine the product's material and labour inputs to be incurred during the manufacturing stage. A complicated design may lead to greater expenditure on material and labour costs every time the product is produced. Life cycle budgeting highlights costs throughout the product life cycle and facilitates value engineering at the design stage before costs are locked in.

Total life-cycle costing approach accumulates product costs over the value chain. It is a process of managing all costs along the value chain starting from product's design, development, manufacturing, marketing, service and finally disposal.

Question 27

Explain the essential features of Life-cycle costing.

Answer

Essential features of Life Cycle Costing:

Product Life Cycle costing involves:

- Tracing of costs and revenue of product over several calendar period- throughout their entire life cycle.
- Emphasis is on Cost and revenue accumulation over the entire life cycle of the product.
- Life cycle costing traces research and design.
- It focuses on development costs, incurred to individual products over their entire life cycles.
- Total magnitude of research and development costs are reported and compared with product revenues generated in later periods.

Question 28

Meena is a news reporter and feature writer for an economic daily. Her assignment is to develop a feature article on 'Product Life-cycle Costing', including interviews with the' Chief

Financial Officers (CFO) and operating, managers. Meena has been given a liberal budget for travel so as to research into company's history, operations, and market analysis for the firm she selects for the article.

Required:

Meena has asked you to recommend industries and firms that would be good candidates for the article. What would you advice? Explain your recommendations.

Answer

The product life cycle span the time from the initial R & D on a product to when customer service and support is no longer offered for that product.

Life Cycle Costing technique is particularly important when:

- (a) High percentage of total life-cycle costs are incurred before production begins and revenue are earned over several years and
- (b) High fraction of the life cycle costs are locked in at the R & D and design stages.

Meena should identify those industries and then companies belonging to those industries where above mentioned feature are prevalent. For example, Automobile and Pharmaceutical Industries companies like Tata Automobile, M&M, Ranbexy and Dabur will be good candidates for study on product life cycle costing.

JUST IN TIME

Question 29

X Video Company sells package of blank video tapes to its customer. It purchases video tapes from Y Tape Company @ ₹ 140 a packet. Y Tape Company pays all freight to X Video Company. No incoming inspection is necessary because Y Tape Company has a superb reputation for delivery of quality merchandise. Annual demand of X Video Company is 13,000 packages. X Video Co. requires 15% annual return on investment. The purchase order lead time is two weeks. The purchase order is passed through Internet and it costs ₹ 2 per order. The relevant insurance, material handling etc ₹ 3.10 per package per year. X Video Company has to decide whether or not to shift to JIT purchasing. Y Tape Company agrees to deliver 100 packages of video tapes 130 times per year (5 times every two weeks) instead of existing delivery system of 1,000 packages 13 times a year with additional amount of ₹ 0.02 per package. X Video Co. incurs no stock out under its current purchasing policy. It is estimated X Video Co. incurs stock out cost on 50 video tape packages under a JIT purchasing policy. In the event of a stock out, X Video Co. has to rush order tape packages which costs ₹ 4 per package. Comment whether X Video Company should implement JIT purchasing system.

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Z Co. also supplies video tapes. It agrees to supply @ ₹ 13.60 per package under JIT delivery system. If video tape purchased from Z Co., relevant carrying cost would be ₹ 3 per package against ₹ 3.10 in case of purchasing from Y Tape Co. However Z Co. doesn't enjoy so sterling a reputation for quality. X Video Co. anticipates following negative aspects of purchasing tapes from Z Co.

- To incur additional inspection cost of 5 paise per package.
Average stock out of 360 tapes packages per year would occur, largely resulting from late deliveries. Z Co. cannot rush order at short notice. X Video Co. anticipates lost contribution margin per package of ₹ 8 from stock out.
- Customer would likely return 2% of all packages due to poor quality of the tape and to handle this return an additional cost of ₹ 25 per package.

Comment whether X Video Co places order to Z Co

Answer

(i) Comparative Statement of cost for purchasing from Y Co Ltd under current policy & JIT

Particulars	Current Policy ₹	JIT ₹
Purchasing cost	18,20,000 (13,000 × 140)	18,20,260 (13,000 × 140.02)
Ordering cost	26.00(2×13 orders)	260.00(2×130 orders)
Opportunity carrying cost	10,500.00 (1/2×1000×140×15%)	1,050.15 (1/2×100×140.02×15%)
Other carrying cost (Insurance, material handling etc)	1,550.00	155.00
Stock out cost	(1/2×1000×3.10)	200(4 × 50)
Total relevant cost	18,32,076	18,21,925.15

Comments: As may be seen from above, the relevant cost under the JIT purchasing policy is lower than the cost incurred under the existing system. Hence, a JIT purchasing policy should be adopted by the company.

(ii) Statement of cost for purchasing from Z Co Ltd.

Particulars	₹.
Purchasing cost	(13,000 × 13.60) 1,76,800
Ordering Cost	(2×130 orders) 260.00

Opportunity Carrying Cost	$(1/2 \times 100 \times 13.60 \times 15\%)$	102.00
Other Carrying Cost	$(1/2 \times 100 \times 3.00)$	150.00
Stock out Cost	(8×360)	2,880
Inspection Cost	$(13,000 \times .05)$	650.00
Customer Return Cost	$(13,000 \times 2\% \times 25)$	6,500.00
Total Relevant Cost		1,87,342

Comments : The comparative costs are as follows,

Under current policy	₹ 18,32,076.00
Under purchase under JIT	₹ 18,21,925.10
Under purchase from Z Co Ltd	₹ 1,87,342.00

Packages should be bought from Z Co as it is the cheapest.

Question 30

How does the JIT approach help in improving an organisation's profitability?

Answer

JIT approach helps in the reduction of costs/increase in prices as follows:

- (i) Immediate detection of defective goods being manufactured so that early correction is ensured with least scrapping.
- (ii) Eliminates/reduces WIP between machines within working cell.
- (iii) OH costs in the form of rentals for inventory, insurance, maintenance costs etc. are reduced.
- (iv) Higher product quality ensured by the JIT approach leads to higher premium in the selling price.
- (v) Detection of problem areas due to better pdn/scrap reporting/labour tracing and inventory accuracy lead to reduction in costs by improvement.

Question 31

Explain, how the implementation of JIT approach to manufacturing can be a major source of competitive advantage.

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Answer

JIT provides competitive advantage in the following ways:

- (i) Stocks of raw materials and finished goods are eliminated, stock holding costs are avoided.
- (ii) JIT aims at elimination of non-value added activities and elimination of cost in this direction will improve competitive advantage.
- (iii) It affords flexibility to customer requirements where the company can manufacture customized products and the competitive advantage is thereby improved.
- (iv) It focuses the direction of performance based production of high quality product.
- (v) It minimize waiting times and transportation costs.

Question 32

Differentiate between 'Traditional Management Accounting' and 'Value Chain Analysis in the strategic framework'.

Answer

Traditional management accounting focuses on internal information. It often places excessive emphasis on manufacturing costs. It also assumes that cost reduction must be found in the "value-added" process i.e. selling price less the cost of raw material. The value chain analysis approach encompasses external and internal data, uses appropriate cost drivers for all major value-creating processes, exploits linkages throughout the value chain, and provides continuous monitoring of a firm's strategic competitive advantages.

Value Chain vs. Traditional Management Accounting

	Traditional Management Accounting	Value Chain Analysis in the strategic framework
1.	If focuses on internal information	Focuses on external informations.
2.	Application of single cost driver at the overall firm level is taken.	Application of multiple cost drivers i.e. structural and executional are taken for each value activity.
3.	It assume that cost reduction must be found in the value added process	Exploits linkages throughout the value chain i.e. within firm, with suppliers and customers.
4.	Insights for strategic decisions somewhat limited in traditional management accounting	Identity cost driver at the individual activity level and develop cost / differentiation advantage either by controlling those drivers better than competitors by reconfiguring the value chain.

Question 33

Describe the Just-in-time systems.

Answer

A complete JIT system begins with production, includes deliveries to a company's production facilities, continues through the manufacturing plant and even includes the types of transactions processed by the accounting system.

- (i) The company must ensure that it receives its supplies on time, preferably directly at the production facility that needs them. The company engineers must assist suppliers at their premises and ensure defect free supplies. Thus raw material inventory is reduced if correct quantities are delivered as per production schedules.
- (ii) Long set-up times are reduced into short ones by eliminating inefficiency. Thus the WIP is reduced and so is the number of products before defects are identified.
- (iii) A 'Kanban' card, which authorizes production of the right quantity by its feeder machine ensures 'pulling' the production process and elimination of inventory. Another method is the introduction of a working cell, which is a cluster of machines run by a single trained operator. This also identifies defects quickly and reduces maintenance costs. Both methods are used together.
- (iv) Work force is trained to be empowered to halt operations understand more about the system, product flow, different machines and thus, elaborate reporting of a past variance is eliminated.
- (v) Suppliers may be paid based on production units adjusted for defects.

Question 34

What do you mean by back-flushing in JIT system? What are the problems that must be corrected before it will work properly?

Answer

Backflushing requires no data entry of any kind until a finished product is completed. At that time the total amount finished is entered into the computer system, which multiplies it by all the components listed in the bill of materials for each item produced. This yields a lengthy list of components that should have been used in the production process and which is subtracted from the beginning inventory balance to arrive at the amount of inventory that should now be left of hand. Back the entire production process. Given the large transaction volumes associated with JIT, this is an ideal solution to the problem.

The following problems must be corrected before it will work properly:

- (i) Production reporting

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- (ii) Scrap reporting
- (iii) Lot tracing
- (iv) Inventory accuracy.

THROUGHPUT ACCOUNTING

Question 35

Vikram Ltd. produces 4 products using 3 different machines. Machine capacity is limited to 3,000 hours for each machine. The following information is available for February, 2009:

Products	A	B	C	D
Contribution (Sales-direct material) ₹.	1,500	1,200	1,000	600
Machine Hours Required/Unit :				
Machine 1	10	6	2	1
Machine 2	10	9	3	1.5
Machine 3	10	3	1	0.5
Estimated Demand (units)	200	200	200	200

From the above information you are required to identify the bottleneck activity and allocate the machine time.

Answer

Machine	Time required for products				Total Time	Time Available	Machine utilization
	A	B	C	D			
1	2000	1200	400	200	3800	3000	126.67%
2	2000	1800	600	300	4700	3000	156.67%
3	2000	600	200	100	2900	3000	96.67%

Since Machine 2 has the highest machine Utilization it represents the bottleneck activity hence product, ranking & resource allocation should be based on contribution/machine hour of Machine 2.

Allocation of Resources						
	A	B	C	D	Machine Utilization	Spare Capacity
Contribution per unit	1500	1200	1000	600		

(₹)						
Time required in Machine 2	10	9	3	1.5		
Contribution per Machine – hour (₹)	150	133.33	333.33	400		
Rank as per contribution / mach. Hour	3 rd	4 th	2 nd	1 st		
Allocation of Machine 2 time	200×10 = 2000	100 (balancing figure)	200×3 = 600	200×1.5 = 300	3000	
Production Quantity	200	100/9=11.11	200	200		
Allocation Machine 1 time	2000	11.11×6 = 66.66	400	200	2666.66	333.34
Allocation of Machine 3 time	2000	11.11×3 = 33.33	200	100	2333.33	666.67

Question 36

A company produces three products A, B and C. The following information is available for a period:

	A	B	C
Contribution (Rupees per unit) (Sales – Direct materials)	30	25	15

Machine hours required per unit of production:

	Hours			
	A	B	C	Throughout accounting ratio
Machine 1	10	2	4	133.33%
Machine 2	15	3	6	200%
Machine 3	5	1	2	66.67%

Estimated sales demand for A, B and C are 500 units each and machine capacity is limited to 6,000 hours for each machine.

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You are required to analyse the above information and apply theory of constraints process to remove the constraints.

How many units of each product will be made?

Answer

Throughout Accounting ratio is highest for 'Machine 2'.

\ 'Machine 2' is the bottleneck

Contribution per unit of bottleneck machine hour:

Total 'Machine 2' hours available = 6,000

	A	B	C
A. Contribution per unit (₹ .)	30	25	15
B. 'Machine 2' hours	15	3	6
C. Contribution per 'Machine 2' hours (A / B)	2	8.33	2.50
D. Ranking	3	1	2
E. Maximum Demand	500	500	500
'Machine 2' hours required (B × E)	7,500	1,500	3,000
'Machine 2' hours available	1,500	1,500	3,000
Units	100	500	500

Shut Down & Divestment

Question 37

What is divestment strategy? Highlight the main reasons for divestments.

Answer

Divestment Strategy:

Divestment involves a strategy of selling off or shedding business operations to divert the resources, so released, for other purposes. Selling off a business segment or product division is one of the frequent forms of divestment strategy. It may also include selling off or giving up the control over subsidiary where by the wholly owned subsidiaries may be floated as independently quoted companies.

Reason for Divestment Strategy

1. In case of a firm having an opportunity to get more profitable product or segment but have resource constraint, it may selling off it's unprofitable or less profitable division

and utilized the recourse so released. Cost Benefit analysis & Capita Budgeting Method are the useful tool for analyzing this type of situation.

2. In case of purchase of new business, it may be found that some of the part of the acquired business is not upto the mark. In such type of situation disposal of the unwanted part of the business is more desirable than hold it.
3. In case where any business segment or product or subsidiary is pull down the profit of the whole organization, it is better to cut down of that operation of the product or business segment.

Question 38

Explain the essential features of Life-cycle costing.

Answer

Essential features of Life Cycle Costing:

Product Life Cycle costing involves :

- Ø Tracing of costs and revenue of product over several calendar period. Throughout their entire life cycle.
- Ø Emphasis is on Cost and revenue accumulation over the entire life cycle of the product.
- Ø Life cycle costing traces research and design.
- Ø It focus on development costs, incurred to individual products over their entire life cycles.
- Ø Total magnitude of research and development costs are reported and compared with product revenues generated in later periods.

Question 39

What is disinvestments strategy? Highlight the main reasons for disinvestments.

Answer

Divestment Strategy: Divestment involves a strategy of selling off or shedding business operations to divert the resources, so released, for other purposes. Selling off a business segment or product division is one of the frequent forms of divestment strategy. It may also include selling off or giving up the control over subsidiary where by the wholly owned subsidiaries may be floated as independently quoted companies.

Reason for Divestment Strategy

1. In case of a firm having an opportunity to get more profitable product or segment but have resource constraint, it may selling off it's unprofitable or less profitable division and utilized the recourse so released. Cost Benefit analysis & Capita Budgeting Method are the useful tool for analyzing this type of situation.

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2. In case of purchase of new business, it may be found that some of the part of the acquired business is not upto the mark. In such type of situation disposal of the unwanted part of the business is more desirable than hold it.
3. In case where any business segment or product or subsidiary is pull down the profit of the whole organization, it is better to cut down of that operation of the product or business segment.

Question 40

What are the critical success factors for the implementation of a "Total Quality Management" programme?

Answer

Critical success factors of TQM:

- Focus on customer needs.
- Everyone in the organisation should be involved.
- Focus on continuous improvement.
- Design quality in product and production process.
- Effective performance measurement system.
- Rewards and performance measurements should be renewed.
- Appropriate training and education to everyone to understand the aim of TQM.

Question 41

List out the remedies available for difficulties experienced during implementation of PRAISE.

Answer

Remedies available for difficulties experienced in each step available during implementation of praise:

Sl. No.	Activities	Remedies
1.	Problem Identification	Participate in programs like brain storming, multi voting, GD etc Precise definition of a problem and quantification.
2.	Ranking	· Participative approach · Sub ordination of individual to group approach.
3.	Analysis	· Lateral thinking/Brain storming.
4.	Innovation	· Systematic evaluation of all aspects of each strategy.
5.	Solution	· Effective internal communication. · Training of personnel/managers

6.	Evaluation	· Participative approach · Effective control system to track actual feedback system
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Question 42

How can value analysis achieve cost reduction?

Answer

Value analysis can do cost reduction in the following manner:

- By identifying and removing unnecessary components in a product which had utility earlier.
- By introducing component substitution at a lesser cost without affecting the quality of the product.
- By simplifying the product design.
- By introducing alternative methods with less cost but improved efficiency.

Question 43

Classify the following items under the three measures used in the theory of constraints:

- (i) Research and Development Cost
- (ii) Rent/Utilities
- (iii) Raw materials used for production
- (iv) Depreciation
- (v) Labour Cost
- (vi) Stock of raw materials
- (vii) Sales
- (viii) Cost of equipments and buildings.

Answer

The 3 key measures are :

- | | | |
|-----------------|---------------------------------------|-------------|
| Contribution | (iii) Raw Material for production | (vii) Sales |
| Operating Costs | (ii) Rent/utilities (iv) Depreciation | (v) Labour |
| Investments: | (i) R& D (vi) Raw Material Stock | |
| | (viii) Building and Equipment Cost | |

Question 44

Name any four stage in the process of bench marking

Answer

Various stages in the process of benchmarking.

- I Planning
 - Determination of benchmarking goal statement
 - Identification of best performance
 - Establishment of the benchmarking or process improvement team
 - Defining the relevant benchmarking measures
- II Collection of data and information
- III Analysis of finding based on data collected
- IV Formulation and implementation of recommendation
- V Constant Monitoring and reviewing.

Question 45

Differentiate between 'Traditional Management Accounting' and 'Value Chain Analysis in the strategic framework'.

Answer

Traditional management accounting focuses on internal information. It often places excessive emphasis on manufacturing costs. It also assumes that cost reduction must be found in the "value-added" process i.e. selling price less the cost of raw material. The value chain analysis approach encompasses external and internal data, uses appropriate cost drivers for all major value-creating processes, exploits linkages throughout the value chain, and provides continuous monitoring of a firm's strategic competitive advantages.

Value Chain vs. Traditional Management Accounting

	Traditional Management Accounting	Value Chain Analysis in the strategic framework
1.	If focuses on internal information	Focuses on external informations.
2.	Application of single cost driver at the overall firm level is taken.	Application of multiple cost drivers i.e. structural and executional are taken for each value activity.
3.	It assume that cost reduction must be found in the value added process	Exploits linkages throughout the value chain i.e. within firm, with suppliers and customers.

4.	Insights for strategic decisions somewhat limited in traditional management accounting	Identify cost driver at the individual activity level and develop cost / differentiation advantage either by controlling those drivers better than competitors by reconfiguring the value chain.
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Question 46

Describe the Just-in-time systems

Answer

A complete JIT system begins with production, includes deliveries to a company's production facilities, continues through the manufacturing plant and even includes the types of transactions processed by the accounting system.

- (i) The company must ensure that it receives its supplies on time, preferably directly at the production facility that needs them. The company engineers must assist suppliers at their premises and ensure defect free supplies. Thus raw material inventory is reduced if correct quantities are delivered as per production schedules.
- (ii) Long set-up times are reduced into short ones by eliminating inefficiency. Thus the WIP is reduced and so is the number of products before defects are identified.
- (iii) A 'Kanban' card, which authorizes production of the right quantity by its feeder machine ensures 'pulling' the production process and elimination of inventory. Another method is the introduction of a working cell, which is a cluster of machines run by a single trained operator. This also identifies defects quickly and reduces maintenance costs. Both methods are used together.
- (iv) Work force is trained to be empowered to halt operations understand more about the system, product flow, different machines and thus, elaborate reporting of a past variance is eliminated.
- (v) Suppliers may be paid based on production units adjusted for defects.

Question 47

What is Backflushing in JIT? State the problems that must be addressed for the effective functioning of the system.

Answer

Back flushing requires no data entry of any kind until a finished product is completed. At the time the total amount finished is entered into the computer system, which multiplies it by all the components listed in the bill of materials for each item produced.

To work system properly some serious problems must be corrected.

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- (i) Production reporting: The total production figure entered into the system must be absolutely correct.
- (ii) Scrap reporting: All abnormal scrap must be diligently tracked and recorded; otherwise these materials will fall outside the back flushing system and will not be charged to inventory.
- (iii) Lot tracing: Lot tracing is impossible under the back flushing system. It is required when a manufacturer need to keep records of which production lots were used to create a product in case all the items in a lot must be recalled.
- (iv) Inventory accuracy: Maintain accurate set of inventory records.

Question 48

Explain the major components of balanced score card.

Answer

Well disgned balanced score card combines financial measures of past performance with measures of the firm's drivers of future performance. Generally the Balanced Score Card has the following perspectives from which a company's activity can be evaluate

1. Customer perspective i.e how customers see us?
2. Internal perspective ie. In what processes must the firm excel?
3. Innovation & learning perspective i.e,can we continue to improve and create value?
4. Financial perspective i.e., how we look to our share holders?

Question 49

Classify the following measures under appropriate categories in a balanced score card for a banking company which excels in it s home loan products:

- (i) *A new product related to life insurance is being considered for a tie up with the successful housing loan disbursements.*
e.g. every housing loan applicant to be advised to take a life policy or compelled to take a fire insurance policy.
- (ii) *How different sectors of housing loans with different interest rates have been sanctioned, their volumes of growth in the past 4 quarters.*
- (iii) *How many days are taken to service a loan, how many loans have taken longer, what additional loans are to be released soon, e.t.c*

(Students are not required to copy these statements into their answer books)

Answer

- | | |
|------------------------------------|-----------------------------------|
| (i) New product tie up | - Innovation/learning perspective |
| (ii) Growth of Volume | - Financial perspective |
| (iii) Time for loan/Fresh products | - Customer perspective |

Question 50

Brief the principles associated with synchronous manufacturing.

Answer

Synchronous Manufacturing

It is an all encompassing manufacturing management philosophy which includes a set of principles, procedures, and techniques where every action is evaluated in terms of common goals of the organization.

The 7 principles are :

- i. Focus on synchronizing the production flow than on idle capacities.
- ii. Value of time at a bottleneck resource is equal to the throughput rate of products processed by the bottle neck.
- iii. Value of time at a non bottleneck resource is negligible.
- iv. Level of utilization of a non bottleneck resource is controlled by other constraints within the system.
- v. Resources must be utilized, not simply activated.
- vi. Transfer batch should not be equal to the process batch.
- vii. A process batch should be variable both along its route and overtime.

Question 51

Mention the data required to operate the material requirement planning system.

Answer

Data requirements to operate material requirement planning system:

1. The master Production schedule: This schedule specifies the quantity of each finished unit of products to be produced and the time at which each unit will be required.
2. The Bill of material file: The bill of material file specifies the sub-assemblies, components and materials required for each of the finished goods.
3. The inventory file: This file maintains details of items in hand for each sub-assembly, components and materials required for each of the finished goods.

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4. The routing file: This file specifies the sequence of operations required to manufacture sub-assemblies, components and finished goods.
5. The master parts file: This file contains information on the production time of sub-assemblies; components produced internally and lead times for externally acquired items.

Question 52

Explain the pre-requisites for successful operation of material requirement planning.

Answer

Pre-requisites for successful operation of MRP system are:

- (i) The latest production and purchasing schedules prepared should be strictly adhered to. Day to Day change from predetermined schedules will cause chaos.
- (ii) Raw Materials, sub-assemblies and components required for production should be pre-determined in quantifiable terms. Standard should be set for the consumption quantity, quality, mix and yield of raw materials for every unit of finished product.
- (iii) Work-force must be appraised of the system and the need for absolute adherence to the schedules prepared.
- (iv) Necessary internal control system should be developed to ensure total adherence to the schedule.
- (v) Accuracy of the data supplied is vital to the MRP system.

Question 53

A company makes a single product which sells at ₹ 800 per unit and whose variable cost of production is ₹ 500 per unit. Production and sales are 1000 units per month. Production is running to full capacity and there is market enough to absorb an additional 20% of output each month.

The company has two options:

Option-I

Inspect finished goods at ₹ 10,000 per month. 4% of production is detected as defectives and scrapped at no value. There will be no warranty replacement, since every defect is detected. A small spare part which wears out due to defective material is required to be replaced at ₹ 2,000 per spare for every 20 units of scrap generated. This repair cost is not included in the manufacturing cost mentioned above.

Option-II

Shift the finished goods inspection at no extra cost, to raw material inspection, (since defective raw materials are entitled to free replacement by the supplier), take up machine set-up tuning

and machine inspection at an additional cost of ₹ 8,000 per month, so that scrap of finished goods is completely eliminated. However, delivery of uninspected finished products may result in 1 % of the quantity sold to be replaced under free warranty due to minor variation in dimensions, which does not result in the wearing out of the spare as stated in Option-I

- (i) Using monthly figures relevant for decision making, advise which option is more beneficial to the company from a financial perspective.
- (ii) Identify the quality costs that can be classified as
 - (a) appraisal costs and
 - (b) external failure costs.

Answer

	Option I		Option II	
Production	1000 Units		1000 Units	
Finished Goods Inspection	10,000	Appraisal	-	
Raw Material Inspection scrap 4% = 40 units x variable cost per unit 500	20,000	Appraisal	10,000	
Contribution lost 300 x 40	12,000	Appraisal		
Machine repair	4,000	Appraisal	-	
Machine set up			8,000	
Warranty replacement	-			
1% x 1000 = 10 unit				
Contribution lost 10 x 300			3,000	External failure
Variable Cost lost 10 x 500	<u> </u>		<u>5,000</u>	External failure
Quality Cost	<u>46,000</u>		<u>26,000</u>	

Better Option II

Question 54

During the last 20 years, KL Ltd's manufacturing operation has become increasingly automated with computer-controlled robots replacing operators. KL currently manufactures over 100 products of varying levels of design complexity. A single plant wise overhead absorption rate, based on direct labor hours is absorb overhead costs.

In the quarter ended March, KL's manufacturing overhead costs were:

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	(₹ 000)
Equipment operation expenses	125
Equipment maintenance expenses	25
Wages paid to technicians	85
Wages paid to component stores staff	35
Wages paid to dispatch staff	<u>40</u>
Total	<u>310</u>

During the quarter, the company reviewed the Cost Accounting System and concluded that absorbing overhead costs to individual products on a labour hour absorption basis was meaningless and that overhead costs should be attributed to products using an Activity Based Costing (ABC) system. The following are identified as the most significant activities.

- (i) Receiving component consignments from suppliers.
- (ii) Setting up equipment for production runs
- (iii) Quality inspections
- (iv) Dispatching goods as per customer's orders.

Equipment operation and maintenance expense are apportioned as :

- Component stores 15% production runs 70% and dispatch 15%

Technician's wages are apportioned as:

- Equipment maintenance 30% set up equipment for production runs 40% and quality inspections 30%

During the quarter:

- (i) 980 component consignments were received from suppliers.
- (ii) 1020 production runs were set up
- (iii) 640 quality inspections were carried out.
- (iv) 420 orders were dispatched to customers.

KL's production during the quarter included component R. The following information is available:

	Component R
Component Consignments received	45
Production runs	16
Quality Inspections	10

Orders (goods) dispatched	22
Quantity produced	560

Calculate the unit manufacturing overhead cost of component R using ABC system.

Answer

	Receiving Supplies (₹ 000)	Set ups (₹ 000)	Quality Inspection (₹ 000)	Despatch (₹ 000)	Total (₹'000)
Equipment Operation Expenses	18.75	87.50		18.75	125.00
Maintenance technicians wages initially allocated to maintenance (30% of ₹ 85,000 = ₹ 25,500	3.75	17.50		3.75	25.00
and then reallocated on the same basis on maintenance	3.83	17.85		3.82	25.50
Balance of technician wages, allocated to set ups and quality inspections		34.00	25.50		59.50
Stores wages – Receiving	35.00				35.00
Despatch wages – Despatch				40.00	40.00
	<u>61.33</u>	<u>156.85</u>	<u>25.50</u>	<u>66.32</u>	<u>310.00</u>

Note: Equipment operations expenses and Maintenance allocated on the basis 15%, 70%, and 15% as specified in the question.

The next stage is to identify cost drivers for each activity and established cost driver rates by dividing the activity costs by a measure of cost drive usage for the period. The Calculations are as follows:

Receiving supplies (₹ 61,330/980)	= ₹ 62.58 per component
Performing set ups (₹ 1,56,850/1020)	= ₹ 153.77 per set up
Despatching goods (₹ 66,320/420)	= ₹ 157.93 per goods order despatched
Quality Inspection (₹ 25,500/640)	= ₹ 39.84

Finally the costs are assigned to components based on their cost driver usage. The assignments are as follows:

	(₹)
Direct Labour	300.00
Direct Materials	1200.00

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Receiving supplies	2816.10
Performing Set Up	2460.32
Quality Inspection	398.40
Despatching goods	<u>3474.46</u>
Total Overhead Costs	<u>10461.54</u>
	(₹)
No. of units produced	560
Cost per unit	16.34

For components the overhead costs have been assigned as follows (for components R)

Receiving supplies	(45 receipts at ₹ 62.58)
Performing setups	(16 production runs at ₹ 153.77)
Quality Inspections	(10 at ₹ 39.84)
Despatching goods	(22 at ₹ 157.93)

Question 55

A company produces three products A, B and C. The following information is available for a period:

	A	B	C
Contribution (Rupees per unit) (Sales – Direct materials)	30	25	15

Machine hours required per unit of production:

	Hours			
	A	B	C	Throughout accounting ratio
Machine 1	10	2	4	133.33%
Machine 2	15	3	6	200%
Machine 3	5	1	2	66.67%

Estimated sales demand for A, B and C are 500 units each and machine capacity is limited to 6,000 hours for each machine.

You are required to analyse the above information and apply theory of constraints process to remove the constraints.

How many units of each product will be made?

Answer

Throughout Accounting ratio is highest for 'Machine 2'.

\ 'Machine 2' is the bottleneck

Contribution per unit of bottleneck machine hour :

Total 'Machine 2' hours available = 6,000

		A	B	C
A.	Contribution per unit (₹)	30	25	15
B.	'Machine 2' hours	15	3	6
C.	Contribution per 'Machine 2' hours (A / B)	2	8.33	2.50
D.	Ranking	3	1	2
E.	Maximum Demand	500	500	500
	'Machine 2' hours required (B ´ E)	7,500	1,500	3,000
	'Machine 2' hours available	1,500	1,500	3,000
	Units	100	500	500

Question 56

Traditional Ltd. is a manufacturer of a range of goods. The cost structure of its different products is as follows:

Particulars	Product	Product	Product	
	A	B	C	
Direct materials	50	40	40	₹ /u
Direct labour @ 10 ₹ /hour	30	40	50	₹ /u
Production overheads	30	40	50	₹ /u
Total Cost	110	120	140	₹ /u
Quantity produced	10,000	20,000	30,000	Units

Traditional Ltd. was absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC system and has identified cost drivers and cost pools as follows:

Activity Cost Pool	Cost Driver	Associated Cost
Stores Receiving	Purchase Requisitions	2,96,000
Inspection	Number of Production runs	8,94,000
Dispatch	Orders Executed	2,10,000
Machine Setup	Number of setups	12,00,000

The following information is also supplied:

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Details	Product A	Product B	Product C
No. of Setups	360	390	450
No. of Orders Executed	180	270	300
No. of Production runs	750	1,050	1,200
No. of Purchase Requisitions	300	450	500

You are required to calculate activity based production cost of all the three products.

Answer

The total production overheads are ₹ 26,00,000:

Product A: $10,000 \times ₹ 30 = ₹ 3,00,000$

Product B: $20,000 \times ₹ 40 = ₹ 8,00,000$

Product C: $30,000 \times ₹ 50 = ₹ 15,00,000$

On the basis of ABC analysis this amount will be apportioned as follows:

Statement of Activity Based Production Cost							
Activity Pool	Cost Driver	Ratio	Total Amount (₹)	A (₹)	B (₹)	C	
Stores Receiving	Purchase requisition	6:9:10	2,96,000	71,040	1,06,560	1,18,400	
Inspection	Production Runs	5:7:8	8,94,000	2,23,500	3,12,900	3,57,600	
Dispatch	Orders Executed	6:9:10	2,10,000	50,400	75,600	84,000	
Machine Setups	Set ups	12:13:15	12,00,000	3,60,000	3,90,000	4,50,000	
Total Activity Cost				7,04,940	8,85,060	10,10,000	
Quantity Sold				10,000	20,000	30,000	
Unit Cost				70.49	44.25	33.67	
Add: Conversion Cost				80	80	90	
Total				150.49	124.25	123.67	

Question 57

AML Ltd. is engaged in production of three types of ice-cream products: Coco, Strawberry and Vanilla. The company presently sells 50,000 units of Coco @ ₹ 25 per unit, Strawberry 20,000 @ ₹ 20 per unit and Vanilla 60,000 units @ ₹ 15 per unit. The demand is sensitive to selling price and it has been observed that every reduction of Re. 1 per unit in selling price, increases the demand for each product by 10% to the previous level. The company has the

production capacity of 60,500 units of Coco, 24,200 units of Strawberry and 72,600 units of Vanilla. The company marks up 25% on cost of the product.

The Company management decides to apply ABC analysis. For this purpose it identifies four activities and the rates as follows:

<u>Activity</u>	<u>Cost Rate</u>
Ordering	₹ 800 per purchase order
Delivery	₹ 700 per delivery
Shelf stocking	₹ 199 per hour
Customer support and assistance	₹ 1.10 p.u. sold.

The other relevant information for the products are as follows:

	Coco	Strawberry	Vanilla
Direct Material p.u. (₹)	8	6	5
Direct Labour p.u. (₹)	5	4	3
No. of purchase orders	35	30	15
No. of deliveries	112	66	48
Shelf stocking hours	130	150	160

Under the traditional costing system, store support costs are charged @ 30% of prime cost. In ABC these costs are coming under customer support and assistance.

Required:

- Calculate target cost for each product after a reduction of selling price required to achieve the sales equal to the production capacity.
- Calculate the total cost and unit cost of each product at the maximum level using traditional costing.
- Calculate the total cost and unit cost of each product at the maximum level using activity based costing.
- Compare the cost of each product calculated in (i) and (ii) with (iii) and comment on it.

Answer

- Cost of products under target costing

Demanded unit and selling price

Coco		Strawberry		Vanilla	
Selling Price	Demand	Selling Price	Demand	Selling Price	Demand
25	50000	20	20000	15	60000

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24	55000	19	22000	14	66000
23	60500	18	24200	13	72600

Target cost of each product after reduction in selling price

	Coco	Strawberry	Vanilla
Selling price after reduction	23.00	18.00	13.00
Profit marks up 25% on cost i.e 20 % on selling price	4.60	3.60	2.60
Target cost of production (per unit)	18.40	14.40	10.40

(ii) Cost of product under traditional costing

	Coco	Strawberry	Vanilla
	(₹)	(₹)	(₹)
Units	60500	24200	72600
Material cost (8,6,5 per unit)	8	6	5
Labour cost (5,4,3 per unit)	5	4	3
Prime cost	13	10	8
Store support costs (30% of prime)	3.90	3	2.40
Cost per unit	16.90	13.00	10.40

(iii) Cost of product under activity based costing

	Coco	Strawberry	Vanilla
	(₹)	(₹)	(₹)
Units	60500	24200	72600
Material cost (8,6,5 per unit)	484000	145200	363000
Labour cost (5,4,3 per unit)	302500	96800	217800
Prime cost	786500	242000	580800
Ordering cost @ ` 800 (35, 30, 15)	28000	24000	12000
Delivery cost @ ` 700 (112, 66, 48)	78400	46200	33600
Shelf stocking @ ` 199, (130,150,160)	25870	29850	31840
Customer Support ` 1.10	66550	26620	79860
Total Cost	985320	368670	738100
Cost Per unit	16.29	15.23	10.17

(iv) Comparative Analysis of cost of production (₹)

	Coco	Strawberry	Vanilla
	(₹)	(₹)	(₹)
(a) As per Target Costing	18.40	14.40	10.40
(b) As per traditional Costing	16.90	13.00	10.40
(c) As per Activity Based Costing	16.29	15.23	10.17

(a) – (c)	2.11	-0.83	0.23
(b) – (c)	0.61	-2.23	0.23

Note : The cost of product of strawberry is higher in ABC method in comparison to target costing and traditional methods. It indicated that actual profit under target costing is less than targeted. For remaining two products, ABC is most suitable.

Question 58

H. Ltd. manufactures three products. The material cost, selling price and bottleneck resource details per unit are as follows:

	Product X	Product Y	Product Z
Selling price (₹)	66	75	90
Material and other variable cost (₹)	24	30	40
Bottleneck resource time (minutes)	15	15	20

Budgeted factory costs for the period are ₹ 2,21,600. The bottleneck resources time available is 75120 minutes per period.

Required:

- (i) Company adopted throughput accounting and products are ranked according to 'product return per minute'. Select the highest rank product.
- (ii) Calculate throughput accounting ratio and comment on it.

Answer

- (i) Calculation of Rank according to product return per minute

Particulars	X	Y	Z
Selling Price	66	75	90
Variable Cost	24	30	40
Throughput Contribution	42	45	50
Minutes per unit	15	15	20
Contribution per minute	2.8	3	2.5
Ranking	II	I	III

- (ii)

Factory Cost per minute(221600/75120)	2.95	2.95	2.95
TA Ratio = Contrb per min / cost per minute	0.95	1.02	0.85
Ranking based on TA Ratio	II	I	III

Comment : Product Y yields more contribution compared to average factory contribution per minute, whereas X and Z yield less.

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Question 59

Fruitolay had decided to increase the size of the store. It wants the information about the probability of the individual product lines : Lemon, grapes and papaya. It provides the following data for the 2009 for each product line:

	Lemon	Grapes	Papaya
Revenues	₹ 79,350.00	₹ 2,10,060.00	₹ 1,20,990.00
Cost of goods sold	₹ 60,000.00	₹ 1,50,000.00	₹ 90,000.00
Cost of bottles returned	₹ 1,200.00	₹ 0	₹ 0
Number of purchase orders placed	36	84	36
Number of deliveries received	30	219	66
Hours of shelf stocking time	54	540	270
Items sold	12,600	1,10,400	30,600

Fruitolay also provides the following information for the year 2009:

S. No.	Activity	Description of Activity	Total costs (₹)	Cost allocation basis
1.	Bottle returns	Returning of empty bottles to the store	1,200.00	Direct tracing to product line
2.	Ordering	Placing of orders of purchases	15,600.00	156 purchase orders
3.	Delivery	Physical delivery and the receipts of merchandise	25,200.00	315 deliveries
4.	Self stocking	Stocking of merchandise on store shelves and ongoing restocking	17,280.00	864 hours of time
5.	Customer support	Assistance provided to customers including bagging and checkout	30,720.00	153600 items sold

Required:

- Fruitolay currently allocates store support costs (all costs other than the cost of goods sold) to the product line on the basis of the cost of goods sold of each product line. Calculate the operating income and operating income as the percentage of revenue of each product line.
- If Fruitolay allocates store support costs (all costs other than the cost of goods sold) to the product lines on the basis of ABC system, calculate the operating income and operating income as the percentage of revenue of each product line.
- compare both the systems.

Answer

(i)

Particulars	Lemon	Grapes	Papaya	Total
Revenue	79,350	2,10,060	1,20,990	4,10,400
Less: Cost of goods sold (COGS)	60,000	1,50,000	90,000	3,00,000
Less: Store Support Cost	18,000	45,000	27,000	90,000
Operating income	1,350	15,060	3,990	20,400
Operating Income %	1.70%	7.17%	3.30%	4.97%

(ii) ABC System

Activity	Cost Hierarchy Level	Total Costs (₹)	Quantity Of Cost Allocation Base	Overhead Allocation Rate
Ordering	Batch	15600.00	156 Purchase orders	₹ 100
Delivery	Batch	25200.00	315 delivering orders	₹ 80
Shelf stocking	Output unit	17280.00	864 self stocking hours	₹ 20
Customer support	Output unit	30,720.00	153600 items sold	₹ 0.20

Particulars	Cost Driver	Lemon	Grapes	Papaya	Total
Bottle Returns	Direct	1,200	0	0	1,200
Ordering	Purchase orders	3,600	8,400	3,600	15,600
Delivery	Deliveries	2,400	17,520	5,280	25,200
Self Stocking	Hours of time	1,080	10,800	5,400	17,280
Customer Support	Items Sold	2,520	22,080	6,120	30,720
Grand Total		10,800	58,800	20,400	90,000

Particulars	Lemon	Grapes	Papaya	Total
Revenue	79,350	2,10,060	1,20,990	410,400
Less: Cost of goods sold	60,000	1,50,000	90,000	300,000
Less: Store Support Cost	10,800	58,800	20,400	90,000
Operating income	8,550	1,260	10,590	20,400
Operating Income %	10.78%	0.60%	8.75%	4.97%

Summary

	Lemon	Grapes	Papaya	Total
Under Traditional Costing System	1.70%	7.17%	3.30%	4.97%
Under ABC System	10.78%	0.60%	8.75%	4.97%

The grapes line drops sizeably when ABC is used. Although it constitutes 50 % COGS, it uses a higher percentage of total resources in each activity area., especially the high cost of customer support area. In contrast, lemon line draws a much lower percentage of total resources used in each activity area than its percentage of total COGS. Hence under ABC, Lemon is most profitable. Fruitolay can explore ways to increase sales of lemons and also explore price increases on grapes.

Operating Income Ranking is highest for Grapes under Traditional System because other products bear its overhead cost, whereas under ABC a more accurate picture shows Grapes as the lowest ranking product.

EXERCISE

TOTAL QUALITY MANAGEMENT

Question 1

Define Total Quality Management? What are the six Cs for successful implementation of TQM?

Answer

Refer to Chapter 1: Paragraph 1.2.2 & 1.2.5

ACTIVITY BASED COST MANAGEMENT

Question 2

Explain the concept of cost drivers indicate what you will consider as cost drivers for the following business function:

Research & development; and Customer service.

Answer

Refer to Chapter 1: Paragraph : 1.3.3

Question 3

What is activity based costing?

Answer

Refer to Chapter 1: Paragraph: 1.3.2 & 1.3.4

Question 4

What are the areas in which activity based information is used for decision making?

Answer

Refer to Chapter 1: Paragraph: 1.3.9

Question 5

Explain the concept of activity based costing. How ABC system supports corporate strategy?

Answer

Refer to Chapter 1: Paragraph: 1.3.7.3

Question 6

Computo Ltd. manufactures two parts 'P' and 'Q' for Computer Industry.

P : annual production and sales of 1, 00,000 units at a selling price of ₹100.05 per unit.

Q : annual production and sales of 50,000 units at a selling price of ₹150 per unit.

Direct and Indirect costs incurred on these two parts are as follows:

	(₹ in thousand)		
	P	Q	Total
Direct Material cost (variable)	4,200	3,000	7,200
Labour cost (variable)	1,500	1,000	2,500
Direct Machining cost (See Note)*	700	550	1,250
Indirect Costs:			
Machine set up cost			462
Testing cost			2,375
Engineering cost			<u>2,250</u>
			<u>16,037</u>

Note: Direct machining costs represent the cost of machine capacity dedicated to the production of each product. These costs are fixed and are not expected to vary over the long-run horizon.

Additional information is as follows:

	P	Q
Production Batch Size	1,000 units	500 units
Set up time per batch	30 hours	36 hours
Testing time per unit	5 hours	9 hours
Engineering cost incurred on each product	8.40 lacs	14.10 lacs

A foreign competitor has introduced product very similar to 'P'. To maintain the company's share and profit, Computo Ltd. has to reduce the price to ₹86.25. The company calls for a meeting and comes up with a proposal to change design of product 'P'. The expected effect of new design is as follows:

- Direct Material cost is expected to decrease by ₹5 per unit.

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- Labour cost is expected to decrease by ₹2 per unit.
- Machine time is expected to decrease by 15 minutes; previously it took 3 hours to produce 1 unit of 'P'. The machine will be dedicated to the production of new design.
- Set up time will be 28 hours for each set up.
- Time required for testing each unit will be reduced by 1 hour.
- Engineering cost and batch size will be unchanged.

Required:

- Company management identifies that cost driver for Machine set-up costs is 'set up hours used in batch setting' and for testing costs is 'testing time'. Engineering costs are assigned to products by special study. Calculate the full cost per unit for 'P' and 'Q' using Activity-based costing.
- What is the Mark-up on full cost per unit of P?
- What is the Target cost per unit for new design to maintain the same mark up percentage on full cost per unit as it had earlier? Assume cost per unit of cost drivers for the new design remains unchanged.
- Will the new design achieve the cost reduction target?
- List four possible management actions that the Computo Ltd. should take regarding new design.

Answer

- (a) Cost driver per machine set up hour = ₹ 70

- (b) Cost driver per testing hour = ₹ 2.50

	P	Q
(c) Total cost (₹)	87,00,000	73,37,000
(d) Cost per unit (₹.)	87.00	146.74
(e) Percentage of mark up on full cost = 15%		
(f) Target cost per unit (₹) = 75.00		

	Cost P.U	Total Cost
(g) Total Cost (₹)	77.36	77,36,000

The target cost is ₹75 p.u. and estimated cost of new design is ₹77.36 p.u. The new design does not achieve the target cost set by Computo Ltd. Hence the target mark up shall not be achieved.

Question 7

Why are conventional product costing systems more likely to distort product costs in highly automated plants? How do activity-based costing systems deal with such a situation?

Answer

Refer to Chapter 1: Paragraph: 1.1

Question 8

Differentiate between 'Value-added' and 'Non-value-added' activities in the context of Activity-based costing.

Give examples of Value-added and Non-value-added activities.

Answer

Refer to Chapter 1: Paragraph: 1.6.6

Question 9

Traditional Ltd. is a manufacturer of a range of goods. The cost structure of its different products is as follows:

Particulars	Product A	Product B	Product C	
Direct materials	50	40	40	₹./u
Direct labour @ 10 ₹./hour	30	40	50	₹./u
Production overheads	30	40	50	₹./u
Total Cost	110	120	140	₹./u
Quantity produced	10,000	20,000	30,000	Units

Traditional Ltd. was absorbing overheads on the basis of direct labour hours. A newly appointed management accountant has suggested that the company should introduce ABC system and has identified cost drivers and cost pools as follows:

Activity Cost Pool	Cost Driver	Associated Cost
Stores Receiving	Purchase Requisitions	2,96,000
Inspection	Number of Production runs	8,94,000
Dispatch	Orders Executed	2,10,000
Machine Setup	Number of setups	12,00,000

The following information is also supplied:

Details	Product A	Product B	Product C
No. of Setups	360	390	450
No. of Orders Executed	180	270	300
No. of Production runs	750	1,050	1,200
No. of Purchase Requisitions	300	450	500

You are required to calculate activity based production cost of all the three products.

Answer

	A	B	C
Unit Cost	70.49	44.25	33.67
Add: Conversion Cost	80	80	90
Total	150.49	124.25	123.67

VALUE CHAIN ANALYSIS

Question 10

What steps are involved in value chain analysis approach for assessing competitive advantages?

Answer

Refer to Chapter 1: Paragraph: 1.6.6

TARGET COSTING LIFE CYCLE COSTING

Question 11

What is Target Costing and what are the stages to the methodology?

Answer

Refer to Chapter 1: Paragraph: 1.4.3.2 & 1.4.12

Question 12

What is Product Life-cycle Costing ? Describe its characteristics and benefits.

Answer

Refer to Chapter 1: Paragraph: 1.5.5 & 1.5.7

JUST IN TIME

Question 13

What do you mean by 'Back flushing' in JIT system? Explain briefly the problems with back flushing that must be corrected before it will work properly.

Answer

Refer to Chapter 1: Paragraph: 1.9.4