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Activity-Based Costing

The Concept

Activity-Based Costing

In contrast to traditional/absorption costing system, ABC system first accumulates overheads costs for each organizational activity, and then assigns the costs of the activities to the products, services, or customers (cost objects) causing that activity.

Origin

During **1980's**, the limitations of absorption costing system were felt with severity. Companies were looking for a system that could reflect true product cost in order to fight competition. The absorption costing system was designed decades ago, when most companies produced narrow range of products. Further, overhead costs were small enough to make a big difference in the identification of cost of a product. This criticism of absorption costing led to generation of the idea of **ABC** system. David **Cooper** and Robert **Kaplan** wrote articles on the idea of **ABC** system in **1990** and **1992.** The new system was accepted widely and became reality of the day. Now **ABC** system has become part of every management accounting text book and being implemented the world over.

Definitions

- **ABC** is a cost attribution to cost units on the basis of benefit received from indirect activities.

-- Cima Official Terminology

- An **activity** is an event that incurs costs.
- A **cost object** is defined as anything for which a separate measure of cost is desired/required.
- **An activity cost pool:** The overheads cost allocated to a distinct type of activity or related activities.
- A **cost driver** is any factor or activity that has a direct cause and effect relationship with the resources consumed.
- **Cost Unit:** An item of production or a service for which it is useful to have cost information.
- **Cost accounting:** The process of identifying, analyzing, summarizing, recording and reporting costs associated with business operations.
- **Direct costs:** Those costs that are directly associated with the manufacturing process.
- **Indirect/overheads costs:** Those costs that are not directly identifiable with a unit of production.

Related Concepts

- **Direct Costing System**
  A system of costing the products where direct costs (also referred to as **variable costs**) are assigned to products only. It reflects the contribution to indirect costs. **The system is considered appropriate for decision-making purposes.** It is recommended in the circumstances where indirect costs are a low proportion of a company's total costs.

- **Traditional or Absorption Costing System**
  It reflects full cost pertaining to a product. It is easy to use and, therefore, is practiced widely. **The allocation of overhead costs under the system is based on a rate determined by either a percentage of direct labor cost or number of labor hours worked or another.** Therefore, the reported allocation of overheads for a given product may be incorrect. It is the main defect of absorption costing.

- **Activity-Based Costing System**
  It also reflects full cost pertaining to a product. **ABC system establishes relationships between overheads costs and activities so that we can better allocate overheads costs.** It reflects the more accurate use of overheads costs based on their relevant activity levels achieved. The system has eliminated the defects of traditional/absorption costing system.

The Defect of Traditional Costing System

Spreads overheads cost over entire product range. A single overheads recovery rate (also known as predetermined overheads rate or overheads absorption rate) is used to absorb total overheads cost to all production.

For instance,

- **For job order costing**, overheads cost absorption rates are normally based on direct labor cost or direct labor hours
- **For process costing**, overheads cost absorption rates are normally based on machine hours worked

Results of the defect:

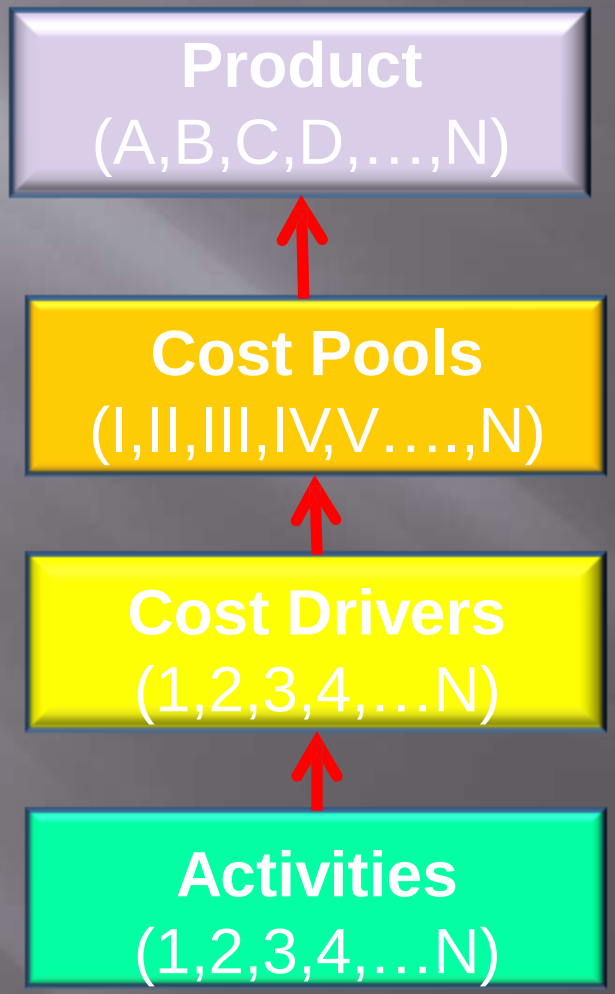
- Each product appeared to cost the same, as far as overheads cost is concerned
- Products with high profit margins subsidized products with low profit margins
- In-accurate cost accumulation led to inaccurate profit planning of products
- A product cannot compete in the market if its cost is not accurately accumulated and reflected in costing records

ABC System

An overheads cost allocation system that:

- allocates overheads cost to multiple activity cost pools and
- assigns the activity cost pools to products or services **by means of cost drivers** that represent the activities used.

Process


Product
(A,B,C,D,…,N)
Cost Pools
(I,II,III,IV,V….,N)
Cost Drivers
(1,2,3,4,…N)
Activities
(1,2,3,4,…N)

Design & Implementation

Step 1 Identify Cost Objects i.e. Product A,B,C

Step 2 Identify direct costs i.e. Direct Materials, Direct Labor, Direct expense

Step 3 Select the cost allocation bases to be used for overheads cost i.e. # of set-ups, # of units, etc.

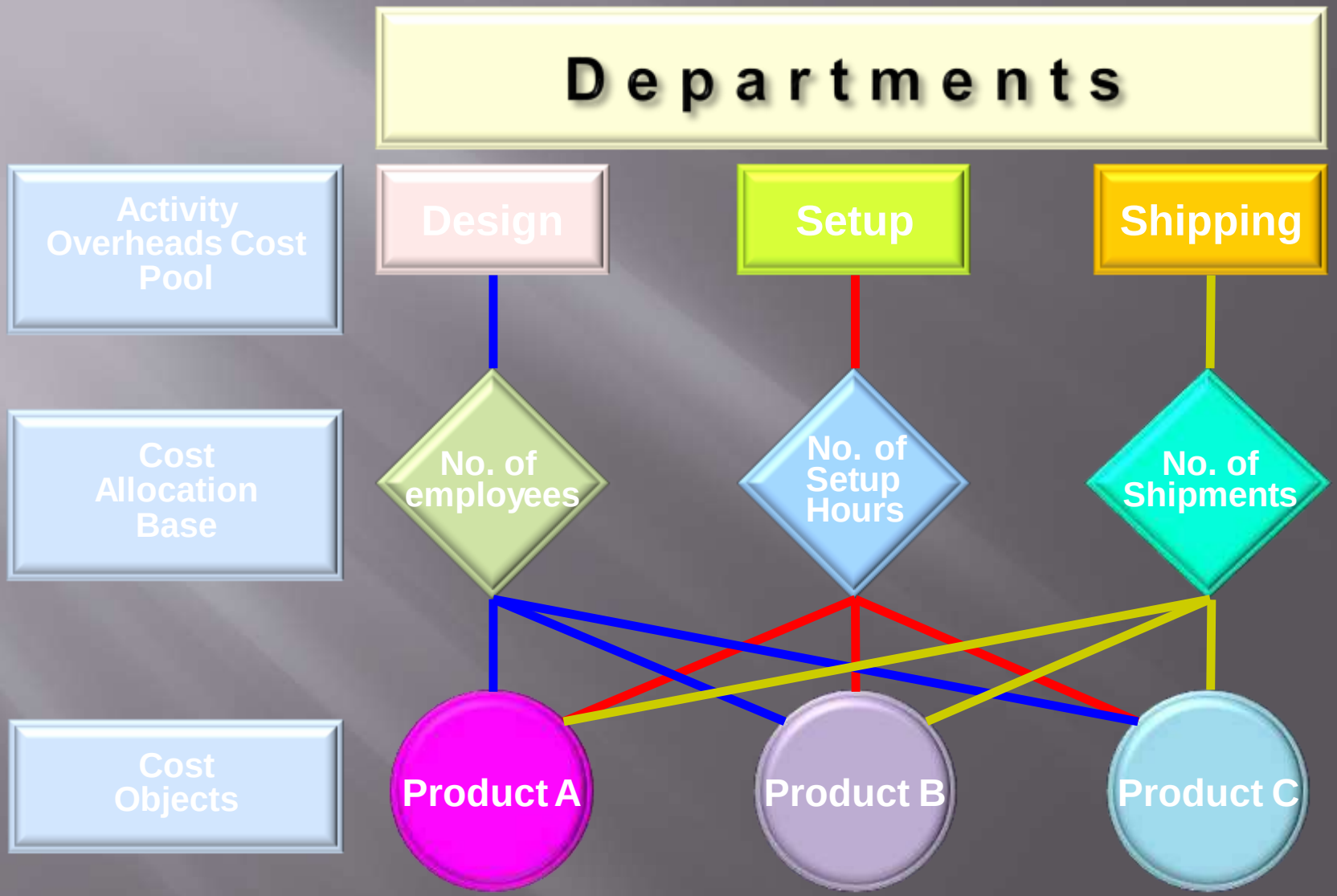
Step 4 Identify the overheads cost associated with the bases selected

Step 5 Compute the rate per unit

Step 6 Compute overheads cost for allocation to products

Step 7 Compute costs of products

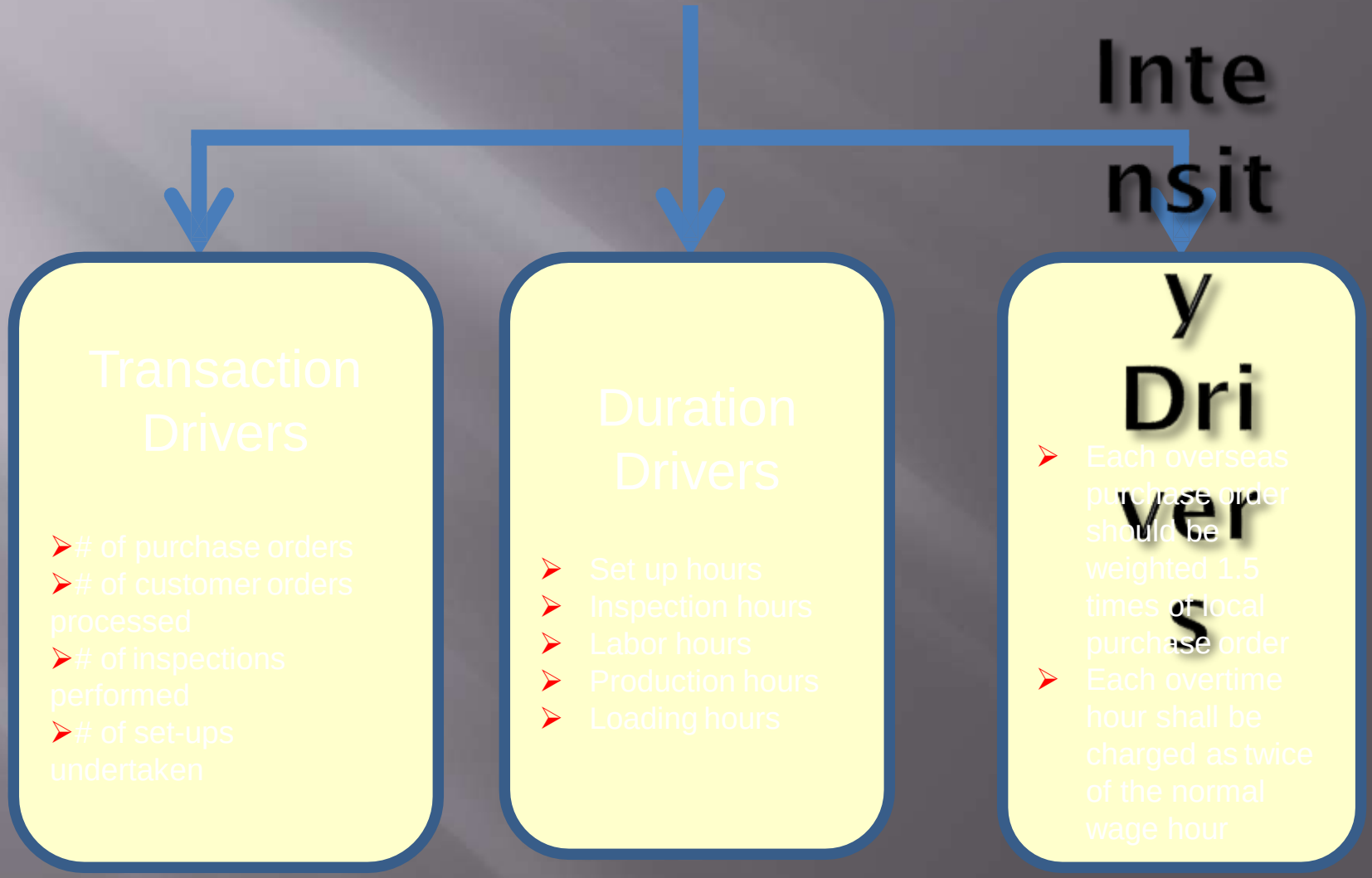
Allocation Stage



Cost Pools & Cost Drivers

Activity Cost Pools	Activity Cost Drivers
❑ **Production**	a) Number of units b) Number of set-ups c) Number electricity units consumed
❑ **Marketing**	a) Number of sales personnel b) Number of sales orders
❑ **Research & Development**	a) Number of research projects b) Personnel hours spend on projects c) Technical complexities of the projects
❑ **Customer Service**	a) Number of service calls b) Number of products serviced c) Hours spend on servicing products
❑ **Purchasing**	a) Number of purchase orders
❑ **Material Handling**	a) Number of material requisitions

Types of Cost Drivers



Levels of Activities

I. **Unit-level activities**

The costs of direct materials, direct labor, and machine maintenance are examples of unit-level activities.

II. **Batch-level activities**

are costs incurred every time a group (batch) of units is produced . Purchase orders, machine setup, and quality tests are examples of batch-level activities.

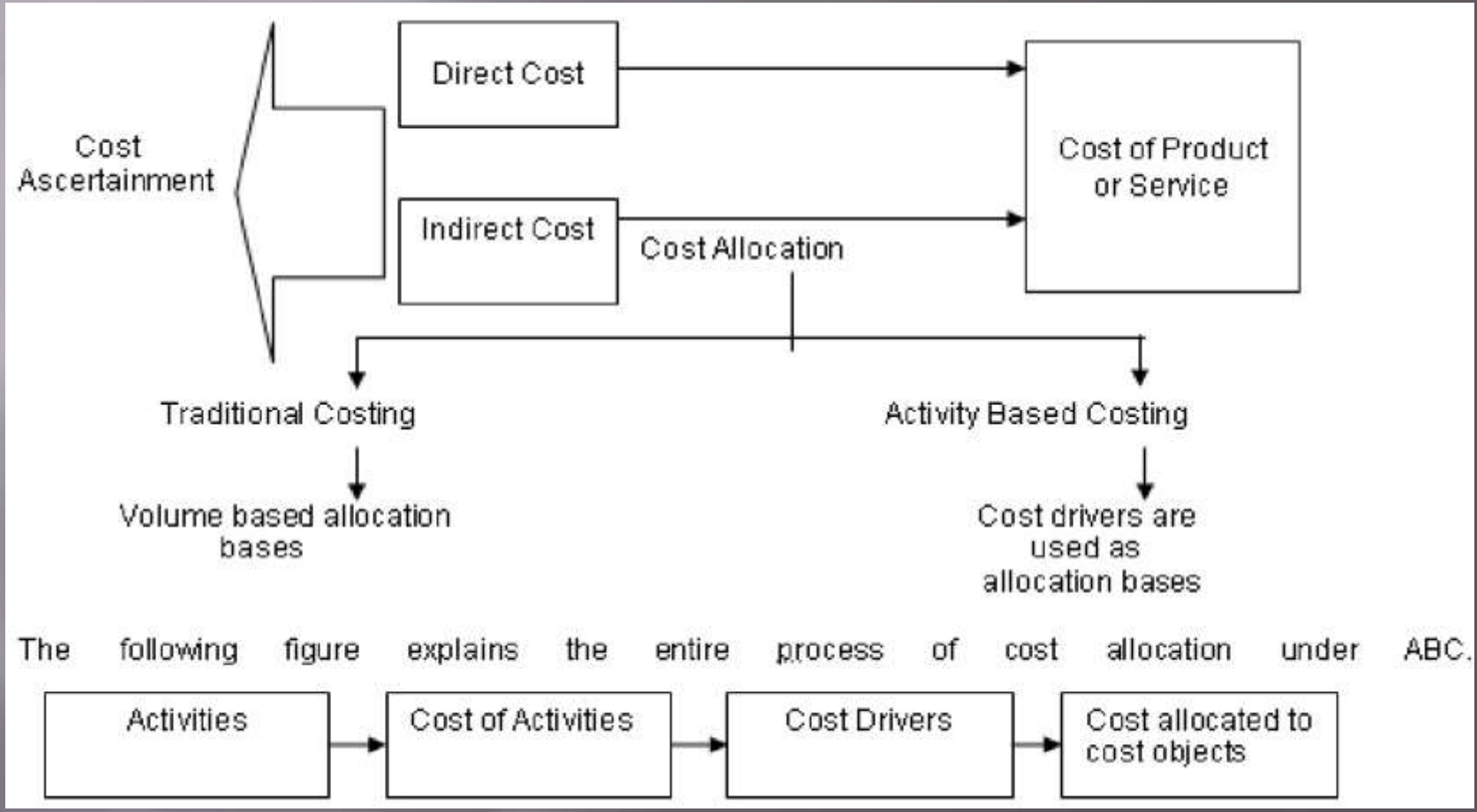
III. **Product-line activities**

Examples of product-line activities are engineering changes made in the assembly line, product design changes, and warehousing and storage costs for each product line.

IV. **Facility support activities**

The costs relating to the activities are administrative in nature and include building depreciation, property taxes, plant security, insurance, accounting, outside landscape and maintenance, and plant management's and support staff's salaries.

Cost Ascertainment



The following figure explains the entire process of cost allocation under ABC.

An Illustrative Model

Alpha Ltd. is manufacturing two products A and B. Both products are manufactured on the same machines and undergo the same processes. Here is the detail of budgeted data obtained for the two products for the financial year ending on December 31, 20x1:

Description	A	B
Budgeted production quantity (units)	25,000	2,500
Number of purchase orders	400	200
Number of set-ups	150	100
Resources required/unit:		
Direct material (AED.)	**25**	**62.5**
Direct labor (Hours)	**10**	**10**
Machine time (Hours)	**5**	**5**

DATA (Continues)

Budgeted production overheads cost for the year have been calculated as follows:

Description	Amount (AED.)
▪ Volume related overheads cost	275,000
▪ Purchase related overheads cost	300,000
▪ Set-up related overheads cost	525,000
Total overheads cost	**1,100,000**

The budgeted labor rate is AED. 20 per hour.

The company's present system is to absorb overheads by product units using rates per labor hour. However, the company is considering implementing a system of activity-based costing. Following cost drivers for overheads are used.

- Volume related overheads
  - ➢ Machine hours
- Purchase related overheads
  - ➢ Number of purchase orders
- Set-up related overheads
  - ➢ Number of set-ups

Solution

Require ments:

a) Calculate the unit costs for product A and B using:
   i. The absorption costing system
   ii. The proposed activity-based costing system
b) Compare the results in (i) and (ii) and explain the differences.

Solution:

The first step is to determine the overheads absorption rate or cost driver rates for each activity. Then utilize these rates to data given for each product.

Description	A	B	Total
Production quantity	25,000	2,500	
Direct labor hours required	250,000	25,000	275,000
			AED.
Total production overheads			1,100,000

Solution

Description	A	B	Total
Overhead absorption rate per labor hour 1,100,000/275,000)	**(AED.**		**AED. 4**
▪ Machine hours required	125,000	12,500	137,500
▪ Total purchase orders	400	200	600
▪ Total set-ups	150	100	250
Cost per cost driver			
Volume related overheads cost			AED. 275,000
Machine hours required			137,500
Volume related overheads/machine hour (AED. 275,000/137,500)			**AED. 2**
Purchases related overheads cost			AED. 300,000
Total purchase orders			600
Purchase related overheads / order (AED. 300,000/600)			**AED. 500**
Set-ups related overheads cost			AED. 525,000
Total set-ups			250

Solution

(a) (i) Unit cost working under traditional/absorption costing system

Description of cost components	A	B
	AED.	AED.
Direct materials cost	25.00	62.50
Direct labor cost (AED. 20 x 10 labor hours/unit)	200.00	200.00
Overheads (10 labor hours x AED. 4)	40.00	40.00
	----------	----------
Total cost per unit	**265.00**	**302.50**
	==========	==========

Solution

(a) (ii) Unit cost working under Activity-Based Costing system

Description of cost components	A	B
	AED.	AED.
Direct materials cost	25.00	62.50
Direct labor cost	200.00	200.00
Volume related overheads cost (AED. 2 x 5 machine hours/unit)	10.00	10.00
Purchases related overheads cost:		
➢ Product A: [(AED. 500 x 400 Orders)/ 25,000 Units]	8	
➢ Product B: [(AED. 500 x 200 Orders)/2,500 Units]		40
Set-up related overheads cost:		
➢ Product A: [(AED. 2,100 x 150 Set-ups)/25,000 Units]	12.60	
➢ Product B: [(AED. 2,100 x 100 Set-ups)/25,00 Units]		84.00
	-------	--------
Total cost per unit	**255.60**	**396.50**

Solution

(b) Difference in cost per unit under two systems.

Description	A	B
	AED.	AED.
Cost as per traditional costing system	265.00	302.50
Cost as per ABC costing system	255.60	396.50
↑Increase/(Decrease)↓	(9.40)	94.00
% change	↓(3.55%)	↑31.07%

Explanation & Recommendation

Under Traditional Costing System, the cost of Product A is increased by AED. 9.40 per unit (i.e. 3.55%) and the cost of Product B is decreased by AED. 94 per unit (i.e. 31.07%). These variances in cost per unit are because of inappropriate absorption of overheads cost under Traditional Costing System. Therefore, ABC system is highly recommended for the company, in order to book the correct overheads cost for Products A and B.

Illustration

XYZ Company makes a product AD that it sells to Alpha Company. The company has ABC system in operation that it uses for internal decision making. The company has two overheads departments, whose costs are listed as below:

Description	Amount (AED.)
Manufacturing overheads cost	500,000
Selling and administrative overheads cost	300,000

Total overheads costs	**800,000**
	=========

The company's **ABC** system has the following activity cost pools and activity drivers in place:

Activity Cost Pool

- **Assembling units**
- **Processing orders**
- **Supporting customers**
- **Other**

Activity Drivers

- Number of units
- Number of orders
- Number of customers
- Not applicable

Illustration

Costs assigned to other activity cost pool have no activity driver; they consist of the costs of unused capacity and organization-sustaining costs - neither of which are assigned to products, orders or customers.

XYZ Company distributes the costs of manufacturing overheads and of selling and administrative overheads cost to the activity cost pools based on employee information, the results of which are reported as below:

Description	Assemblin g Units	Processing Orders	Supporting Customers	Other	Total
Manufacturing overheads	50%	35%	5%	10%	100%
Selling & administrative overheads	10%	45%	25%	20%	100%
Total activity	1,000 units	250 orders	100 customers	--	--

Illustration

Required:

1. Perform the first stage allocation of overhead costs to the activity cost pools.

2. Compute activity rates for the activity cost pools.

3. **VB** is one of the **XYZ**'s big customers. Last year **VB** ordered **AD** four different times. **VB** ordered a total of **80 units** of **AD** during the year. Construct a table showing the overhead costs of these **80 units** and **four orders**. The price per unit charged to the customer is AED. 595. The direct materials cost per unit is estimated at AED. 180 per unit and direct labor cost per unit is AED. 50.

Solution

1. The first stage allocation of costs to the activity cost pools appears as below:

Activity Cost Pools

Description of cost components	Assembling Units	Processing Orders	Supporting Customers	Other	Total
	AED.	AED.	AED.	AED.	**AED.**
Manufacturing Overheads cost	250,000	175,000	25,000	50,000	**500,000**
Selling & admin. Overheads cost	30,000	135,000	75,000	60,000	**300,000**
Total cost	**280,000**	**310,000**	**100,000**	**110,000**	**800,000**

Solution

2. The activity rates for the activity cost pools are:

Activity Cost Pools	Total Cost	Total Activity	Activity Rate
	AED.	Units	AED.
Assembling units	280,000	1,000	280 per unit
Processing orders	310,000	250	1,240 per order
Supporting customers	100,000	100 customers	1,000 per customer … **(c)**

3. The overheads cost for the four orders of a total of 80 units of ASD would be computed as follows:

Activity Cost Pools	Total Cost	Total Activity	Activity Rate
	AED.		AED.
Assembling units	280 per unit	80 units	22,400 …. **(a)**
Processing orders	1,240 per order	4 units	4,960 …. **(b)**
Supporting customers	1000 per customer	Not applicable	

Solution

4. The product and customer margin can be computed as follows:

AD Product Margin:	**AED.**	**AED.**
Sales (AED. 595 per unit 80 units)		**47,600**
Cost:		
Direct materials cost (AED. 180 per unit 80 units)	14,400	
Direct labor cost (AED. 50 per unit 80 units)	4,000	
Volume related overhead **(a)**	22,400	
Order related overhead **(b)**	4,960	45,760

AD Product Margin for the order		**1,840**
		==========
Customer Profitability Analysis – XYZ Co.		
Product margin	1,840	
Less: Customer support overhead (above)	1,000	

Profit	**840**	
	========	

Advantages

1. **ABC** system provides accurate costing of products/services.
2. Management has better understanding overheads cost.
3. The system utilizes unit cost rather than total cost unlike absorption costing system.
4. **ABC** system integrates well with **Six Sigma** and other continuous improvement programs.
5. The in-depth study of overheads cost under **ABC** system makes all wastages visible to management and all non-value added activities known to them. Thus, better controls can be exercised on them.
6. It supports performance management and scorecards.
7. The system enables costing of processes, supply chains, and value streams.
8. **ABC** system helps in benchmarking other products.

Disadvantages

1. Implementing **ABC** system **requires a big budget** initially.
2. After implementation, the maintenance of the system is costly. Data concerning numerous activity measures must be collected , checked, and entered into the system on regular basis.
3. **ABC** system produces numbers such as product margins that are different from the profits produced by traditional costing system. Management may be double minded as they are used to work with traditional costing system, as a requirement for external reporting.
4. **ABC** system generated data can be **misinterpreted** and must be used with care when used in making decisions. Costs assigned to products, customers and other cost objects are only potentially relevant.
5. **Reports generated** by **ABC** system do not conform to **Generally Accepted Accounting Principles (GAAP).** Consequently, an organization involved in **ABC** should have two cost systems - one for internal use and one for preparing external reports.

Implementation Challenges

- The initiative to implement **ABC** system must be strongly supported by the management. The workings involve a tremendous job of making inquiries from employees.
- The design and implementation of **ABC** system should be the responsibility of a cross functional team of technicians. Normally, the team would include representatives from accounting, finance, **IT**, marketing, production and engineering departments.
- Services of an **ABC** system consultant must be hired in order to prevent the wastage of resources and time.
- Selection of **ABC** software that could implement and automate the processing of the system should be made upon expert advice. We have given a list of **ABC** system softwares as **Appendix A.**

Appendix A:
ABC Softwares

Software Detail

No.	Soft ware	Website
1	TDABC	http://www.acornsys.com
2	SAS® Activity-Based Management	ww.sas.com
3	ABC Focus activity based costing software	http://www.cashfocus.com
4	Prismata	http://www.prismata.com
5	Activity Based Costing For EXCEL	http://www.mrdashboard.com
6	Activity Based Costing – Workforce Software	http://www.workforcesoftware.com
7	SYSPRO Activity Based Costing	http://africa.syspro.com
8	Activity Based Costing/Management Software	http://www.business.com
9	ABC/M systems	http://www.algsoftware.com.au
10	Acorn Systems	http://www.acornsys.com
11	CostPerform, UK	http://costperform.co.uk
12	ACTIVITY BASED COSTING ANALYSIS SIMULATION MODEL	http://www.xjtek.com
13	Enlighten Software	http://www.enlighten-software.com
14	Prodacapo ABM	http://www.prodacapo.com/abm

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