CHAPTER 5
ACTIVITY-BASED COSTING (ABC)

The traditional costing system was developed and successfully used for more than 100 years until early 1980s. Prior to 1980s, most manufacturing companies were labor intensive, the product variety was small, and the overhead costs were generally very low compared to direct costs (DM and DL represent 80% of production costs and FOH costs represent about 20%). Also, non-manufacturing costs such as marketing and after sales services were relatively small comparing to production costs.

In the late 1970s and early1980s the business environment has significantly changed. The relative proportion of FOH has increased significantly (almost 80% of production costs). In addition, non-manufacturing costs became very significant and important to achieve customer satisfaction.

PROBLEMS WITH TRADITIONAL COSTING SYSTEMS

Two main problems tend to occur when traditional costing system is used: (i) products ***cross-subsidization*** and (ii) ***excluding non-manufacturing*** costs from the process of product costing.

1. Product Cost Distortions and Cross Subsidies

Traditional costing system uses a single volume based allocation base such as machine hours or machine hours to allocate FOH costs to cost objects. , which may result in cost smoothing phenomenon. Cost smoothing or peanut butter costing describes a costing approach that uses broad averages to assign the ***indirect cost*** of resources **uniformly** to cost objects when the individual products, services, or customers in fact ***use*** those resources in a **non-uniform** way. This, in turn, may result in over-costing some products and under-costing some others (a phenomenon called **"product cost cross-subsidization".**

- **Product under-costing** occurs when a product consumes a relatively high level of resource but is allocated a relatively lower amount of indirect costs than what it actually consumed. This may result in unrecognized losses on sales from under pricing.

- **Product over-costing** occurs when a product consumes a relatively low level of resources but is allocated a relatively higher amount of indirect cost than what it actually consumed. This may result in loss of sales from overpricing. Consequently, the company might erroneously drop certain successful products.

Generally, ABC solves this problem by separating overhead costs into different cost categories referred to as cost pools. Costs that are caused by, or driven by, the same activity are pooled together and then allocated, or traced, to products using an appropriate measure of the activity volume.

Excluding Non-Manufacturing Costs

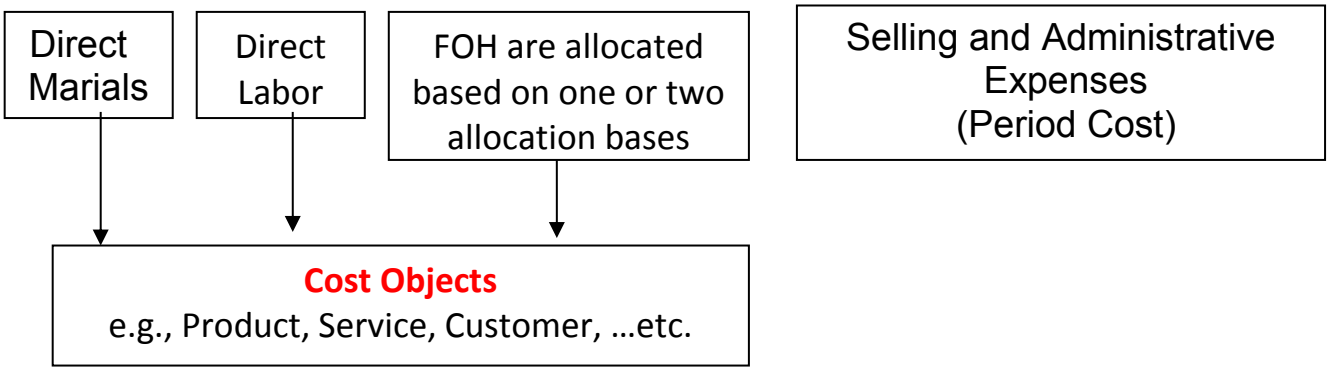
Non-manufacturing costs such as selling and administrative costs are not assigned to products or services. However, many of these non-manufacturing costs are significant part of the costs of the products and can be identified with certain products. For example, sales commission, shipping costs, and warranty repair costs can be easily traced to individual products and services.

Thus, the ABC approach provides the potential for more accurate product costs for management decisions concerning product planning, product design and introduction, product design changes, product pricing, make versus buy, product distribution, product service and product discontinuance. ABC also provides potential benefits to many service oriented industries such as banking, insurance, health care, and transportation.

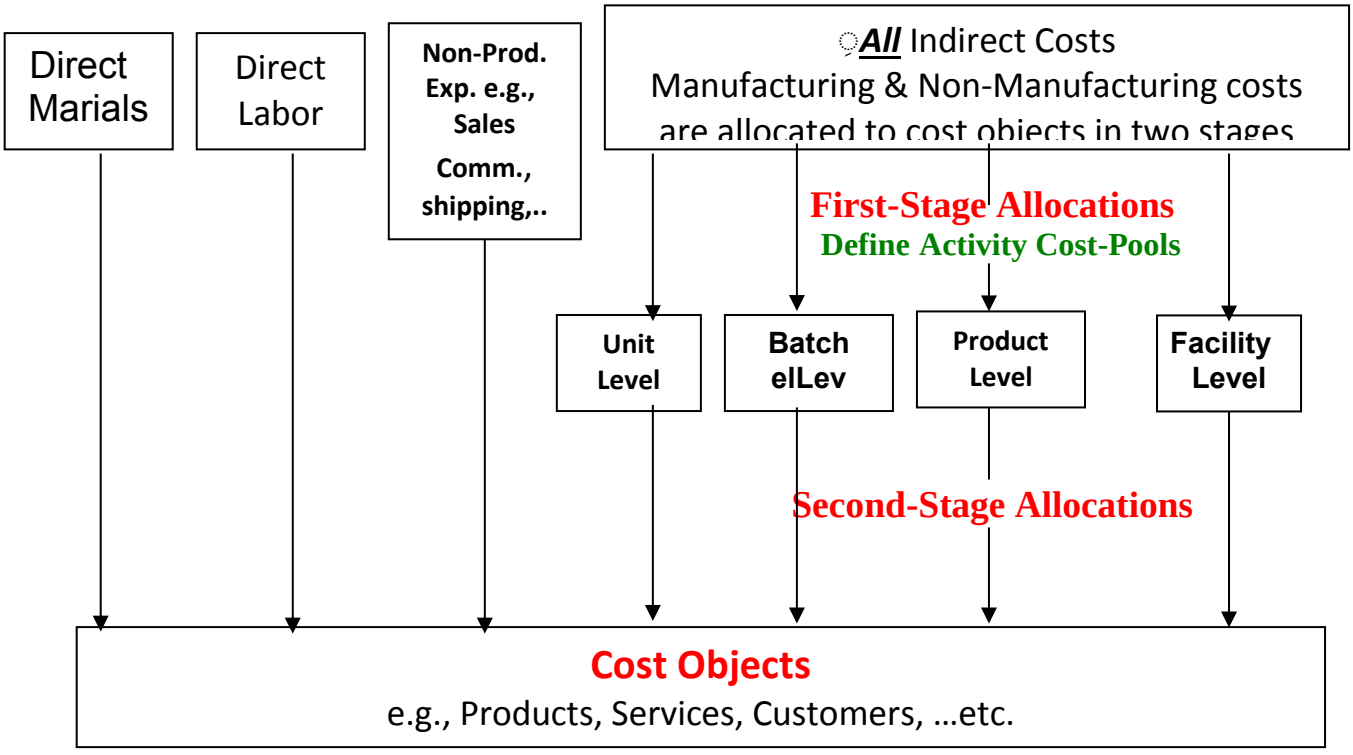
Figure 1 shows the differences between Traditional Costing system and ABC costing system.

Figure 1

TRADITIONAL COSTING SYSTEM (TCS)



ACTIVITY-BASED COSTING (ABC)



Mechanics of Activity-Based Costing

In order to produce and sell a product or a service, a firm should carry out thousands of different activities.

An activity is an event or a task or an action that should be taken in order to perform a particular business operation. Examples include: designing a product, developing a product, purchasing and receiving raw material or parts, setting up a machine to process a particular order, operating a machine, scheduling production to fulfill orders, inspecting products, correcting defective units, packaging, shipping products, customer services, etc.

Performing each of these activities consume resources (i.e., incurring costs). Following are the steps of designing and implementing an ABC system:

1. Identify all the ***activities*** that the firm has to perform in order to produce a product or to perform a service.
2. Estimate the ***resources*** (i.e., costs) required to fulfill each activity.
3. Identify ***activity cost pools***. Since it is impractical to track thousands of activities, it is important to simplify the process by grouping each set of similar activities into one activity cost pool. For example, activities that could be associated with running a machine may include the costs of labor, maintenance and power. These costs usually incurred when the machine is running.

A useful way to think about forming ***activity cost pools*** is to organize them into four general categories/levels (cost hierarchy): (a) unit-level, (b) batch-level, (c) product-level, and (d) organization-level activities.

(a). Unit-level activities: Activities that are performed each time a unit is produced. The costs incurred to perform activities at the unit level are *assigned* to each unit produced.

Examples unit-level include direct materials, direct labor, indirect materials, and certain types of indirect costs that are highly correlated with the units produced such as electricity to run machine, depreciation of machines, maintenance of machines, etc. Each unit produced consumes the same amount of these resources. The activity **measure** (allocation base) for this cost pool could be ***units produced or machine-hours***.

(b). Batch-level activities: Activities that are performed each time a batch of goods is processed, regardless of how many units are in the batch. For examples, tasks such as placing purchase orders, setting up machines, and arranging for shipments to customers are batch-level activities. Costs incurred at the batch-level depend on the ***number of batches*** processed regardless of the number of units produced in each batch. The batch-level costs are indirect to each individual units produced but are directly related to the batch.

(c). Product-level activities: Activities that are related to a specific product regardless of how many units produced or batches run. Examples of this type of activities include, designing & developing a product, and advertising for a product.

(d). Facility-level activities: Activities that are carried out regardless of which products are produced, how many batches are run, or how many units are produced.

4. Develop Activity Measures for each Activity Cost Pool:

An activity measure is a **cost driver** that causes the amount of costs incurred in an activity cost pool to change. The activity measures are used as an **allocation base** to assign the costs accumulated in a cost pool to the users of the cost pool. There are two types of drivers (indicators) for the amount of resources consumed each time a user (i.e., a cost object) uses an activity:

- **Transaction Driver**: A simple count of the number of times an activity occurs (e.g., # of bills sent out to customers, assuming that all bills consume the same amount of time to prepare).

- **Duration Driver:** A measure of the amount of time required to perform an activity.

5. Compute ***activity rates*** (i.e., the cost per unit of activity)
Activity rate for each cost pool is calculated as follows:

$$\textbf{The activity rate} = \frac{\text{the total cost assigned to an activity cost pool}}{\text{the total amount of activity for the cost pool}}$$

6. **Assign** costs to cost objects**.**
The activity rates can then be used to assign costs to all cost objects that consume or use the cost pool. Following is the allocation equation:

Assigned costs = the activity rate x the amount of activity used up by the cost object.

Example 1:

Haymarket BioTech, Inc. (HBT) produces and sells two secure communication systems, Regular and Super. HBT has the following operating data for the two products:

	Regular	Super	Total
Production Volume (units)	20,000 units	5,000 units	**25,000 units**
Selling Pricing per unit	$200	$400	
DM + DL per unit	$80	$200	
Total Budgeted DL hours	75,000 hrs	25,000 hrs	**100,000 hours**
DL hours per unit	3.75 hrs	5 hrs	

HBT uses a traditional costing system and uses Direct Labor hours as an allocation base to allocate FOH to the two products. The firm has a total **budgeted factory overhead of $2,000,000**.

Traditional Costing System

Application Rate = Budgeted FOH / Budgeted DL hours
=

Applied FOH per unit = Application Rate x Actual Quantity Used of Base
Applied FOH per unit of Regular =
Applied FOH per unit of Super =

Product Profitability Analysis under the Traditional Costing System

	Regular	Super
Selling Pricing	$200	$400
Unit DM + DL	(80)	(200)
Applied FOH		
Gross Margin		

Activity-Based Costing Analysis

In an attempt to use an activity-based costing, HBT has identified the following activities, budgeted costs, and activity consumption cost drivers:

Activity	Budgeted Cost	Activity Consumption Cost Driver
Engineering	**$125,000**	**Engineering hours**
Setups	**300,000**	**# of setups**
Machine	**1,500,000**	**Machine-hours**
Packing	**75,000**	**# of packing orders**
Total	**$2,000,000**	

HBT also has gathered the following operating data pertaining to each of its products:

	Regular	Super	Total
Engineering hours	7,500	5,000	12,500
Number of setups	100	200	300
Machine-hours	100,000	50,000	150,000
Packing orders	10,000	5,000	15,000

Using the gathered data, the cost driver rate for each activity consumption cost driver is calculated as follows

Applied Overhead Costs per unit of Regular

(1)	(2)	(3)	(4) = (2)/(3)	(5)	(6) =(4) x(5)	(7) = (6) / 20000
Activity Cost Driver	**Overhead Costs**	**Total Activity Consumption**	Application Rate	Activity Consumed by Reg.	Total Applied to Reg.	Applied FOH **per unit**
Engineering hours	$125,000	**12,500 hrs**				
Number of setups	300,000	300 setups				
Machine-hours	1,500,000	150,000 hrs				
Packing orders	75,000	15,000 order				
Applied Overhead Costs per unit of **Regular**						

Applied Overhead Costs per unit of Super

(1)	(2)	(3)	(4) = (2)/(3)	(5)	(6) =(4) x(5)	(7) = (6) / 5000
Activity Cost Driver	**Overhead Costs**	**Total Activity Consumption**	Application Rate	Activity Consumed Super	Total Applied to Super.	Applied FOH per unit
Engineering hours	$125,000	**12,500 hrs**				
Number of setups	300,000	300 setups				
Machine-hours	1,500,000	150,000 hrs				
Packing orders	75,000	15,000 order				
Applied Overhead Costs per unit of **Super**						

Profitability Analysis under ABC

	Regular	Super
Selling Pricing	$200	$400
Unit DM + DL	(80)	(200)
Applied FOH		
Gross Margin		

Comparison Between Traditional and ABC systems in Cost Allocation

	Regular	Super
Traditional Costing System		
ABC System		
Cost Distortion Per unit		
Total units produced		
Total Cost Distortion		