

CHAPTER TWO
THEORETICAL FRAMEWORK

SECTION ONE

OVERVIEW OF COSTING SYSTEM

2.1.1 Costing Concepts

During the 1920s accountants were found to be quite willing to modify costing systems to make them more responsive to managerial needs, and managers began to use cost information to judge the impact of their decisions on company profits. After World War II (1939-1945) there was an increasing awareness of the view that cost information, in particular, and accounting information, in general, should be appropriate to the needs of users, especially decision-makers¹. Recently, the perceived importance of cost accounting information has been increased because of decreasing profitability, increasing costs and competition, and economic crises².

Costing is a process of assigning costs to cost objects. It defined by (Taylor, 1965) as “the proper allocation of expenditure”³. Costing system accumulates costs by some natural classification (such as materials, fuel, and advertising) and assigns these costs to cost objects. Cost accumulation means collecting costs by some "natural" classification such as materials or labour, or by activities performed such as order processing or machine processing. Cost assignment means tracing or allocating costs to one or more cost objects such as activities, departments, customers, or products. Cost tracing is a specific term for assigning direct costs; Cost allocation

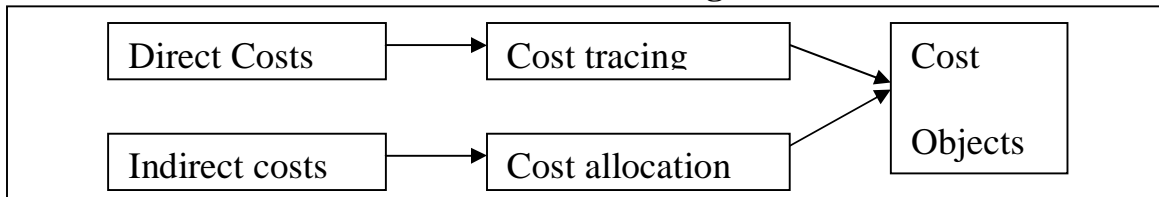
¹. Ning, Y., The Development of Costing Systems: A Historical Perspective, Journal of Modern Accounting and Auditing, Vol.1, No.2, 2005 p. 21.

². UYAR, A., Cost and Management Accounting Practices: A Survey of Manufacturing Companies, Eurasian Journal of Business and Economics, Vol.3, No.6, 2010, p. 119.

³. Taylor, A.H. & H. Shearing, Financial and Cost Accounting for Management: The Fundamentals of modern cost accounting techniques, 4th ed, McDonald and Evans LTD, London, 1965, p.207.

specifically refers to assigning indirect costs¹. The relationship among those three concepts can be portrayed through the exhibit 2/1/1 as follows:

Exhibit 2/1/1: Cost assignment



Source: Horngren, C. T., Datar, S. M. and Foster G., Cost Accounting: A Managerial Emphasis, 10th ed, Pearson Prentice Hall, New Jersey, 2000, p.96

Cost allocation which refers to assigning indirect costs to cost objects is very important for several reasons. First, allocation is required for predicting the economic effects of strategic and operational control decisions. Second, allocation provides desired motivation and to give feedback for performance evaluation². Third, allocation is required for valuing inventories and for computing income as per the generally accepted accounting principles. Fourth, allocations help managers in inducing desired organizational behavior and in dissuading or “taxing” undesired behavior³.

This cost allocation has traditionally been a two-stage process. In the first stage, costs were assigned to cost pools (often called cost centers), and in the second stage, costs were allocated from the cost pools to cost objects⁴.

There are many different allocation bases (direct material cost percentage, direct labour cost percentage, direct labour hour, prime cost

¹. Horngren, C.T., G. Suddem & W. O. Stratton, Introduction to Management Accounting, 14th ed, Pearson Prentice Hall, New York, 2005, p. 131.

². Horngren, C.T., G.L. Suddem, W.O. Stratton, D. Burgstahler, & J. Schatzburg, Introduction To Management Accounting, 14th ed, Pearson Custom Publishing & Pearson Prentice Hall, New York, 2008, p. 140.

³. Balakrishnan, R., E. Labro, & K. Sivaramakrishnan, Product Costs as Decision Aids: An Analysis of Alternative Approaches (Part 1), Accounting Horizons, American Accounting Association, Vol. 26, No. 1 DOI: 10.2308/acch-50086, 2012, p.2.

⁴. Cooper, R., & R.S. Kaplan, R., How cost accounting distorts product costs?, Management Accounting, 1988, p. 20.

percentage, machine hour, units of product) are used in the first stage to allocated costs from plant overheads accounts to cost center. In the second stage, a common method of assigning manufacturing overhead to product is to compute a plant- wide rate, using a volume – related allocation base. This method assumes that all overhead cost variation can be explained by one allocation base (cost driver). Under this method, all overhead is allocated from the cost pools to all the products, using only one overhead rate (commonly direct labour or machine hours). This rate is computed by dividing the total budgeted manufacturing overhead by the total budgeted estimated allocation base. The single plantwide overhead rate distorts product cost by averaging high and low overhead costs¹.

A slightly more refined method was developed to use departmental factory overhead. This method uses different rates for each production department to allocate overhead to products. Departmental overhead rates are determined by dividing the budget production department overhead by the budget allocation base for each department. However, even departmental overhead rate will not correctly assign overhead costs in situations where a company has range of products and complex overhead because the departmental method usually relies on volume as the factor in allocation overhead cost to product².

ABC is a method that attempt to assign overhead costs more accurately than the two methods above. ABC Allocation method improves on traditional manufacturing overhead in two ways. First, an analysis of what causes cost to happen may result in reclassification of certain costs from overhead to direct material, direct labour, or some other direct cost

¹ . Hansen, D.R., Management Accounting, PWS-KENT Publishing Company, Boston, 1990, p. 205.

² . Folk, J.M, R. H. Garrison, E. W. Noreen, Introduction to Managerial Accounting, McGraw-Hill/Irwin, New York, 2002, p. 120.

classification. Second, rather than using one a giant cost pool and a single allocation base resulting in one plant-wide application rate or departmental production overheads rates, ABC uses multiple costs pools to develop multiple application rates. Under this method, factory overhead costs are initially accounted for in activity cost pools. These cost pools are related to a given activity, such as machine usage, inspection, moving, production setups, and engineering activities. These activity cost pools are assigned to products, using overhead rates for each activity. Activity rates are determined by dividing the cost budgeted for each activity pool by the estimated activity base for that pool¹.

2.1.2 Functions of costing system

Cooper and Kaplan (1998) suggest that costing systems (by which they mean cost accounting that is management information systems about costs must fulfill primary functions²: (a) Valuation of inventory and measurement of the cost of goods sold for financial reporting purposes. (b) Estimating of the costs of activities, products, services and customers for the purposes of pricing and also decision-making about whether they are profitable and whether to continue supply chain. (c) Providing feedback to managers and operators about process efficiency.

2.1.3 Designing and Installation of Costing System:

There is no costing system which can be adopted by all types of organization. Each organization has to find its own optimal system. Before a costing system is installed, a great deal of attention is called for. In particular, the business must be studied in detail to find out the exact

¹. Jones, K.H, M. L. Werner, K. P. Terrel, & R. L. Terrel, Introduction To Management Accounting: A user Perspective, *Prentice Hall, New Jersey*, 2000, p.73.

². Botten, N., Managerial Accounting – Business Strategy- Strategic level, *CIMA's Official Learning System*, CIMA Publishing – An imprint of Elsevier, 2008, p.423.

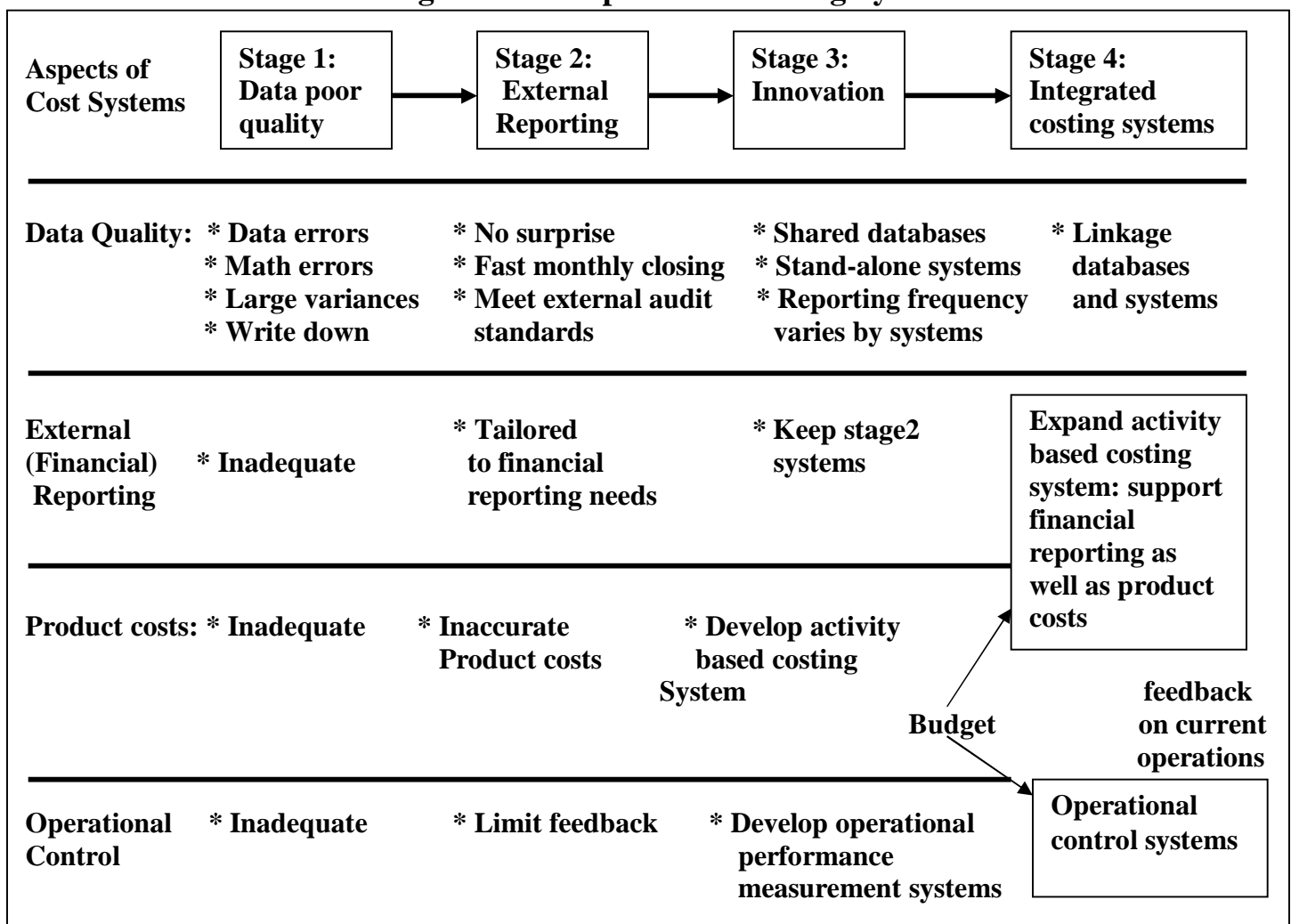
information required. Clearly, the design of a system of cost accounts and details of the method employed will vary according to the features of each concern. The following factors should be considered in the installation of a costing system: (a) The Product: the nature of the product will determine the type of costing system to be applied. The relative values of materials, labour and overheads in relation to total cost of the product should be considered before installing an efficient system of cost control. (b) The organization: the existing organization should be disturbed as little as possible. The size and type of organization are obviously relevant to the cost accountant's investigation. The scope of authority of each executive, the source from which the cost accountant is to derive his information, and the type of costing information required by various levels of management should be kept in mind. (c) Manufacturing processes and methods: the costing system to be installed must reflect the manufacturing processes and methods of production of a particular company. The accountant designing the system must know the wage payment system, incentive schemes, methods of time keeping and booking, the control of inventories, cost of tools and machines, and cost of other related operations. (d) The technical aspects: the technical details of the business should be carefully studied. Effort should be made to secure the systematic assistance and support of the factory staff. (e) Reconciliation of cost and financial accounts. (f) Legal requirements: the legal requirements such as laws (income tax, securities "contracts" Regulation Act prescribe certain record -keeping) should be kept in view while designing and installing a costing system. (g) Simple procedures: The system of costing to be installed should be simple to understand and easy to operate¹.

¹. Nigam, B.M.L., I.C. Jain, Cost Accounting: An Introduction, Prentice Hall of India, 2001, pp. 11-12.

2.1.4 The Four-Stage of Cost Systems (integrated costing systems)

Kaplan advocated that in his article “one costing system is not enough” companies develop new costing systems to produce useful information for operational control and for analyzing the profitability of products, product lines, and customers. These new systems were initially to be separate from the one used to prepare external financial statements¹. The exhibit 2/1/2 explains the four stages of costing system.

Exhibit 2/1/2: Four Stages of Development of Costing Systems



Source: Kaplan, R.S., The Four-Stage Model of Cost Systems Design, Management Accounting, Vol.71, No.8, 1990, p.23.

¹ . Kaplan, R. S., The Four-Stage Model of Cost Systems Design, Management Accounting, Vol.71, No.8, 1990, p.22.

The above exhibit 2/1/2 explains that cost accounting has moved through four stages with the final stage being the one to which management should aspire as follows:

- a. **Stage 1 system: Poor Data Quality:** These are wholly inadequate systems even for financial reporting where there are no accurate algorithms for allocating costs to products and hence large and uncontrolled variances occur¹.
- b. **Stage 2 systems: External Reporting:** Most companies have Stage 2 costing systems. They are called traditional or conventional costing systems. The financial statement prepared from Stage 2 systems require few post-closing adjustments, meet auditability standards with adequate data integrity and internal controls, support fast monthly closings, and engender a general belief within the corporation that financial statements produced by the system are reliable. These systems have been criticized as being inadequate for managerial purposes and they have serious limitations for operational control, and for accurate product costing and profitability analysis. The limitation for operational control because they are not timely, high level of aggregation, focusing on aggregate financial results and many of the periodic operating reports are contaminated with extensive allocations of costs. Stage 2 systems also are inadequate for product costing and profitability analysis because they rely on only a few allocation bases for assigning indirect costs to products, product lines, and customers².
- c. **Stage 3 systems: Innovation :** To overcome the limitations of stage 2 systems, Stage 3 systems were developed for operational control and for

¹ . Botten, N., Op.cit, p. 424.

² . Kaplan, R.S., Ibid, p. 22.

strategic profitability analysis. These systems are disjointed where additional costing information is collected and distributed alongside the conventional system. The main elements are¹: A well- functioning traditional costing systems using conventional method of allocation of costs to products and preparing monthly reports and financial statements; One or more activity based cost systems taking data from the official financial system as well as other sources to measure accurately the costs of activities, processes, products, services, customers and organizational units; Operational feedback systems providing operators and all front-line employees with timely accurate information both financial and non-financial on the efficiency, quality and cycle time of business process.

d. Stage 4 systems: Integration: Integrated costing systems will drive information to prepare external reporting statements from the activity based and operational control systems developed during stage 3. As companies experiment with, gain confidence in, and eventually standardize their strategic profitability systems and their operational control systems, they can replace their stage 2 financial reporting systems with reconciliation modules that prepare GAAP external reporting statements from data already being collected for the managerial systems².

2.1.5 Costing Methods: Costing methods are those which help a firm to compute the cost of production or services offered by it. There are two principle methods of costing Job costing and process costing.

a. Job costing: In this system, the cost object is a unit or multiple units of a distinct, identifiable product or service that is typically custom-made

¹ . Botten, N., Ibid, p. 425.

² . Kaplan, R.S., Ibid,, p. 22.

and produced in small quantities with relatively large unit costs, as is typical in the construction, furniture, aircraft, and machinery industries. Job costing systems accumulate production and manufacturing costs on a unit-by-unit (or batch-by-batch) basis to derive a per-unit product cost¹.

b. Process costing is commonly used in such manufacturing operations as cement plants and flour mills, in which the production process is standardized and continuous and the product remains essentially the same from day to day. The process costing accumulates costs without attempting to allocate them during the accounting period to specific units of goods being manufacturing. At the end of the fiscal period, the average cost per unit is determined by dividing the total number of units produced into the total costs accumulated. In many types of business that use process costing, manufacturing consists of a progressive series of distinct operations or processes. Usually each process is carried out in a different department. A unit cost may be computed for each process or department. This department unit cost may be a useful tool in measuring and controlling efficiently².

The differences between these two systems are: Under job costing, the costs are captured for each job. Under process costing, the costs for each process or department are captured in a complete manner. In process costing, costs are accumulated by departments, operations, or processes. The work performed on each unit is standardized or uniform where a continuous mass production or assembly operation is involved³. In job costing, total costs are determined when the job is completed. In process costing, total costs are

¹ . Horngren, C. T., Datar, S. M. & Foster G., Cost Accounting: A Managerial Emphasis, 11th ed, Prentice Hall, New York, 2003, p. 99.

² . Brock, H.R., & L.A. Herrington, Cost accounting: Principles and Applications, 6th ed, Glencoe/McGraw. Hill, 1999, p. 11

³ . SAP AG, White Paper - Business Intelligence – Aiming for the Strategic Costing System, <http://www.sap.com/contactsap>, 2009, p.5.

determined at the end of the period of time. In job costing, the unit cost is the total cost per job divided by the units produced. In process costing, the unit cost is the total manufacturing costs for the period divided by units produced during the period¹

c. Operation costing: operation costing is a hybrid of job and process costing and is used by companies, such as clothing or automobile manufacturers, that make product in batches, large numbers of products that are standardize with a batch. Operation costing is similar to process costing in that standardized methods are used to manufacture the product. At the same time, the product may have some customized, individual features that require the use of job costing². The table 2/1/1 summarizes the three types of costing system methods.

Table 2/1/1: Costing systems methods

Costing Systems Methods			
	Job Costing	Operations Costing	Process Costing
Type of Product	Custom	standardized	Homogeneous
Example	Construction, movie, studies, hospitals, print shop.	Automobile and clothing manufacturing	Beverages, oil refineries, paint, paper, rolled steel

Source: Jackson, S., R. Sawyers, & G. Jenkins, Managerial Accounting: A focus on Decision Making, Thomson- South- Western, New York, 2006, p.67.

2.1.6 Costing Techniques: Costing techniques are those which help a firm to present the data in a particular manner so as to facilitate the decision making as well as cost control and cost reduction. The following are some of the costing techniques:

¹ . Weygand, J.J., D. E. Kieso, P.D. Kimmel, Managerial Accounting: Tools for business Decision Making, 3rd ed, John Willy & Sons, New York, 2005, p. 97.

² . Jackson, S., R. Sawyers, G. Jenkins, Managerial Accounting: A focus on Decision Making, Thomson- South- Western, New York, 2006, p.67.

- a. Absorption costing:** This technique is also called full or conventional costing. This technique assigns fixed overhead costs to the product as expenses only when a sale occurs, so that reported product costs measure total manufacturing costs (fixed & variable manufacturing costs)¹.
- b. Variable costing:** This technique is also called direct costing; the cost of product is composed only of variable manufactured costs; costs that increase or decrease as the volume of production rises or falls. This technique is more useful to management in making decisions².

The difference between Absorption and variable costing in the treatment of fixed overhead. Absorption costing, which is widely used in financial reporting, assigns overhead costs to the inventory product during the manufacturing process. Under variable costing, the fixed overhead cost is treated as a period cost and is recorded on the income statement as an expense. The fixed costs for overhead go to the product under absorption costing and to the period under variable costing³. The table 2/1/2 portrays comparison of absorption and variable costing in general:

Table 2/1/2 Comparison between Absorption & Marginal Costing

Absorption Costing	Costs	Variable Costing
Product ←	Direct materials	→ Product
Product ←	Direct labor	→ Product
Product ←	Variable manufacturing overhead	→ Product
Product ←	Fixed manufacturing overhead	→ Period
Period ←	General selling and administrative	→ Period

Source: Webster, W. H., Accounting for Managers, McGraw-Hill, New York, 2004, p. 120

¹ . Cooper, R., & R.S. Kaplan, Op.cit, p. 20.

² . Warren, C., J. Reeve, P. Fees, Managerial Accounting, 8th ed, Thomson South-Western, 2005, p.133

³ . Webster, W. H., Accounting for Managers, McGraw-Hill, New York , 2004, p. 120.

c. Standard Costing: A technique in which cost components are predetermined using standard costs, assuming normal operations, instead of using actual costs. The standard costs are then compared with actual costs and variances are explained in terms of either price or quantity¹ Standard costing provides management with frequent variance reports which highlight when costs or revenues are not going according to expectations. Thus, management can take appropriate corrective action as early warning about possible losses and efficiencies; Also it helps to ensure the control of all the elements of cost and revenue in terms of price and volume; work well in small, medium and long- scale businesses; help to achieve uniformity in the costing of job and/ or products².

d. Budget: Budget is a business plan for the short term- typically one year. It is likely to be expressed mainly in financial terms. Its role is to convert the strategic plans into actionable blueprints for the immediate future. Budgets will define precise targets concerning: cash receipts and payments; sales, broken down into amounts and prices for each of the products or services provided by business; detailed stock (inventory) requirements; detailed labour requirements; specific production requirements³.

Standard costing and budget are very similar. The major distinction between the two terms is that standard is a unit amount, whereas a budget is a total amount⁴. Budget relates to a forecast amount of money to be received or incurred in respect of a certain function, whether the function is a country,

¹ . Ibid, p. 139.

² . Chadwick, L., Management Accounting, Rout ledge, London & New York, 1993, p.121

³ . Atrill, P., &E. McLaney, Management Accounting for decision makers,4th ed, FT Prentice Hall, Pearson education, New York, 2005, p.10

⁴ . Folk, J.M., et al., Op.cit, p. 330.

distinct council, company, division or an operating unit, while standard relates to the cost price or sales value of a unit of product or service¹.

Methods and techniques of costing should be regarded as tools of a cost accountant and it should not be constructed that a particular method or technique is superior to any other. Just as skilled workman uses different tools for different tasks, similarly, a cost accountant should use these methods and techniques appropriately either individually or in combination. For example, standard costing may be combine with process costing to give “standard process costing” or standard costing may be combine with marginal costing as well as process costing to give standard marginal process costing².

¹. Owler, L.W.J.& J.L. Brown, Cost accounting and costing methods, 14th ed, Macdonald & Evans,1978, p.519.

² . Arora, M.N, Cost accounting : Principles & Practice,9th ed, Vikas Publishing House PVT Ltd, New Delhi, 2006, p.1.14.

SECTION TWO

TRADITIONAL COSTING SYSTEMS

2.2.1 Background of traditional costing systems

Traditional costing systems were developed in the early part of the twentieth century for monitoring direct labor cost for mass production of a few standard items because direct labour cost was a significant portion of total product costs¹. They well known as conventional or volume-based systems (VBC) or Stage 2 systems are accounting systems that don't accumulate or report costs of activities or processes². They use measures of output volume (such as the number of output units, machine hours, material costs) and/or measures that used to be of output volume (such as direct-labor hours and direct labor cost) as the allocation bases to allocate indirect costs to cost objects³.

Traditional costing systems are characterized by the following features: (a) they are adequate for meeting financial reporting requirements such as inventory valuation; (b) they report highly distorted product costs; (c) they feature non-existent or highly distorted customer costs; (d) they provide feedback to managers and employees that are too late, aggregated and financial for taking decisions on running their business⁴.

These traditional costing systems fail to fulfill two of the role costing systems outlined earlier, that is: Estimating of the costs of activities, products, services and customers for the purposes of pricing and also

¹ . Wijewardena, H., A. De. Zoysa, a Comparative Analysis of Management Accounting Practices in Australia and Japan: An Empirical Investigation, The International Journal of Accounting, Vol.34, No.1, 1999, p. 58.

² . Horngren,C.T., et al., Op.cit, p. 150.

³ . Ning,Y., Op.cit, p.23.

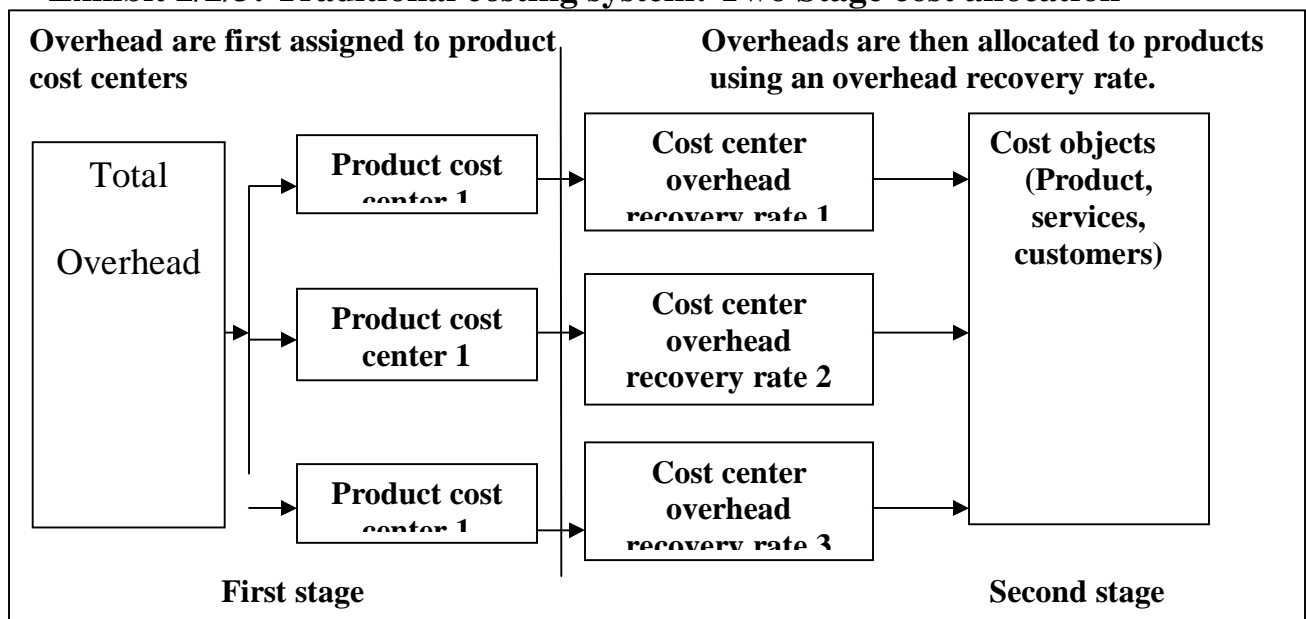
⁴ . Botten, N., Op.cit, p. 424.

decision-making about whether they are profitable and whether to continue supply chain; providing feedback to managers and operators about process efficiency.

2.2.2 Two-stage cost allocation

Traditional costing systems assign all manufacturing overhead costs even manufacturing overhead costs that are not caused by the products to products with two stages as in Exhibit 2/2/3: The first stage is to gather manufacturing overhead costs into a single plant-wide cost pool or cost pools defined for organizational (departmental) sub-units. In the second, manufacturing overhead costs are assigned from cost pool to units of product manufactured on the basis of one variable, such as direct labour,etc¹.

Exhibit 2/2/3: Traditional costing system: Two Stage cost allocation



Source: Atrill, P., & E. McLaney, Management accounting for decision makers, FT Prentice Hall, Pearson education, 4th edition, 2005, p .114.

¹ . Anthony, A.A., R.D. Banker, R.S. Kaplan, & S.M. Young, Management Accounting, 3rd ed, Prentice Hall, New Jersey, 2001, p. 134.

2.2.3 Limitations of traditional costing systems

Traditional costing systems have been the subject of much criticism, especially in relation to the accuracy of product costing. The literature identified a number of fundamental limitations in traditional costing systems:

- (a) **Inaccurate cost allocations:** Traditional costing systems allocate indirect costs using a single overhead rate with an allocation base of direct labour. However, overhead costs are created by a variety of factors, and allocating costs just on the basis of labour, or any single allocation base, may seriously distort product costs¹. If cost systems results in distorted product costs being reported, the overcosted product will lead to higher bid prices and business lost to those competitors who are able to quote lower process purely because their cost system produce more accurate cost information².
- (b) **Service-related costs & Customer-related costs:** Service-related costs have increased considerably in the last few decades. Costing for these services was previously non-existent. Customer-related costs (finance, discounts, distribution, sales, after-sales service, etc.) are not related to the product's cost objects, Customer profitability has become as crucial as product profitability³.
- (c) **Costs of activities and processes:** Traditional costing does not report useful information about those activities that have the most potential for improving overall performance. They focus manager's attention on improving the efficiency of particular processes in order to reduce costs, when in fact these processes are of limited significance to the firm other than

¹ . Johnson, H. T., & R. S. Kaplan, *Relevance lost: The rise and fall of management accounting*, Boston: Harvard Business School Press, 1987, p. 22.

² . Drury, C., *Cost & Management Accounting*, 6th ed, Thomson, Australia, 2006, p.5

³ . Glad, E., H. Becker, *Activity-Based Costing & Management*, John Wiley & Sons, New York, 1996, p. 2.

the fact that they attract substantial overheads¹. They provide just information about salaries and depreciation at the department level. Such functional overhead reports do not provide information about the effectiveness of the work done, nor do they capture and describe the contribution of each worker. They are dominated by functional classification. This functional classification is accompanied by the use of cost variance as a key performance measure. Traditional measures and metrics often cause behavior that improves functional performance at the expense of overall company performance².

(d) Traditional costing systems reporting reflect only the raw material portion of a product, not the extra set-up time required to make the product. Additionally, traditional reporting ignores costs for technological support to solve manufacturing problems and doesn't account for hidden quality product costs. In contrast, ABC reporting assigns these costs to specific product³.

(e) **Time lag:** TCs data for management reporting are historic in nature. Data lag behind the actual manufacturing activities on the assumption that control can be applied after the fact to correct errors in lean setting, however, shop floor managers need immediate information about abnormal deviations. They must know in real time about a machine breakdown or a robot out of control. After the fact information is too late to be useful⁴.

(f) **Financial orientation:** Accounting data use dollars as standard unit of measure for comparing disparate items being evaluated. Decisions pertaining to the functionality of a product or process, improving product quality, and

¹ . Popesko, B., Op.cit, p.104

² . SAP AG, Op.cit, p.6.

³ . Nancy, M.M.A., Op.Ci, p.44.

⁴ . Bodnar, G.H., & W.H. Wood, Accounting information systems, 10th ed, Pearson, New Jersey, 20XX, p. 30.

shortening delivery time, however, are not necessarily well served by financial information produced through TCs. They attempt to force such data into a common financial measure¹.

Despite considerable criticism about the usefulness of traditional costing systems, their use is still widespread. Some surveys (Innes and Mitchell, 1995) estimate that 40% or more of firms rely on traditional volume-based systems especially in developing countries. However, by necessity, these surveys tend to have small sample sizes, and focus on specific regions and on manufacturing firms; thus, the extent to which this estimate is a global average is unknown.

2.2.4 Cost distortion in traditional costing systems

The indirect assignment of cost lowers the costs of measurement of a cost system, but it can introduce considerable distortion. Distortion occurs when either the unit price or the quantity used of a resource is not attributed accurately to cost centers and products. Five factors explain the sources of distortion. First, some costs are allocated to products that are unrelated to the products being produced. For example, research and development costs for future products, excess capacity costs, and corporate overheads costs (e.g., pension costs of retired workers)².

Second, distortion is introduced by omitting costs that are related to the products being produced or to customers serviced. Examples of such costs that are frequently omitted include selling, general, and administrative costs; and warranty costs for existing products. Cost systems usually omit such costs because for financial reporting purposes, these cannot be capitalized and assigned to inventory. Third, distortion can be introduced by

¹ . Ibid, p.30.

² . Cooper, R. & R.S. Kaplan, *The Design of Cost Management systems: Text, Cases, and Readings*, Harvard Business Review, Prentice- Hall international, Inc., New Jersey, 1991, p. 3.

costing only a subset of the outputs of the company as products. For example, when the outputs of the company include both tangible (i.e., manufactured) and intangible (i.e., service) products, cost systems may assign costs only to the tangible products. This treatment does not introduce distortion into reported costs if the costs of the intangible products are minor or expensed as period costs. However, many of the costs of intangible products are typically allocated to the tangible products, thus causing the reported costs of those products to be too high¹.

Fourth, distortion can be introduced by indirectly assigning costs inaccurately to products. Inaccurate assignment can introduce two different forms of distortion. Price distortion is introduced when the cost system is too aggregated and average prices are used instead of specific prices. Quantity distortions are introduced by when the costs are indirectly assigned to products using a basis that is not perfectly proportional to the actual consumption of resources by products². Finally, distortion is introduced by attempting to allocate common or joint costs to products. Any attempt to allocate such costs to products is doomed to be arbitrary and misleading. Joint costs emerge when the production process necessarily produces two or more products, as is the case when refining crude oil. Common costs pose similar problems to joint costs. They occur when multiple products are produced using the same indivisible resource. For example, when a machine is setup to allow a batch of products to be produced, then the cost of the setup is common to every unit in the batch³.

¹ . Ibid, p. 3

² . Ibid, p. 4

³ . Ibid, p. 4

SECTION THREE

ACTIVITY BASED COSTING (ABC)

2.3.1 Background of Activity based costing (ABC)

Traditional costing systems work well when companies manufactured a narrow range of products and the costs of direct labour and materials were the most important production factors. However, by the late 1980s product lines and marketing channels had proliferated and direct labour only represented a small fraction of overall costs while expenses covering operations such as marketing, distribution and research and development had increased considerably. Therefore, activity based costing (ABC) was introduced in 1980s by (Cooper & Kaplan) based on their experiences with Harvard Business School cases as a response to general dissatisfaction with traditional costing systems, seemingly offered a great new opportunity for companies to obtain more accurate costs of their processes, products, and customers¹.

ABC system has gained a high profile in professional and academic journals and textbooks in management accounting as a technique which improves the accuracy of product/service costing and also assists managers in understanding how resources are used across a firm's value-chain to deliver strategic outcomes².

ABC system works on the principle that activities cause costs and therefore it is essential to match these activities to the appropriate products and services in order to give far more accurate information about how much

¹. Kaplan, R.S. & S.R. Anderson, The Speed-Reading Organization, Business Finance, www.searchfinance.com, 2007, p. 39.

². Byrne, S., E. Stower, & P. Torry, Is ABC Adoption a Success in Australia?, Journal of Applied Management Accounting Research, Clayton North, 2009, Vol. 7, No. 1, p. 15.

they actually cost¹. An **activity** is any event, action, transaction or work sequence that incurs cost when producing a product or providing a service. A **cost pool** is a distinct type of activity (e.g., ordering materials or setup machines). A **cost driver** is any factor that affects costs such as number of units produced, number of products sold, sales dollars, number of service calls. They identify the linkage between activities and cost objects, such as products, services, and customers; they serve as quantitative measures of output of activities². They are two types of costs drivers- resource cost driver and activity cost driver. Resource cost driver is a measure of the quantity of resource consumed by an activity. For example, number of purchase orders, whereas activity cost driver is a measure of the frequency and intensity of demand placed on the activities by cost objects. It is used to assign activity costs to cost objects consuming the activity³. ABC system could bring significant improvement in the quality of overhead cost allocation by incorporating both volume-based measures and causal principles in the costing system.

ABC system is a method that calculates a more accurate product cost by identifying an organization's major operating activities, tracing the indirect costs to those activities, and allocating activity costs to products using a cost driver that is related to the cause of the cost⁴.

The underlying assumptions of ABC system contrast sharply with traditional costing systems assumptions. Traditional costing systems assume that products cause costs. ABC assumes that activities cause costs, and

¹ . Coulter, D., G. McGrath, A. Wall, Time-Driven Activity-Based Costing, Accountancy Ireland, Vol. 43, No. 5, 2011, p.12.

² . Anthony, A.A., et al., Op.cit, p.167

³ . Arora, M.N,Op.Cit, p. 5.3.

⁴ . Dimitropoulos, P., Activity -based costing in Sport organizations: Theoretical Background & Future Prospects, XOPHTIA (Sport Management International Journal (SMIJ))-CHOREGIA (Scientific Fourm in Sport Management), Vol.3, No.2, 2007, p.19.

product (and other cost objects) creates a demand for activities¹. The ABC methodology offers four procedural and two conceptual differences relative to traditional costing systems. The following are the key changes from a procedural perspective: Use of non-volume-based drivers to allocate costs; Formation of cost pools by activities (that might cut across departments), distinguishing between a cost center and a cost pool; Expansion of the set of resource costs considered to include selling, general and administration (SGA) costs as well as pre-production costs; and Expansion of the set of cost objects considered beyond products to include customers, distribution channels, and so on. The two key conceptual innovations: use of the cost hierarchy (i.e., classifying costs into volume-, batch-, product-, and facility level costs); and use of practical capacity rather than budgeted capacity to derive allocation rates².

2.3.2 Two-stage cost allocation

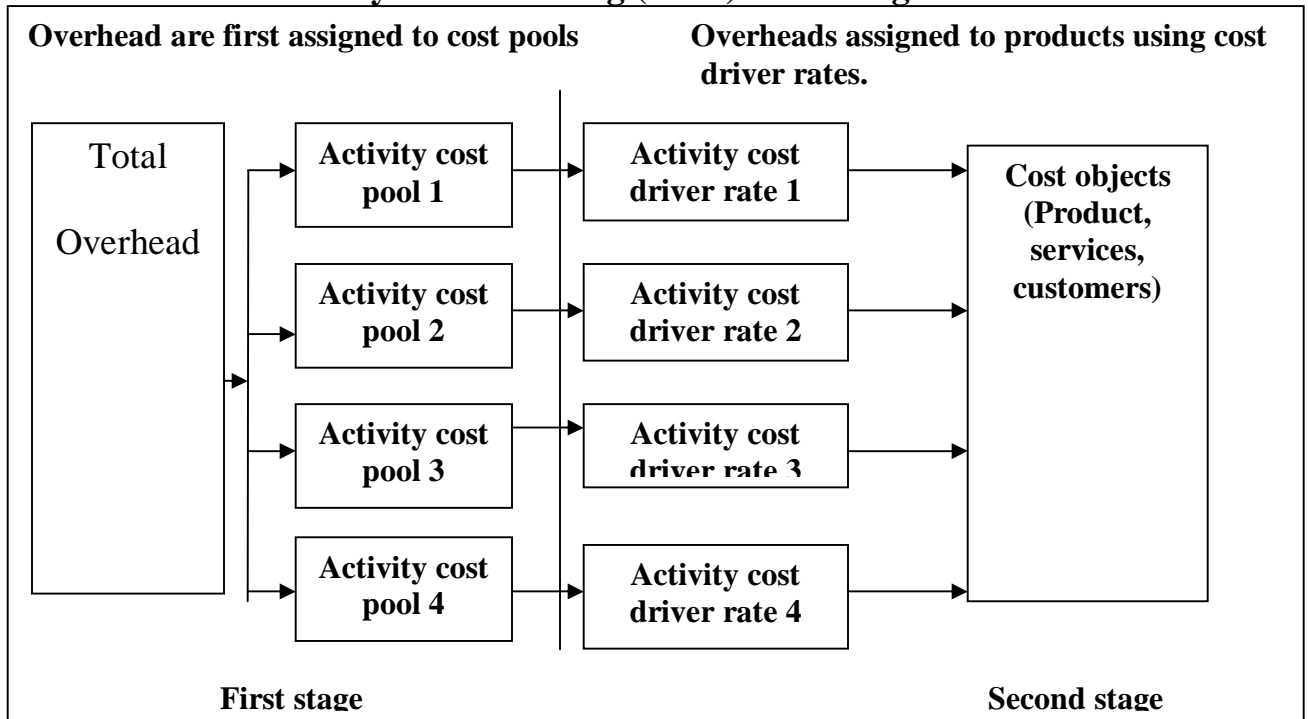
The ABC system assumes that products or customers generate activities, and the activities consume resources. ABC is based on a two stage allocation process. First of all, the costs of resources are allocated to the activity cost pools using first-stage cost drivers (in traditional costing systems, in contrast, these costs are allocated to departments or cost center). In the second stage, the costs of activities are assigned from the activity cost pools to cost objects using cost drivers (volume and non-volume related drivers). That is, the activity costs are allocated to the cost objects based on the relevant cost drivers (i.e. number of machine hours, number of setups, number of design specifications, and number of customer visits). The cost

¹ . Granof .M. H., D.E. Platt & I. Vaysman, Using Activity-Based Costing to Manage More Effectively, The PricewaterhouseCoopers Endowment for the Business of Government, G r a n t R e p o r t, 2000, p.9.

² . Balakrishnan, R., et al., Op.cit, p. 2.

drivers are linkage between activities and cost objects¹. This stage is similar to a traditional costing system except that the traditional system uses solely volume related characteristics of the product without consideration for non-volume related characteristics. Some examples of cost drivers not related to volume include setup hours, number of setups, ordering hours, and number of orders. Allocating non-volume related costs using volume-based methods distort the product costs². The exhibit 2/3/4 illustrates the two-stage allocation process ABC as follow.

Exhibit 2/3/4: Activity-based Costing (ABC): Two Stage cost allocations



Source: Botten, N., Managerial Accounting – Business Strategy- Strategic level, CIMA’s Official Learning, CIMA Publishing –An imprint of Elsevier, 2008, p.425.

¹ . Dalci, I., V. Tanis, & L. Kosan, Customer profitability analysis with time-driven activity-based costing: a case study in a hotel, International Journal of Contemporary Hospitality Management, Vol. 22, No. 5, Emerald Group Publishing Limited, www.emeraldinsight.com/0959-6119.htm, 2010, p. 610.

² . Gayle, L.R., Cost Accounting: Using a cost management approach, 6th edition, Irwin McGraw- Hill, New York, 1996, p. 127.

2.3.3 The objectives of Activity-based Costing (ABC)

A well-designed activity-based costing (ABC) system has three strategic objectives. The first is to report accurate costs that can be used to identify the source of firm profits. The second is to identify the cost of activities so that more efficient ways to perform them or produce their outputs can be identified. The final one is to identify the future need for resources so that they can be acquired more efficiently¹.

2.3.4 The steps of designing Activity-based Costing system

Cooper et al. (1992) argue that the design of ABC system comprises four basic steps are identifying activities, creating a cost pool (or cost center) for each activity, determining the cost driver for each activity, and assigning the overhead costs to products according to the products demand for activities. These four basic steps of designing ABC can be combined into two stage process which has been discussed above.

a. Identifying major activities in the organization: One of the first benefits from the ABC analysis was the restructuring and mapping of the organization's expenses from functional categories and departments to show how they related to the activities and business processes. A cost hierarchy technique is utilized to segregate the indirect costs into four categories²:

a. Unit-level activities costs: Costs that vary with every unit produced or the volume of production such as supplies for factory, energy for machinery.

b. Batch-level activities: Costs are incurred when a batch of product is produced such machine setups, material movements or purchasing.

¹. Cooper, R., & R. Slagmulder, Activity-based budgeting--part 1, Strategic Finance, Vol. 82, No. 3, 2000, p. 84.

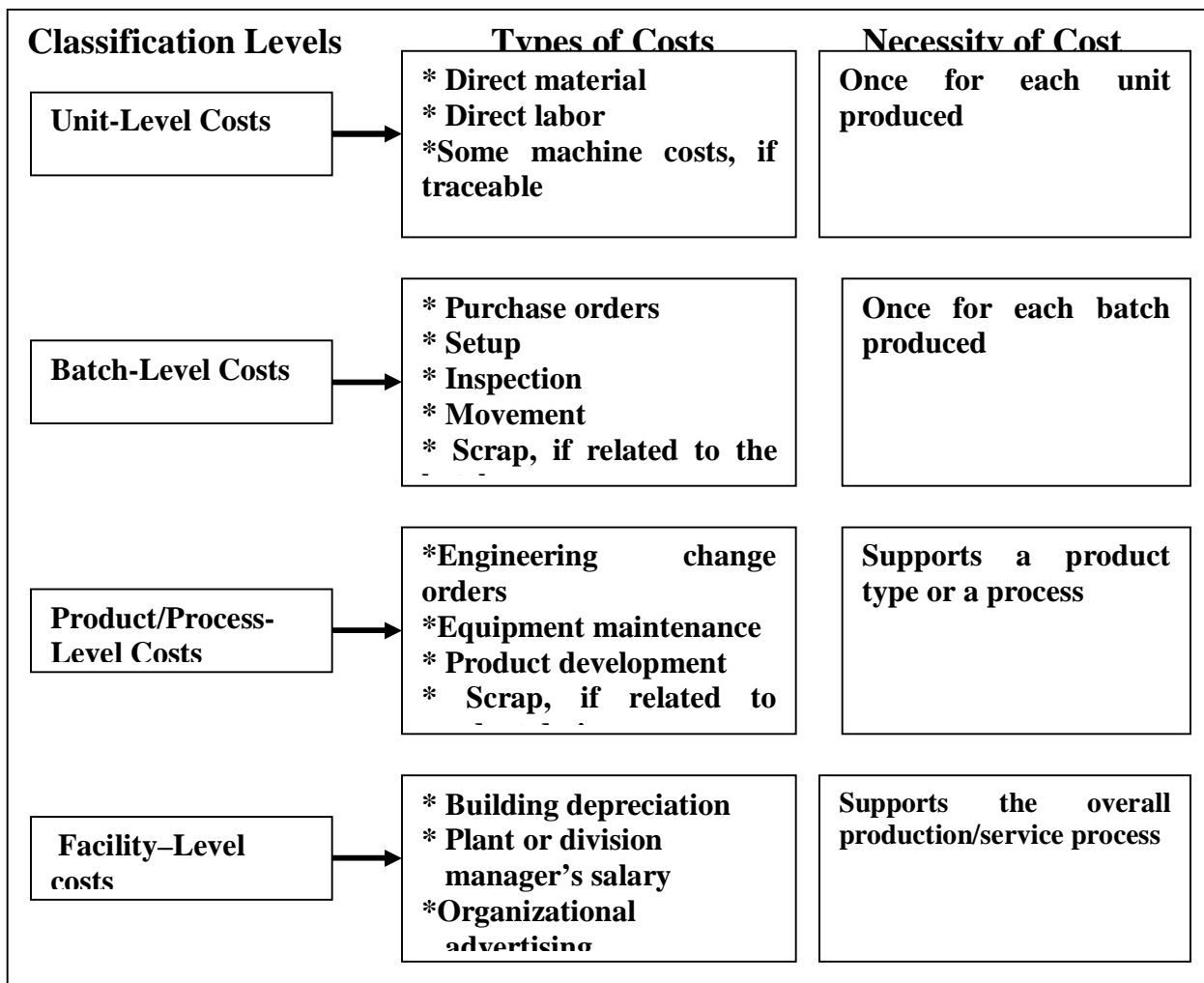
². Jackson, S., et al., Op.cit, p.105

c. **Product –sustaining activities:** Costs are incurred as needed to support the production of each type of product such as process engineering, product specifications or engineering change notices.

d. **Facility-sustaining activities costs:** Costs viewed as period costs. Those costs are incurred to sustain the overall manufacturing processes and do not vary with the number of or type of products produced such as plant management, taxes, building and grounds maintenance, heating and lighting.

The kinds of costs that occur at the various levels are given in exhibit 2/3/5

Exhibit 2/3/5: Hierarchy of Activities



Source: Costanzo, C., "ABN AMRO Says Web Will Anchor Its Expansion" American Banker, www.abnamro.com/profile, 1999, p. 137.

b. Create a cost pool (or cost center) for each activity: Overhead costs are divided into homogenous cost pools. A homogenous cost pool is a collection of overhead costs for which costs variations can be explained by a single cost driver. Overhead activities are homogenous whenever they have the same consumption ratios for all products¹.

c. Determine the cost driver for each activity: Activity cost drivers identify the linkage between activities and cost objects (such as products, services, and customers). Cost drivers should cause, or drive, the incurrence of costs. For example, costs of purchasing might be driven by the number of purchase orders processed, whereas engineering costs might be driven by the number of parts in a product. Typical cost drivers for the activities identified in the exhibit 7 are provided in the third column of table 3. Unit, batch, and product-level activities are assigned to products based on a cause-and-effect basis. Facility-level costs, however, cannot be allocated on a cause-and-effect basis to individual product. Nevertheless, these costs are usually allocated to products using some arbitrary allocation basis. For example, plant occupancy (e.g., plant manager's salaries, rent, taxes, and insurance). Allocation of the costs would require the use of arbitrary cost drivers, such as square footage, number of employees, labour hours, or machine hours².

A selection of cost driver requires two factors should be considered: the cost of measurement (any cost driver that can be used with existing information should be chosen to minimize the cost of measurement); and the degree of correlation between the cost driver and the actual consumption of overhead (By exploiting the existing information to minimize the cost the cost of obtaining cost driver quantities. It is sometimes possible to replace a

¹ . Hansen, D.R., Op.Cit, 1990, p.208.

² . Brewer, P.C, R.H. Garrison, E.W. Noreen, Introduction To Managerial Accounting, McGraw-Hill, 2007, p. 137.

cost driver that directly measures the consumption of an activity with cost driver that indirectly measures that consumption)¹.

Recognize that cost drivers can take several forms²: (a) Transaction drivers: These count how often does the activity occur such as number of setups, number of receipt, and number of products supported. They can be used when all outputs make essentially the same demands on the activity. Transaction drivers are the least expensive type of cost driver but are also the least accurate, because they assume that the quantity of resources is required every time an activity is performed. (b) Duration drivers: These represent the amount of time required to perform an activity such as set up hours, inspection hours, and direct labour hours. They can be used when significant variation exists in the amount of activity required for different outputs. (c) Intensity drivers: For some activities, however, even duration may not be accurate enough. Intensity drivers directly charge for resources used each time an activity is performed such as set up cost per hour. Intensity drivers are the most accurate cost drivers but the most expensive to implement it.

The choice of a transaction, duration, or intensity cost drivers can be occur for almost any activity. For example, a sales activity (e.g., support existing customer) it can use either transaction, duration, or intensity cost drivers: cost per customer (assumes all customers use the same); cost per customer hour (assumes different customers use different amount of sales resources time, but each hour of support time costs the same); Actual cost per customer (actual or estimated time and specific resources, including travel, committed to specific customers).

¹ . Hansen, D.R., Op.cit, p. 212.

² . Anthony, A.A., et al., Op.cit, pp. 172 - 173.

d. **Assign the costs of activities to products according to the products demand for activities:** The final stage involves assigning activity cost pools to products, using overhead rates for each activity as in Exhibit 2/3/3. Activity rates are determined by dividing the cost for each activity pool by the estimated activity cost driver for that pool¹.

Table 2/3/3: Activities and Cost drivers

Activity	Level	Typical cost driver
Repair and maintenance of factor equipment.	Unit	Machine hour, labour hours, or number of units.
Energy costs for factory equipment	Unit	Machine hour.
Supplies for factory	Unit	Machine hour or number of units.
Purchasing	Batch	Number of purchase orders or number of parts.
Receiving	Batch	Amount of material or number of receipts
Machine setups	Batch	Number of setups
Product testing	Product	Number of change orders, number of tests, or hours of testing time
Engineering costs	Product	Number of engineering hours or number of products
Product design	Product	Number of new or revised products
Quality design	Unit, batch, product	Number of inspections, hours of inspection, or number of defective units
Plant occupancy costs (rent, taxes, insurance, etc)	Facility	Square footage, number of employees, labour hours, or machine hours

Source: Researcher, 2012

¹ . Ralph, B.F., Activity-based costing and the theory of constraints: Using time horizons to resolve two alternative concepts of product cost, Journal of Applied Business Research, Vol.14, No.1, 1998, p. 84.

2.3.5 Supported conditions for adoption Activity-Based Costing (ABC)

There are number of conditions supported the adoption of ABC system are: (a) Products diversity, product models variation, productivity process complexity. (b) Increasing of sustaining activities (e.g., product engineering design, process design, production programming, data automatic processing with computer), and increasing important of accounting due to growth in requirements of accurate information by management. (c) High percentage of indirect costs (overhead) over direct costs (direct labour). (d) High percentage of fixed costs due to using of advanced manufacturing systems. (e) Increased competition (f) Shortness of economic product life, and the need to improve or develop products/ services by adding or omitting to satisfy customer requirements. (g) The need to modernizing the traditional costing systems for more accurate cost information. (h) Difficulty in interpreting the profit of some small and large products. (i) Lowering the prices of some competitive products. (j) High percentage of joint cost in production cost structure due to use of automation, increase number of sustaining activities; and using joint products¹.

2.3.6 The Benefits of Activity-based Costing (ABC):

Research on adoption of ABC system suggests that one of the major perceived benefits from implementing ABC is the more accurate product cost information; more accurate allocation of indirect costs and identification of activities and processes. Cooper and Kaplan suggested that a major concern in the ABC system is to allocate overhead cost more accurately to products². ABC system improves the accuracy of product costs

¹ . Dayfullah, R.M., Op.cit, p. 689.

² . Bjørnenak, Op.Cit, p. 9.

in three ways: First, ABC increases the number of cost pools used to accumulate overhead costs. Rather than accumulating all overhead costs in a single plantwide pool, or accumulating them in departmental pools, the company accumulates costs for each major activity. Second, the activity cost pools are more homogenous than departmental cost pools. Third, ABC uses a variety of activity measures to assign overhead costs to products, some of which are correlated with volume and some of which are not¹. ABC estimates the cost of resources employed in organizational processes to produce outputs. Managers can use the ABC resource usage cost information to monitor and predict the changes in demands for activities as a function of changes in output volume and mix, process changes and improvements, introduction of new technology, and changes in product and process design². ABC improved awareness of the activities driving overhead costs which may improve the control exercised over the incurrence of such costs. It might generate an information base to facilitate the implementation of a total quality management process to overcome problems limiting current performance³. ABC benefits both strategic and operational decisions. Companies were using the information to make major decisions on product lines, market segments, and customer relationships, as well as to stimulate process improvements and activity management⁴. Webster determined a top 10 list of the decisions where ABC information can make significant contributions: Modifying product mix and pricing, Restructuring product pricing and price points, Identifying substitute products, Eliminating

¹ . Brewer, P. C., et al., Op.cit, p. 137.

² . Cooper, R., R. S. Kaplan, Activity-Based Systems: Measuring the Costs of Resource Usage, Accounting Horizons, Vol. 6, No. 3, Sarasota: 1992, p. 1.

³ . Malcolm, S, Managing your ABC system, Management Accounting, 1994, Vol. 75, No. 10, p. 46.

⁴ . Cooper, R., Kaplan, R. S., Lawrence,S.M., E. Morrissey, R.M., Oehm, From ABC to ABM, *Management Accounting*, Vol. 74, No. 4, 1992, ABI/INFORM Global, p. 57.

products and resulting excess capacity, Improving product design and development, Redesigning products, Improving production processes, Improving customer relationships, Changing operating policies and strategy, Improving supplier relationships¹. ABC system improves the performance by classifying activities into value-added and non-value-added activities. Then, the non-value-added must be eliminated². It identifies the most and least profitable products and customers; and equipping managers with cost intelligence to drive continuous improvement³. ABC supports other strategic initiatives by highlighting the activities that could benefit most from Six Sigma and other improvement initiatives such as TQM, JIT ...etc taking place in business today. Thus, ABC can be used as a part of program to improve operations. For example, combination ABC systems with JIT inventory system should result in even more accurate product costing through eliminating most of facility- level costs which are required arbitrary allocation methods⁴. ABC can supplement and coexist with traditional financial systems. Companies continued to operate their existing financial systems while developing and interpreting ABC models⁵.

In general, the conditions or cases which can more likely to benefits from ABC system are: (a) Cost distortion: companies that have a high potential for cost distortions are more likely to benefit from ABC. Cost distortion is likely when companies make diverse products that consume resources differently. Products that vary a great deal in complexity are typically diverse, but differences in colour or other seemingly minor differences in products can lead to product diversity when these differences

¹ . Webster, W.H., Op.cit, pp. 137-138.

² . Akyol, D. E., et al., Op.cit, p. 44.

³ . Hall, J. A., Op.cit, p. 327.

⁴ . Jackson, S., et al., Op.cit, p.107

⁵ . Cooper, R., et al., 1992, p.57

materially change the products and affect the resources they consume. Krumwiede & Jordan carried out a Survey on Cost Management Methods and activity-based costing among Cost Management Group members. The results showed that the higher the potential for cost distortions, the likelier a firm may be to implement ABC. (b) larger companies appear more likely than small ones to implement ABC¹. Roztocki and Schultz discovered that larger companies are more likely to adopt the ABC methodology and are benefited from the adoption more than smaller firms. This is because the larger companies tend to have a more diverse mix of products and services and have more specialized personnel who are familiar and knowledgeable with the ABC approach. As a result of the review of the article, it can be suggested that the Activity-Based Costing tool is very applicable to both manufacturing and service industries and sizes². (c) Companies that have large proportion of non-unit level costs are also to benefit from ABC. Unit level costs vary with the number of units produced and can be allocated with reasonably accuracy volume-based cost drivers. On the other hand, volume-based drivers can results in cost distortions when allocating non-unit-level costs (batch-, product-, and facility-level costs)³. (d) Companies that have a large portion of indirect and supporting costs and those with a great number of processes and activities are likely to benefit from ABC⁴. (e) Company's production or marketing managers that are ignoring data provided by the

¹ . Krumwiede, K.R., & W. G. Jordan, Fewer Companies Believe ABC is Necessary, New Survey Findings, Cost Management Update, No.83, 1998, p. 2.

² . Narong, D.K., Activity-Based Costing And Management: Total Quality Management Solution To Quality Cost Shortcomings Of The Traditional Cost Accounting Systems, MSc. in Quality Assurance, California State University Dominguez Hills, 2008, p.18.

³ . Jackson, S., et al., Op.cit, p. 117.

⁴ . Popesko, B., Activity-Based Costing Application Methodology For Manufacturing Industries, E+M Ekonomie a Management , ABI/INFORM Global, No. 1, 2010, p.105.

existing system and are instead using other alternative data when pricing or making other product decisions are likely to use ABC¹.

2.3.7 Limitations of Activity-based Costing (ABC)

Despite the advantages of providing more product costs information than traditional costing systems, there are limitations: (a) **ABC can be expensive to use:** Many companies are discouraged from using ABC by the increased cost of identifying multiple activities and applying numerous cost drivers. Kaplan & Anderson, (2003) argued that ABC has been difficult for many organizations to implement ABC because of the high costs incurred to interview and survey people for the initial ABC model, the use of subjective and costly to validate time allocations, and the difficulty of maintaining and updating the model such as (a) processes and resource spending change, (b) new activities are added, and (c) increases occur in the diversity and complexity of individual orders, channels and customers². (b) **Some arbitrary allocations continue:** even though more overhead costs can be assigned directly to products through ABC's multiple activity cost pool, certain overhead costs remain to be allocated by means of some arbitrary volume-based cost driver such as labour or machine hours³. (c) **ABC is not conforming specifically with generally accepted accounting principles (GAAP):** ABC would suggest that some nonproduct costs (such as those in research and development) be allocated to products, whereas certain other traditionally designated product costs (such as factory building depreciation) not be allocated to products. Therefore, most companies have used ABC for internal reporting, while continuing to maintain their general and subsidiary

¹ . Weygand, J.J, et al., Op.cit, p.154.

² . Kaplan, R. S. & S.R. Anderson, Time-Driven Activity-Based Costing, 2004, p.1.

³ . Weygand, J. J., et al., Op.cit, p. 153.

ledger accounts and prepare their external financial statements on the basis of a more “traditional” system—requiring two products costing systems and causing even more costs to be incurred. (d) **ABC has two limitations for decisions with shorter time horizons**: a failure to distinguish between fixed and variable costs; and full absorption of cost that are partially sunk¹.

2.3.8 Activity-based Costing (ABC) & Service Companies:

Even though the ABC concept was initially developed in a manufacturing context, it can be applied equally well in the services sector, as activities are universal to all organizations. For example, (Innes & Mitchell, (1995) & (1999) document successful application in the U.K.'s largest financial institutions. Companies in the service sector have been embracing ABC in record numbers over the past decade. This trend is especially true of companies whose industry groups (such as airlines, telecommunications, and utilities) have encountered significant changes due to deregulation. For example, King et al. (1994) document successful applications in the telecommunications, transport, wholesale and distribution, marketing, health, and information services sectors². However, implementing of ABC in service sector is not without limitations: A common problem is type of work done in service companies tends to be non-repetitive. Unlike highly automated manufacturing companies, analyzing the activities of a service provider can be difficult when activities differ greatly for each customer or service. In addition, service- oriented companies are

¹ . Ralph, B.F., Op.cit, p. 84.

² . Kennedy, T., & J. Affleck-Graves, Op.cit, p. 4.

likely to have proportionately more facility-level costs which are used arbitrary allocation methods than do manufacturing companies¹.

Anthony et al. suggested that more common five pitfalls that have occurred are: (a) Lack of clear business purposes; (b) lack of senior management commitment; (c) Delegating the project to consultants; (d) Poor ABC model design; (e) and individual and organizational resistance².

2.3.9 Other types of Activity-based Costing (ABC)

Activity based costing (ABC) appeared around the mid-1980s to solve the problems of traditional costing systems;" that is, the conventional costing systems are often unable to identify correctly the true costs of processes. Then, by the early 1990s the activity based costing had developed from product costing into activity-based budgeting and activity-based management (ABM) by (Jones & Dugdale) and a recently added time-driven version by (Kaplan & Anderson) in 2004 & 2007³. The term ABC is used in throughout this study as a reference inclusive of both ABC and ABM.

2.3.9.1 Activity-based management (ABM):

Activity-based costing (ABC) can also be used to identify activities that would benefit from process improvements. When used in this way, ABC is often called Activity-based management (ABM)⁴. ABC supplies the information, and ABM uses this information in various analyses designed to yield continuous improvement. The major change in focus required for moving from ABC to an ABM system as in is one shifting from a cost assignment view (i.e. from resources → activities → cost objects) to a

¹ . Jackson, S., Op.cit, p.115

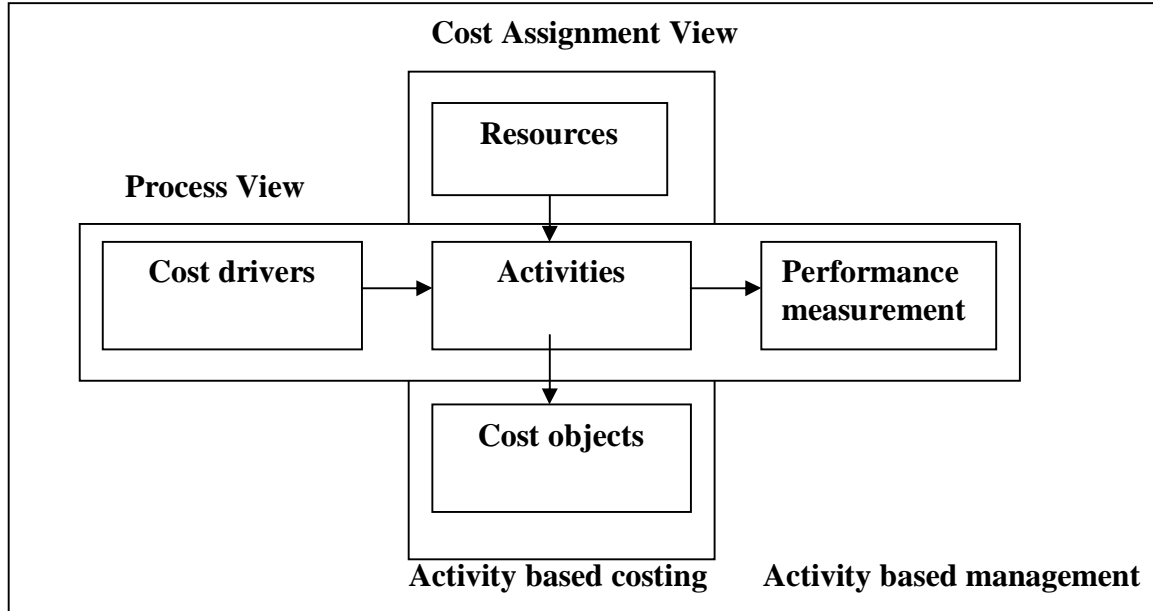
² Anthony, A.A., et al., Op.cit, p.184.

³ Chapman, C.S., A.G. Hopwood, & M.D. Shields, Handbook of Management Accounting Research, ELSEVIER, Vol.3, 2009, p.1272

⁴ . Brewer, P. C., et al., Op.cit, p. 136.

process management view (i.e. cost drivers → activities → performance measures) (see Exhibit 2/3/6)¹.

Exhibit 2/3/6: How ABM uses ABC information



Source: Gupta, M., & K. Galloway, Activity-based costing/management and its implications for operations management, Technovation, Vol. 23, 2003, p.134.

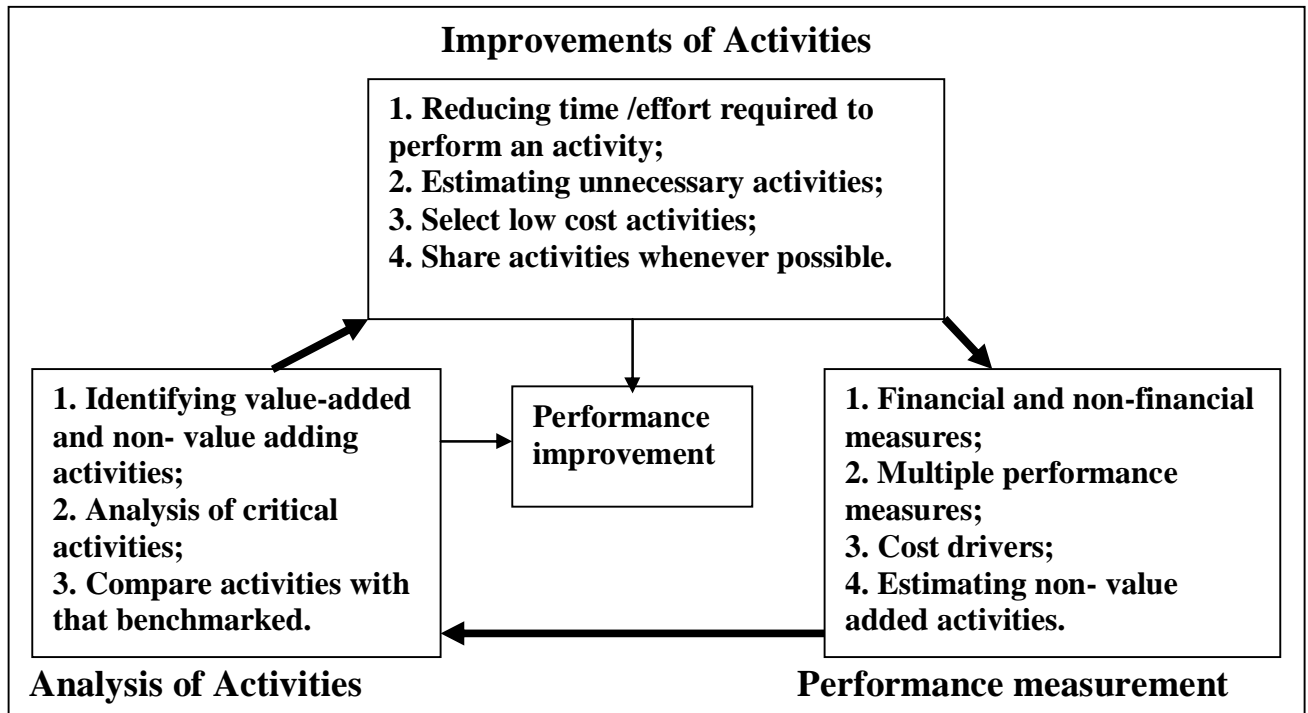
The process view reflects the need for a new category of information about activity performance. This information shows what causes work (cost drivers) and how well it is done (performance measures). It helps identify improvement opportunities and ways to improve². ABM which focuses on business activities is one of the most important management methods in increasing the quality of the goods and services, performance, functionality, customer satisfaction level and profitability. ABM continually directs the

¹ . Gupta, M., & K. Galloway, Activity-based costing/management and its implications for operations management, Technovation, Vol. 23, 2003 p.133

² . Turney, P.B.B., Activity-based management, Management Accounting, Vol. 73, 1992a , No.7, p. 21

attention of the managers towards development with the data it gets by focusing on the activities is shown in Exhibit 2/3/7¹.

Exhibit 2/3/7: Conceptual Framework for Activity-Based Management



Source: Ayvaz, E & D. Pehlivanl, The Use of Time Driven Activity Based Costing and Analytic Hierarchy Process Method in the Balanced Scorecard Implementation, International Journal of Business and Management & Published by Canadian Center of Science and Education, Vol. 6, No. 3, 2011, p. 157.

2.3.9.2 Activity-based budgeting (ABB)

Another field in which ABC method is used successfully is budgeting and deviation analysis. Activity based budgeting which is thought to be a part of ABM and continuation of ABC method. It defined as a budgeting methodology for enhancing the accuracy of financial forecasts and increasing management understanding. It analyses the products or services to be produced by considering the activities required producing them, and

¹ . Ayvaz, E., & D. Pehlivanl, The Use of Time Driven Activity Based Costing and Analytic Hierarchy Process Method in the Balanced Scorecard Implementation, International Journal of Business and Management, Vol. 6, No. 3, 2011, p. 149.

then identifying the resources needed in order to perform those activities¹. According to another source, ABB is defined as a plan prepared to assign the sources of related departments' activities and is also explained as an important planning vehicle which presents more reliable information when compared with the budgets prepared in traditional methods².

One of the biggest differences between traditional budgeting and ABB is the amount of information needed to develop the budgets. ABB requires much more information in two forms: First, the information about the relationship between resource consumption and acquisition is greater because the ABB system is more detailed and, in particular, requires information about the way resources are consumed. Second, there is a need to understand the relationship between secondary output quantities and secondary resource consumption³. Thus, ABB has two advantages over traditional budgeting. First, it has the potential of being more accurate, and, second, it provides greater insights into why the demand for resources is not linear with production volume⁴.

ABB uses the principles of ABC to estimate the firm's future demand for resources. At the heart of ABB is a reversal of an ABC system. Instead of driving the cost of resources to activities and then to outputs, the demand for outputs drives to activities and then to resources. The classical North South process of ABC is replaced by the South-North process of ABB in Exhibit 2/3/8.

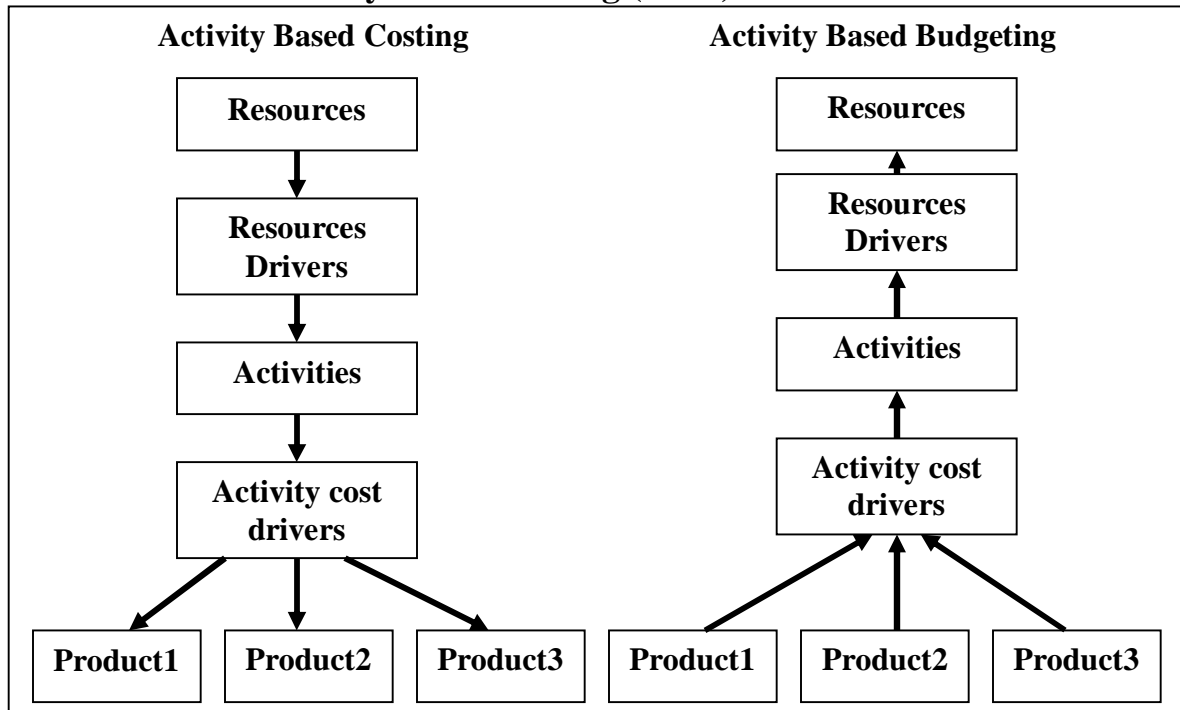
¹. Buys, P., K. Green, Strategic Costing Techniques: Activity-based Budgeting, *Accountancy SA*, Accounting & Tax Periodicals, 2007, p. 38

². Ayvaz, E., & D. Pehlivanl, Op.cit, p.149

³. Cooper, R., R. Slagmulder, Activity-based budgeting-part 2, *Strategic Finance*, Vol. 82, No. 4, 2000, p. 26.

⁴. Cooper, R., R. Slagmulder, Activity-based budgeting--part 1, *Strategic Finance*, Vol. 82, No. 3, 2000, p. 85.

**Exhibit 2/3/8: Activity Based Budget (ABB) Process in Reverse of
Activity Based Costing (ABC) Process**



Source: Liu, L.Y J, J. J. Robinson; J. Martin, An application of activity-based budgeting: A UK experience, *Cost Management*, Vol.17, No. 5, 2003, p. 31.

However, a simple reversal approach does not work well at all. Typically, the estimates for resource demand that are obtained this way are hopelessly inaccurate. The source of these errors is not a failure of the central activity-based model but fundamental differences between ABC and ABB. There are at least four possible reasons: spending versus consumption patterns, secondary outputs, fungible resources, and unavailability of detailed knowledge¹.

ABB has very persuasive financial benefits such as: (a) It enables managers to make fact -based investment decisions, based on the value of specific deliverables. (b) It ensures that projects with the best returns are

¹. Cooper, & Slagmulder, 2000, p. 85.

identified while those with poor returns are discouraged. (c) Access to more accurate budgeted information of the specific cost objects; (d) Provides relevant information for fact-based decisions during the budgeting process; (e) staff entrepreneurs are empowered to manage the level of reinvestment in their business units (e.g., in training, product R&D and business development) to ensure a sustainable, competitive business; (f) defines projects or deliverables, i.e. which projects will be funded, thereby matching the organization's expectations to available resources; (g) Serving as a basis to determine fair and understandable price lists; and because ABB determines rates on specific work, there are no (or limited) distortions from corporate good' activities), its rates and prices are comparable to outsourced rates¹.

2.3.9.3 Time Driven Activity-based Costing (TD-ABC)

Although, companies which use Activity based costing (ABC) are advantageous in several ways, for instance they analyze activities more correctly, and they use reliable costing information in budget, and estimate profitability of customer and product, several managers have recently given up using ABC because of the high implementation costs incurred to interview and survey people for the initial ABC model, the use of subjective and costly-to-validate time allocations, and the difficulty of maintaining and updating the model as (a) processes and resource spending change, (b) new activities are added, and (c) increases occur in the diversity and complexity of individual orders, channels and customers².

¹ . Buys, P., K. Green, Strategic Costing Techniques: Activity-based Budgeting, Accountancy SA, Accounting & Tax Periodicals, 2007, p. 38.

² . Kaplan & Anderson, Op.Cit, p. 1.

The more recent technique was designed by Kaplan and Anderson as the improved version of traditional ABC which helps company estimate the source demand of each process, product and customer with the help of required time to fulfill the activities and the cost of capacity unit time was *Time Driven Activity Based Costing* (TDABC) ¹. TDABC is a logical application of the notion that the supply and consumption of resources are distinct. The resulting concept of time equations represents a fundamental departure from two-stage allocation systems such as ABC².

TDABC translates the costs drivers in time-equivalents (standards of working hours). The standards can be revised when the production conditions change. The TDABC is a way to reintroduce the standard costing approach into the ABC methodology. The TDABC simplifies the ABC method for three reasons³: (a) The number of activities is reduced and the analysis is made at the level of the departments or of the processes. Kaplan and Anderson (2004) present a case study, where some 1,200 activities have been reduced in 200 processes. (b) The need to collect information from different services is limited because of the use of standards. (c) The different types of drivers are expressed in only one equivalent-time driver.

Two important aspects of a TDABC system are: estimating the practical capacity of the resources supplied and the cost of these resources. Dividing the total cost of resources supplied by the practical capacity yields the cost per time unit. Then, the time needed for performing the activities is multiplied by the cost per time unit in order to assign the costs to products or

¹ . Ayvaz, & Pehlivanl, Op.Cit, p.149

² . Balakrishnan, R., E. Labro, & K. Sivaramakrishnan, Product Costs as Decision Aids: An Analysis of Alternative Approaches (Part 1), Accounting Horizons, American Accounting Association, Vol. 26, No. 1, 2012, p. 16.

³ . Wegmann, G., The Activity-Based Costing Method: Development and Applications, The IUP Journal of Accounting Research, Vol. 4, No. 1, 2009, p. 16.

customers. With the help of the time equations of TDABC, the time needed to perform an activity can be estimated without any need to continually re-interview people. These time equations can include multiple time drivers if an activity is driven by more than one driver. Obviously, the TDABC approach, with its time equations, makes it possible to know how many minutes that staff members spend on activities in a particular time period. Therefore, the time equations of TDABC can provide larger transparency than a traditional ABC system. With TDABC, it is also possible to pinpoint which customers consume the largest amount of time and resources¹.

The technique of TDABC consists of six successive steps²: (a) Identify the resource pools and their activities. Because all employees in the university restaurant flexibly perform all activities as needed, there is only one resource pool. (b) Determine the costs of the resource pools. The different cost categories in the resource pool are wages, depreciation, and cleaning products. (c) Determine the practical capacity of each resource pool. The practical capacity is estimated at 80% of the theoretically available man-hours of the front-line employees. (d) Calculate the cost per time unit. After dividing the operating expenses (step two) by the practically available time in minutes (step three). (e) Estimate the required time for each transaction.

TDABC offers managers the following powerful benefits: (a) An accurate strategic cost and profitability model that is fast, inexpensive, and easy to build; (b) Integration with the detailed transactional data now available from ERP and customer relationship management systems; (c) A costing model based on transactions specific to the characteristics of

¹ . Dalci, et al., Op.Cit, p. 611.

² . Everaert, P, G. Cleuren, S. Hoozée, Using Time-Driven ABC to Identify Operational Improvements: A Case Study in A university Restaurant, Cost Management, Vol. 26, No. 2, 2012, ABI/INFORM Global, p. 41.

individual orders, processes, suppliers, and customers; (d) A model that identifies opportunities for process efficiencies and capacity management; (e) Forecasts of resource demands, allowing companies to budget for the capacity needed to handle the sales and production estimates in their strategic plans; (f) A model that is easily scalable across highly diverse and complex enterprises via scalable applications software and database technologies; (g) A model that is easy and inexpensive to update as changes occur in process efficiencies and process costs; and (h) A general approach for cost and profitability management that can be used in any industry or company with complexity in customers, products, channels, segments, and processes and large expenditures for people and capital¹.

¹. Kaplan, R. S. & Steven R., Anderson, The Speed-Reading Organization, Business Finance, www.searchfinance.com, 2007, p. 42.

SECTION FOURE

FINACIAL PERFORMANCE & ACTIVITY BASED COSTING SYSTEM

2.4.1 Definition of Financial Performance

Financial performance is a part of organizational performance¹. It a subjective measure of how well a company can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation².

Financial performance is measuring the results of a company's policies and operations in monetary terms. These results are reflected in the firm's return on investment, return on assets, value added, etc³.

2.4.2 Financial Performance measures

There has been a growing interest in using performance measurement in service and academic sectors. Performance measurement is defined as "the process of quantifying the efficiency and effectiveness of action". By implementing performance measures, company can determine how well their actions align with their objectives. However, the types of performance indicators vary. For instance, performance metrics categorized by McKeon comprise time, outcomes, customer satisfaction, cycle time, and percent of population. In contrast, Neely et al., classified performance measurement in

¹ . Nancy, Op.Cit. p.34.

² . Investopedia, www.investopedia.com/terms/f/financialperformance.asp

³ .<http://www.businessdictionary.com/definition/financialperformance.html#ixzz2RjJs8rrC>

four aspects, including quality, time, cost, and flexibility, based on a review of manufacturing performance measures¹. Perhaps the most accepted and widely used performance framework is the Balanced Scorecard (BSC) proposed by Kaplan and Norton. It consists of four perspectives: financial, internal processes, learning and growth, and customer satisfaction².

Financial performance measures provide objective and easily understood feedback to management and personnel. There are many different ways to measure financial performance, but all measures should be taken in aggregation. Line items such as revenue from operations, operating income or cash flow from operations can be used, as well as total unit sales. Furthermore, the analyst or investor may wish to look deeper into financial statements and seek out margin growth rates or any declining debt.

A good financial performance measure should ask how well the company has generated operating profits, given the amount of capital invested to produce those profits. The idea is that the company's financiers are free to liquidate their investment in the company and invest the liberated capital elsewhere. Thus, the financiers must earn at least their opportunity cost of capital on the invested capital. This condition implies that this cost of capital must be subtracted from operating profits to gauge the company's financial performance³.

Measures used in the literature to reflect financial performance vary from study to another study. The most common financial performance measures are: output, profitability, asset utilization, and liquidity. Output can be evaluated by using revenue, sales, or growth. Revenue or sales are the

¹ . Sanford, Op.Cit, p.80

² . Botten, N., Op.Cit, p. 70

³ . Bacidore, J.M., J.A. Boquist, T. T. Milbourn, and A.V. Thakor, the Search for the Best Financial Performance Measure, Financial Analysts Journal, 1997, p.20

income generated from the services performed or products sold. Growth in an organization can be determined by the percentage change in any financial characteristic of the firm profitability or the organization's ability to generate net income can be examined using gross margin, earnings before interest and taxes, net operating income, or EPS. Asset utilization or the employment of a firm's assets to generate income can be calculated by using ROI, return on assets, and economic value-added formulas. Another measure of asset utilization is the asset turnover ratio. Liquidity or the firm's ability to turn assets into cash can be measured using cash flows. Cash flow can be described as the difference between the inflow and outflow of cash. The inflow of cash is generated primarily from receiving money for services provided, sales of products or assets, borrowing loans, and receiving dividends. The outflow of cash is caused by spending money on the cost of providing services, creating products, purchasing assets, and paying loans or dividends. Other measures of liquidity are the current ratio, acid-test ratio, asset turnover, and inventory turnover¹.

Nevertheless, it should be noted that there is no one best generic financial performance measure that is applicable for all types of organizations and contexts. Therefore, this study just used cost and net profits as measures for financial performance due to unavailability of information regarding the other measures.

¹ . Shim, J.K., & J.G. Siegel, Schaum's Outline of Theory & Problems of managerial accounting, McGraw-Hill, 2nd edition, 1999

2.4.3 ACTIVITY BASED COSTING SYSTEM AND FINACIAL PERFORMANCE IMPROVEMENT

The ABC system is considered as one of the most researched cost and management accounting areas due to its ability in providing more accurate costing information and enhancing companies' performance. ABC advocates (e.g., Cooper and Kaplan) claim that ABC provides detailed information on the value added and non-value added activities performed by the organization, the costs associated with these activities, and the drivers of activity costs. This information allows managers to reduce costs by designing products and processes that consume fewer activity resources, increasing the efficiency of existing activities, eliminating activities that do not add value to customers and improving coordination with customers and suppliers¹. Value –added activities are those which increase the perceived worth of a product or service in the hands of its ultimate consumer, whereas, non-valued added activities add no such worth and are therefore, a arguably, unnecessary². Another statement by Kaplan is a well-designed ABC system provides managers with a better understanding the way profits are generated at both the product and the customer level. Managers can take advantage of this understanding and increase profitability by getting rid of unprofitable customers and products or transforming them into profitable ones and attempting to sell more to the profitable ones³.

In addition, (Cooper & Kaplan) argued that the goal of ABC is to increase profits, not to obtain more accurate costs. This can be done by pricing (repricing products, services, and customers) and changes in product

¹ . Ittner, et al., Op.Cit, p. 713.

² . Upchurch, A., Management accounting: Principles & Practice, FT Prentice Hall, Pearson Education Limited, 1998, p.51.

³ . King, A. M., The Current Status of Activity-Based Costing: An Interview with Robin Cooper & Robert S. Kaplan, Management Accounting, Vol. 73, No. 3, 1991, p. 22

and customer mix, which affect profits directly through changes in the margins earned between revenues received and resources expended. In addition, ABC can help managers reduce resource usage through two types of actions: reducing the number of times activities are performed; and increasing efficiency (lowering the costs) of activities performed¹.

Similar opinions expressed by many researchers, for example, (Ward and Patel) suggested that ABC provides a sound foundation for future cash flow projections. This leads to investment in value-added activities that support products, services, customers, and market segments, thereby increasing shareholder value². Akyol, D. E., et al., found that ABC system improves the performance by classifying activities into value-added and non-value-added activities. Then, the non-value-added must be eliminated³. (Turney, P.B.B), noted that, ABC could yield important insights into profitability and as a powerful profit analysis tool. These successes stemmed from ABC's ability to reveal the hidden sources of profitability and embedded cost, and to serve as a catalyst for decisions to improve profitability. Also, ABC helped the company develop a new focus on profitable markets and customers prune unprofitable products, redesign products to remove cost, and eliminate non value added activities⁴. (Jackson, S., et al.,) ABC provides more and more accurate cost information that focuses managers on opportunities for continuous improvement throughout their planning, operating, and control activities⁵.

Some previous studies which are included in this study in chapter one revealed that companies that have adopted management initiatives such as

¹. Cooper, R., R.S. Kaplan, , Op.Cit, pp. 8 & 10.

². Kennedy, T., & J. Affleck-Graves, Op.Cit, p. 21.

³. Akyol, D. E, et al., Op.Cit, p. 44.

⁴. Turney,P.B.B., Op.Cit, pp.1&4.

⁵. Jackson, S., et al., Op.Cit, p. 115.

ABC system, they obtain benefits to improve company performance. Among those are: Cagwin, D., & M. J. Bouwman, found a positive association between ABC and improvement in financial performance (ROI) when ABC is use concurrently with strategic initiatives, when implemented in complex and diverse firm, when used in environment where costs relatively important, and which there are limited numbers of intra-company transactions¹. Kennedy, T., & J. Affleck-Graves, found that the adoption of ABC significantly improves a firm's relative performance in terms of both market and accounting-based measures (EPS, ROE, Debt ratio, Assets Turnover) and the ABC firms clearly outperform matched counterparts by approximately 27% over the three years beginning in which the ABC techniques are first implemented in UK; Also further analysis suggests that ABC adds to firm value through better cost controls and asset utilization, coupled with greater use of financial leverage. AL-Kadash, H., & M. Ferdium, found a positive association between using ABC, JIT and TQM and improvement in financial performance (ROA)² . El shesheni, H.M.A., found a positive relationship between management accounting practices (e.g., ABC) level and company's performance level measured by net profit average³.

On the other hand, although some studies have indicated that ABC can provide significant benefits to organizations, however, critics claimed that there is a little evidence that organizations consistently acted on the ABC information improved company's performance. For example, Innes, J., Sanford, R., found no significant relationship between management accounting practices and a firm's performance, as measured by ROI,

¹ . Cagwin, D., M. J. Bouwman, Op.Cit, p. 1

² . Al-kadash, H. & M. Feridum, Op.Cit, p. 299

³ . El shesheni, H.M.A., Op.Cit, p. 546

operating performance, debt equity management, and ROE. ABC improves corporate profitability¹. This view supported by others, for example, Askarany, D., et al., found no evidence supported that ABC adopters are more satisfied than non-adopters². Ittner, C. D., et al., found no significant association with return on assets (ROA). Instead, there is weak evidence that the association between ABC and accounting profitability is contingent on the plant's operational characteristics³. El temsahi, A., & D. Fadaly, found that the adoption of developed management accounting practices (e.g., ABC) improves employees productivity and does not affect annual sales growth rate⁴. Banker, R. D., et al., found that ABC has no significant direct impact on plant performance, as measured by improvements in unit manufacturing costs, cycle time, and product quality. However, that WCM practices completely mediate the positive impact of ABC on plant performance⁵.

Shedding light on the above debate, this study is going on this direction by investigating the impact of ABC on the financial performance measured by (cost and net profit) Sudanese manufacturing companies to see whether or not ABC improves financial performance by examining some enabling factors which have previously found influence the success of ABC adoption which will reflect positively on the performance enhancement. Namely, these factors are (cost structure; importance of cost information; product diversity; and competition.

¹ . Innes, J., & F. Mitchell, Activity Based Costing, A Review with Case Studies, CIMA, 1990, p. 1

² . Askarany, D., M. Smith, & H. Yazdifar, Op.Cit, p. 63

³ . Ittner, C. D., W. N. Lanen, & D. F. Larcker, Op.Cit, p.711.

⁴ . El temsahi, A., & D. Fadaly, Investigation of the in-firm contingent factors to the adoption of recent management accounting practices, Accounting, Management & insurance Review, No. 12, Cairo University Press, 2009, p. 92.

⁵ . Banker, R.D., I.R. Bardhan & T.Y. Chen, The role of manufacturing Practices in mediating the impact of activity-based costing on plant Performance, Accounting, Organizations & Society, Vol. 33, 2008, p. 1.