

A Study on Developing the Activity-Based Costing System in Comparison with Traditional System: A Case Study

Do Thanh Huyen

Danang University of Science and Technology
4 Ly Tu Trong, Hai Chau Dist., Danang city
Vietnam

Hoang Phuong Tung

Iowa State University of Science and Technology
1137 Pearson Hall, Ames, IA 50011-2206
United States of America

Abstract

Activity-Based Costing (ABC) has been promoted and adopted as a basis for making strategic decisions and for improving profit performance. In addition, ABC information is now also widely used to assess continuous improvement and to monitor process performance. In contrast to ABC systems, traditional costing systems uses only unit-level cost drivers, can not capture the complex and multiproduct processes, designed for a narrow range of products. By focusing on specific activities, ABC systems overcome the limitations of traditional systems and provides more accurate product costs, makes better decision and improve the process. ABC systems will continue to supplement, develop and replace traditional costing systems. A case study is showed the difference of product profitability when using traditional costing system and ABC system.

Key words: Activity-Based Costing, volume-based costing, system, cost driver

1. Introduction

Nowadays, many companies changed the method they manage costs to complete successfully. One of the most popular methods is using Activity-Based Costing (ABC) System. This is a managerial accounting system which determines the cost of activities exactly and provides management with relevant information (Anta, 2008). This paper focuses on main contents of procedure and steps on developing this ABC system. In addition, this paper also compares ABC system with traditional system, especially Volume-Based Costing (VBC) System. ABC is a costing approach that assigns resource costs to cost objects such as products, services, or customers based on activities performed for the cost objects (*Figure 1*).

The premise of this approach is that products or services of a firm are the results of activities and activities uses resource which incur costs (Granof, 2000). Costs of resource are assigned to activities based on the activities that use or consume resources and costs of activities are assigned to cost objects based on activities performed for the cost objects. ABC recognizes the causal or direct relationships between resource costs, costs driver, activities, and cost objects in assigning costs to activities and then to cost objects (*Figure 2*).

In addition, factory overhead costs are assigned to cost objects such as products or services by identifying the resources, activities as well as their costs and amounts needed to produce output (Lindahl, 1997). Therefore, using resource consumption cost drivers, a firm determines the resource costs consumed by activities and calculates the cost of a unit of activity. The firm then assigns the cost of an activity to products or services by multiplying the cost of each activity by the amount of the activity consumed by each of the cost objects.

To use ABC system effectively, items in this system need to be listed exactly. In fact, ABC has been recognized as a basis for making strategic decisions and for improving profit performance (*Figure 3*). In addition, ABC information is now also widely used to assess continuous improvement and to monitor process performance.

2. Some Definitions Used in ABC:

There are some definitions which are used regularly in ABC. Therefore, before discussing ABC, we need to define several important definitions: *activity*, *resource*, *cost driver*, *resource consumption cost driver*, and *activity consumption cost driver*.

2.1. Activity

An *activity* is a specific task or action of work done. An activity can be a single action or aggregation of several actions. For example, moving inventory from workstation A to workstation B is an activity that may require only one action. Production set-up is an activity that may include several actions.

2.2. Resource

A *resource* is an economic element needed or consumed in performing activities. Salaries and supplies, for example, are resources needed or used in performing manufacturing activities.

2.3. Cost driver

A *cost driver* is a factor that causes or relates to a charge in the cost of an activity. Because cost drivers cause or relate to cost changes, measured or quantified amounts of cost drivers are excellent bases for assigning resource costs to activities and for assigning the cost of activities to cost objects.

2.4. Resource consumption cost driver

A cost driver is either a *resource consumption cost driver* or an *activity consumption cost driver*. A *resource consumption cost driver* is a measure of the amount of the resources consumed by an activity. It is the cost driver for assigning a resource cost consumed by or related to an activity to a particular activity or cost pool. Examples of resource consumption cost drivers are the number of items in a purchase or sales order, changes in product design, size of factory buildings, and machine hours.

2.5. Activity consumption cost driver

An *activity consumption cost driver* measures the amount of an activity performed for a cost object. It is used to assign activity cost pool costs to cost objects. Examples of activity consumption cost drivers are the number of machine hours in the manufacturing of product X, or the number of batches used to manufacture product Y.

2.6. Product under-costing or over-costing:

Under-costing: a product consumes a high level of resources but is reported to have a low cost per unit. Companies that under-cost products may make sales that actually result in losses, although they may have the impression that these sales are profitable.

Over-costing: a product consumes a low level of resources but is reported to have a high cost per unit. Companies that over-cost products may overprice their products, losing market share to competitors producing similar products.

Product-cost cross subsidization: occurs when a cost is uniformly spread-meaning it is broadly averaged-across multiple products without recognizing which products require what resources in what amounts. If a company under-costs one of its products, then it will over-cost at least one of its other products.

3. Traditional Manufacturing Costing System

Manufacturing companies operated for many years with the simple job order costing systems and process costing systems. These systems assigned direct labor and direct materials costs to products. Indirect costs, such as machine expense, scheduling, quality control, purchasing, maintenance, supervision, general factory expenses (for building, depreciation, insurance, utilities) were accumulated as support department expenses (Popesko, 2010). Traditional systems use *volume-based costing*, such as direct labor hours or machine hours, to allocate overheads to products. Its allocation bases accurately measure resources that are consumed in proportion to the number of units produced of the individual products such as direct labor, materials, energy and machine-related costs. However, many organizational resources (e.g. support activities such as material handling, material procurement, performing set-ups, production scheduling and inspection) exist for activities that are unrelated to physical volume. Then to production departments in simple proportion to the direct labor hours or other allocation bases worked in each department.

3.1. The two-stage cost assignment procedure of VBC system

VBC systems assign factory overhead costs first to plant or departmental cost pools and second to products or services. In the first stage, charge factory overhead costs to a single plant cost pool or to departmental cost pools. This approach is convenient and simple, because many accounting systems in use today accumulate cost information by department, which is easily aggregated to the plant level. In the second stage, a volume-based rate (based on units produced or hours used in production) is then used to apply overhead to each of the cost objects. A volume-based two-stage cost assignment procedure, however, is likely to distort product or service costs. This is true especially in the second stage where the VBC system uses a cost driver such as direct labor- hours or output units to assign factory overhead costs. Because all products or services do not always consume factory overhead resources in a cost pool in proportion to the volume-based measure or measures the firm uses to assign factory overhead costs, a volume-based system often leads to inaccurate measures for the costs of support activities in its operations.

3.2. Limitations of traditional costing systems

Firstly, traditional cost systems, using only unit-level cost drivers such as direct labor hours, direct labor dollars, machine hours, and units produced, can not capture the economics of complex, multiproduct processes. Secondly, traditional systems were designed for a narrow range of products, and direct labor and materials costs were the dominants factory costs, overhead costs were relatively small and the distortion arising from the inappropriate overhead allocations were not significant. Next, Omission of some support cost, e.g. selling, marketing, distribution, warranty costs, administrative and general overhead costs. Finally, traditional system often allocates costs to tangible products (manufactured) and excludes intangible (service products).

5. Steps in Developing an ABC System

Developing an activity-based costing system entails three steps (*Figure 4*).

5.1. Step1 - Identify Resource Costs and Activities

The first step in designing an ABC system is to conduct an activity analysis to identify the resource costs and activities of the firm. Most firms record resource costs in specific accounts in the accounting system. Examples of these accounts include: supplies, purchasing, materials handling, warehousing, office expenses, furniture and fixtures, buildings, equipment, utilities, salaries and benefits, etc. To identify resource costs for various activities, a firm classifies all activities according to the way in which the activities consume resources, as follows:

- A unit-level activity is performed on each individual unit of product or service of the firm, for examples: direct materials, direct labor hours, inserting a component.
- A batch-level activity is performed for each batch or group of units of products or services, for examples: setting up machines, placing purchase orders, scheduling production, handling materials.
- A product-level activity supports the production of a specific product or service, for examples: designing products, administering parts required for products.
- A facility-level activity supports operations in general, for examples: providing security and safety, performing maintenance of machines, managing the plant.

5.2. Step 2 - Assign Resource Costs to Activities

Activity-based costing uses resource consumption cost drivers to assign resource costs to activities. Because activities drive the cost of resources used in operations, a firm should choose resource consumption cost drivers based on cause-and-effect relationships. Typical resource consumption cost drivers include the number of labor hours for labor intensive, the number of employees for payroll-related activities, the number of setups for batch-related activities, the number of moves for materials-handling activities, the number of machine-hours for machine repair and maintenance, and the number of square feet for general maintenance and cleaning activities. The cost of the resources can be assigned to activities by direct tracing or estimation. Direct tracing requires measuring the actual usage of resources by activities. For example, power used to operate a machine can be traced directly to that machine's operation by reading the meter attached to the machine. Multiple resource consumption cost drivers often are needed to assign different resource costs to activity or activity center cost pools.

5.3. Step 3 - Assign Activity Costs to Cost Objects

The final step is to assign costs of activities or activity cost pools to cost objects based on the appropriate activity consumption cost drivers. Outputs are the cost objects for which firms or organizations perform activities. Typical outputs for a cost system are products and services; however, outputs also can include customers, projects, or business units. For example, the outputs of an insurance company may be individual insurance policies sold to customers, claims processed, types of policies offered, insurance agents, or divisions or subunits of the company. Firms use activity consumption cost drivers to assign activity costs to cost objects. Activity cost drivers should explain why the cost of a cost object goes up or down. Typical activity consumption cost drivers are purchase orders, receiving reports, inspection reports or hours, parts stored, payments, direct labor-hours, machine-hours, and setups and manufacturing cycle time.

6. A Comparison of VBC System and ABC System – A Case Study

This following case study shows the difference of product profitability when using VBC and ABC. The FPT Media, Inc. in Danang city, Vietnam produces and sells two kinds of mobile phone, the high-end mobile phone “FPTstar” and the popular mobile phone “FPTphone”. The FPT Media, Inc. HBT has the following operating data for the two products (*Table 1*).

6.1. Volume-Based Costing

The VBC system that the firm uses assigns factory overhead (OH) based on direct labor-hours (DLH). The firm has a total budgeted overhead of \$2,000,000. Since the firm budgeted 100,000 direct labor hours for the year, the overhead rate per direct labor hour is \$20 per direct labor hour. Since the firm uses 25,000 direct labor hours to manufacture 5,000 units of FPTstar, the factory overhead assigned to FPTstar is \$500,000 in total and \$100 per unit. The factory overhead for FPTphone is \$1,500,000 in total and \$75 per unit since the firm spent 75,000 direct labor hours to manufacture 20,000 units of FPTphone (*Table 2*). A product profitability analysis using the firm's VBC System is showed (*Table 3*).

6.2. Activity-Based Costing

In using an ABC system, the FPT Media, Inc. has identified the following activities, budgeted costs, and activity consumption cost drivers (*Table 4*). The FPT Media, Inc. also has gathered the following operating data pertaining to each of its products (*Table 5*). Using the gathered data, the cost driver rate for each activity consumption cost driver is calculated (*Table 6*). Factory overhead costs are assigned to both products by these calculations (*Table 7*). A product profitability analysis using the firm's activity-based costing system is showed (*Table 8*).

The comparison of product costs and profit margins under the two costing systems is showed (*Table 9*). The activity-based costing system presents a more accurate measurement of product costs by tracing overhead consumption. The preceding comparison shows that the volume-based product costing system significantly undercosts FPTstar (a low-volume product) and overcosts FPTphone (a high-volume product) when considering the actual overhead consumptions of the two products.

7. Benefits and Limitations of ABC:

7.1. Benefits

- Better profitability measures. The ABC provides more accurate and informative product costs, leading to more accurate product and customer profitability measurements and to better-informed strategic decisions about pricing, product lines, and market segments.
- Better decision making. The ABC provides more accurate measurements of activity-driving costs, helping managers to improve product and process value by making better product design decisions, better customer support decisions, and fostering value enhancement projects.
- Process improvement. The ABC provides the information to identify areas where process improvement is needed.
- Cost estimation. The ABC improved product costs lead to better estimates of job costs for pricing decisions, budgeting, and planning.

7.2. Limitations

- Allocations. Not all costs have appropriate or unambiguous activity or resource consumption cost drivers. Some costs require allocations to departments and products based on arbitrary volume measures because finding the activity that causes the cost is impractical.
- Omission of costs. Product or service costs typically do not include costs for such activities as marketing, advertising, research and development, and product engineering even though some of these costs can be traced to individual product or services.
- Expense and time. An ABC system is not cost free and is time-consuming to develop and implement. For firms or organizations that have been using a traditional volume-based costing system, installing a new ABC system is likely to be very expensive. Furthermore, like most innovation management or accounting systems, ABC usually requires a year or longer for successful development and implementation.

8. Conclusion

ABC is an accounting method that allows an organization to determine actual costs associated with each product or service produced by the organizations. Moreover, ABC is a powerful tool for measuring performance, identifying, describing, assigning costs to, and reporting on an organization's operations. Therefore, ABC is not only a method of costing, but also a technique for managing the organization better. It is a one-off exercise which measures the cost and performance of activities, resources and the objects which consume them in order to generate more accurate and meaningful information for making decision.

9. References

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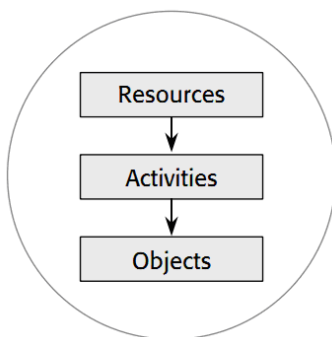


Figure 1. Simple Activity-Based Costing

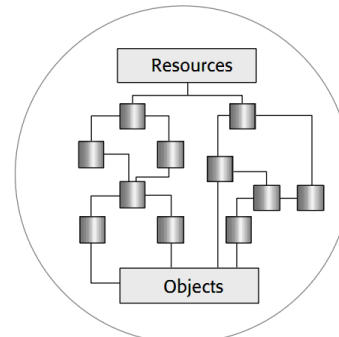


Figure 2. Expanded Activity-Based Costing

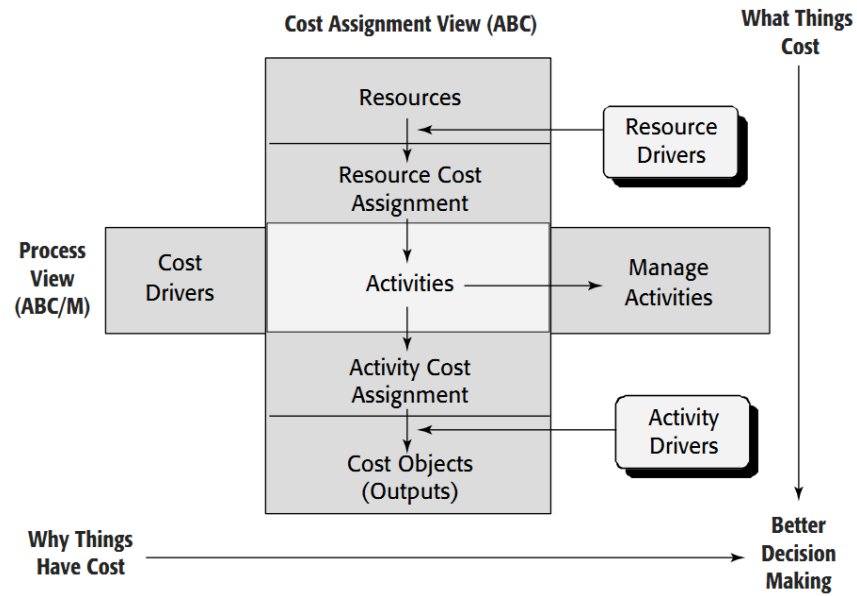


Figure 3. Activity-Based Costing Management Framework

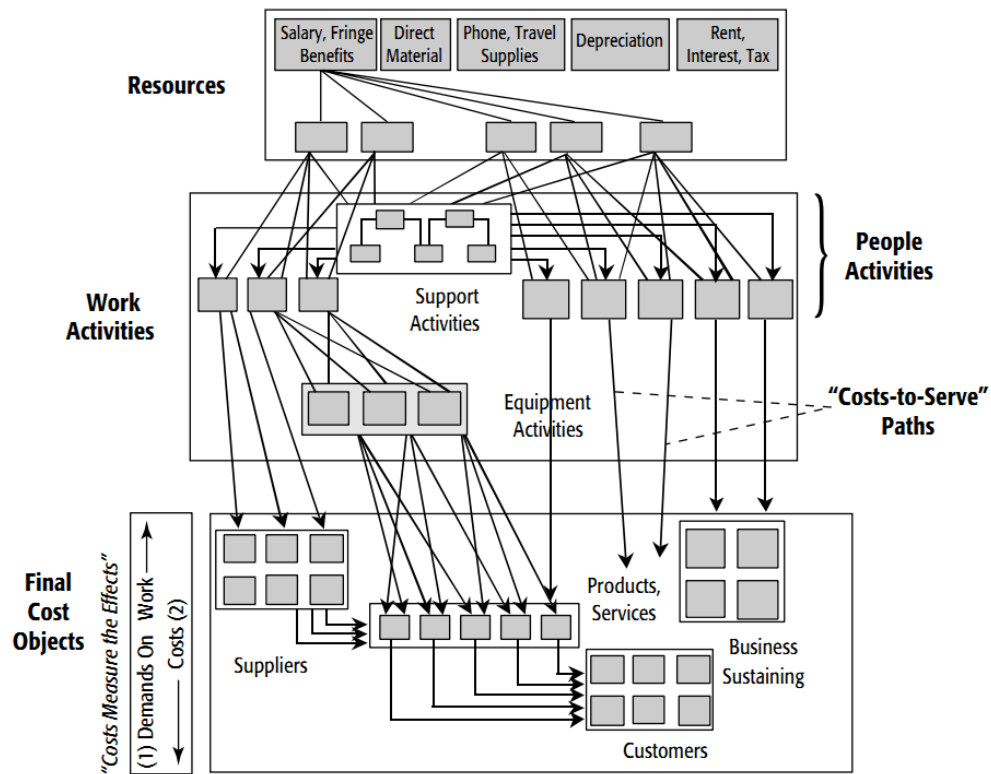


Figure 4. The Cost Assignment Network

Table 1. The Operating data for the two products

	FPTstar	FPTphone
Production volume	5,000	20,000
Selling price	\$400	\$200
Unit direct materials and labor	\$200	\$80
Direct labor-hours	25,000	75,000
Direct labor-hour per unit	5	3.75

Table 2. VBC System - Factory overhead per unit of products

Total overhead	\$2,000,000
Total DHL	$25,000 + 75,000 = 100,000$
Overhead rate per DHL	\$20
Total OH assigned to FPTstar	$\$20 \times 25,000 = \$500,000$
Number of units of FPTstar	5,000
Factory OH per unit of FPTstar	\$100
Total OH assigned to FPTphone	$\$20 \times 75,000 = \$1,500,000$
Number of units of FPTphone	20,000
Factory OH per unit of FPTphone	\$75

Table 3. VBC System - A product profitability

	FPTstar		FPTphone	
Unit selling price		\$400		\$200
Unit cost product:		\$300		\$155
- Direct materials and labor	\$200		\$80	
- Factory overhead	\$100		\$75	
Unit margin		\$100		\$45

Table 4. ABC System – Activities and Budgeted Cost

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

Table 5. ABC System - The Operating data for the two products

Activity Consumption Cost Driver	FPTstar	FPTphone	Total
Engineering hours	5,000	7,500	12,500
Number of setups	200	100	300
Machine hours	50,000	100,000	150,000
Number of packing orders	5,000	10,000	15,000

Table 6. ABC System - The cost driver rate

Activity Consumption Cost Driver	Cost	Activity Consumption	Activity rate
Engineering hours	\$125,000	12,500	\$10
Number of setups	\$300,000	300	1,000
Machine hours	\$1,500,000	150,000	10
Number of packing orders	\$75,000	15,000	5

Table 7. ABC System - Factory overhead costs

FPTstar (5,000 units)				
Activity Consumption Cost Driver	Activity rate	Activities	Total overhead	Overhead per unit
Engineering hours	\$10	5,000	\$50,000	\$10
Number of setups	1,000	200	\$200,000	\$40
Machine hours	10	50,000	\$500,000	\$100
Number of packing orders	5	5,000	\$25,000	\$5
<i>Overhead cost per unit</i>			<i>\$775,000</i>	<i>\$155</i>
FPTphone (20,000 units)				
Activity Consumption Cost Driver	Activity rate	Activities	Total overhead	Overhead per unit
Engineering hours	\$10	7,500	\$75,000	\$3.75
Number of setups	1,000	100	\$100,000	\$5
Machine hours	10	100,000	\$1,000,000	\$50
Number of packing orders	5	10,000	\$50,000	\$2.5
<i>Overhead cost per unit</i>			<i>\$1,225,000</i>	<i>\$61.25</i>

Table 8. ABC System - A product profitability

	AW			SZ		
Unit selling price			\$400			\$200
Unit cost product:						
- Direct materials and labor		\$200			\$80	
- Factory overhead		\$155			\$61.25	
+ Engineering	\$10			\$3.75		
+ Setups	\$40			\$5		
+ Machine running	\$100			\$50		
+ Packing	\$5			\$2.5		
Cost per unit			\$355			\$141.25
Unit margin			\$45			\$58.75

Table 9. The comparison of product costs and profit margins under two systems

	FPTstar	FPTphone
Unit overhead cost		
- Volume-based	\$100	\$75.00
- Activity-based	\$155	\$61.25
=> <i>Difference</i>	\$55	\$13.75
Unit margin		
- Volume-based	\$100	\$45.00
- Activity-based	\$45	\$58.75
=> <i>Difference</i>	\$55	\$13.75