

## ACTIVITY - BASED COSTING DESIGNING

**Wioletta Skibińska, Marta Kadlubek**

*Czestochowa University of Technology*

**Abstract:** The traditional costing system sometimes does not give accurate information about the consumption of different resources and the activities of the organisation. The activity-based costing system is an information-rich costing system which is more and more necessary for the success of many European companies. Base of designing and implementation of an ABC system in the enterprises are presented in the article.

**Keywords:** activity - based costing, cost accounting.

Traditional cost accounting may distort product and/or services costs in an advanced business environment where the overhead costs are a significant portion of total production or service costs [11.]. While traditional cost behavior divides costs into variable and fixed categories, activity-based costing (ABC) divides these same costs into those that vary with unit-level activities, batch-level activities, and product-level activities and facility-level costs [10.].

ABC has been developed to provide more accurate ways of assigning the costs of indirect and support resources to activities, business processes, products, services and customers. Besides this advantage, according to S.P. Agrawal and S. Mehra [1.], ABC is used for improving value-added activities and for decreasing non-value-added activities in a self-perpetuating system of improvement. ABC is useful for the organizations where the indirect cost proportion is more than the direct costs [2.].

B. B. P. Turney [16.] defined ABC as a method of measuring cost and performance of activities and cost objects. It assigns cost to activities based on their use of resources and then assigns cost to cost objects based on their use of activities. The focus of ABC is on accurate information about the true cost of products, services, processes, activities, distribution channels, customers' segments, contracts and projects. ABC allows to identify problems and plot safe courses to solutions and opportunities. It does this by providing financial and non financial information about activities and cost objects.

The goals of ABC can be achieved by managing the activities. It is important to realise that managing activities is not a custodial task. Rather, it is a process of relentless and continuous improvement of all aspects of business. This involves a continuous search for opportunities to improve which in turn involves a careful and methodical study of activities [5.].

As its name implies, ABC recognizes that activities cause costs. Some activities must be performed for each unit of a product manufactured. These activities are called unit-level activities [3.]. For example, product inspection and testing is a unit-level activity in a personal computer manufacturer that inspects and tests all units [10.].

There are more and more applications of ABC in manufacturing industries and some applications in service industries. But direct application of ABC to companies is not a frequent case in the literature. Service sectors including logistics companies have not yet thoroughly addressed their costs and managed them with a process-based costing method. This lack of consideration causes distortions of their cost of services [2].

In view of this, R. Cooper [3.] and R. S. Kaplan [8.] suggested using ABC to improve the accuracy of product costs. In early ABC systems, overhead cost is divided into various cost pools, where each cost pool contains the cost of a group of related activities consumed by products in approximately the same way. Each cost pool is distributed to products by using a unique factor that approximates the consumption of cost. This unique factor, called an allocation basis in traditional cost accounting, could be volume-related (e.g. direct labor hours and machine hours) or volume-unrelated (e.g. number of orders, set-up hours, and number of parts).

Early ABC systems focus on the accurate assignment of overhead costs to products. They do not provide direct information about activities and do not consider the costs outside the plant. Thus, a two-dimensional model of ABC is proposed as shown in Figure 1. This ABC model is composed of two dimensions: cost assignment view and process view described in the following two subsections [14].

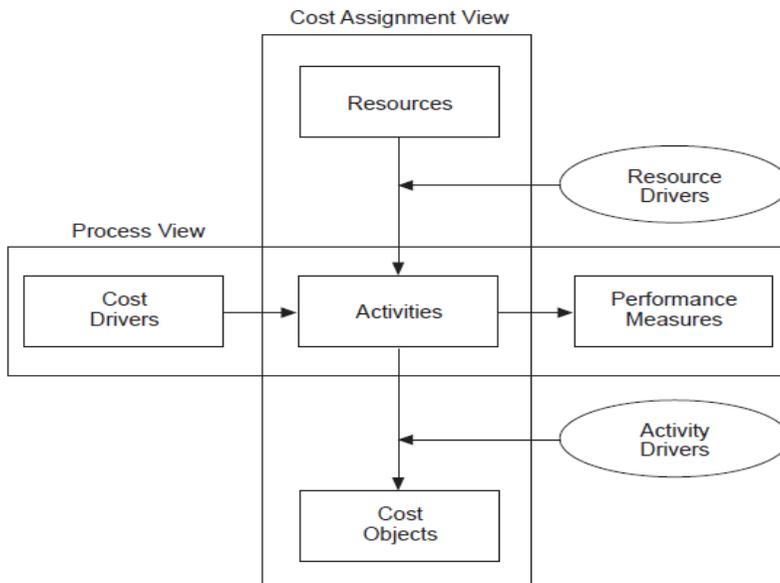


Figure 1. Two-dimensional model of ABC

Source: [14.]

Activity-based costing works in two stages in both service and manufacturing organizations. In the first stage of ABC, overhead costs are divided into homogeneous cost pools. A homogeneous cost pool is a collection of overhead costs for which a single cost driver can explain cost variation. Overhead activities are homogeneous whenever they have the same consumption ratios for all products. Once a cost pool has been defined, the cost per unit of the cost driver is computed for that pool. This is the pool rate. Computation of the pool rate completes the first stage. Consequently, the first stage of ABC produces two outcomes [7.]:

- (1) a set of homogeneous cost pools;
- (2) a pool rate.

In the second stage of ABC, the costs of each overhead pool are traced to products. This is done by using the pool rate computed in the first stage and the measure (the quantity of the cost driver used by each product) of the amount of resource consumed by each product. The overhead costs assigned from each cost pool to each product are computed by multiplying cost drivers unit used with pool rate, i.e. applied overhead = pool rate X cost driver units used [7.].

Figure 2. represents the cost assignment process in ABC. Activity centers are the initial cost consumption centers in ABC. In the first stage, the resources are allocated to the activity centers and the initial cost centers are determined. In the second stage, ABC performs the allocation of activity costs to the cost objects [2.].

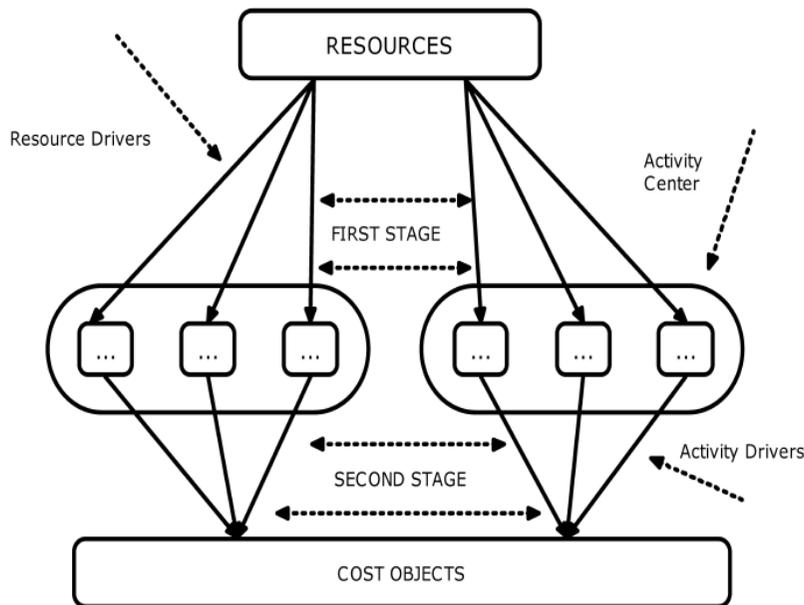


Figure 2. Detailed cost assignment of ABC

Source: [2.]

As it can be seen in Figure 2, the elimination of any activity center or addition of a new activity center will change the cost structure of the services provided. The cost calculation without any computerized process model is time-consuming for these types of trials [12.]. Therefore a computer implementation for rapid calculations and tests of alternative scenarios is vital. ABC processes as shown in Figure 2. are used in devising the process models for testing alternative process configurations for cost reduction [2.].

The total overhead cost per unit of products is obtained by first tracing the overhead costs from the pools to the individual products. The number of units produced then divides this total. The result, i.e. the unit overhead cost plus the per unit overhead cost to the per unit prime cost, yields the manufacturing cost per unit. In service firms, the most important cost is the labor cost for personnel. Direct labor costs are traceable to the service rendered. In service organizations, the most important cost would be the professional labor involved in producing the services, i.e. the direct labor cost must be traceable to the service rendered. In addition to the labor cost, various types of overhead costs will occur in any type of business. In a service firm, the overhead costs usually occur when offering a service. Consequently,

they are classified as service overheads and can be compared with factory overheads in a manufacturing firm. Professional labor costs are considered service overheads rather than period costs (noninventorial costs deducted as expenses during the current period without having been previously classified as costs of inventory) [7].

According to R. Cooper [3.] and R. S. Kaplan [8.], before one can start designing an ABC system, six major decisions should be made and they are [6.]:

1. Should the system be integrated with the existing cost system or should it be a stand alone system?
2. Should a formal design be approved before implementation?
3. Who should take ownership of the final system?
4. How precise should the system be?
5. Should the system report historical or future costs?
6. Should the initial design be complex or simple?

After having answered these important questions one can start with designing the appropriate ABC system for its demanded purposes. A conceptual model presented in Figure 3. has been used to demonstrate the relevance of ABC in manufacturing and service organizations.

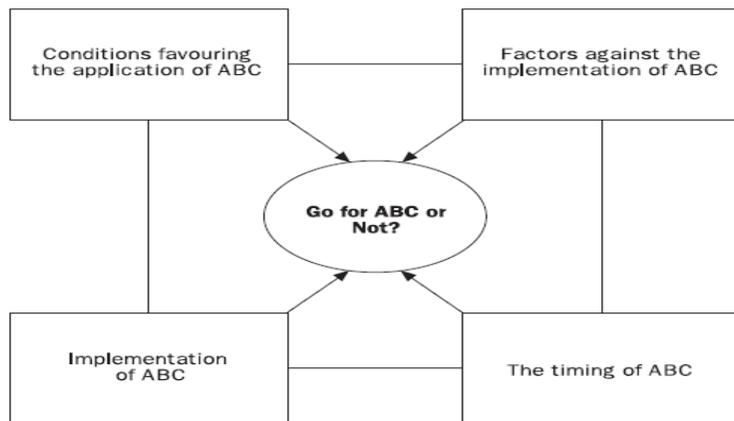


Figure 3. A conceptual model for the decision to implement ABC

Source: [6.]

Based on this principle, different steps are required to design an ABC system. A conceptual model has been developed as shown in Figure 4. to describe the various stages in the design of an ABC system. The design process begins with defining the objectives of an ABC system and ends with the implementation.

As stated before there are some major advantages for the introduction of an advanced cost system, especially ABC system. There are many other financial and marketing factors that have played an increasingly important role in justifying the implementation of ABC systems [14.]:

- Measurement costs. During the last decades the introduction of more advanced information technology has become cheaper and easier to carry out the necessary calculations to arrive at the desired product costs. Therefore, implementation of ABC systems has become easier;
- Increasing costs of error. As a result of the recessions which the world encountered in the last two decades, it has become increasingly important to have a profound knowledge of the right production costs. This, together with the falling labour base

and the more expensive investment programs, gives a synergetic effect. Making wrong decisions based on wrong product figures can lead to very serious consequences;

- Other elements favouring the use of ABC system include the need for changing overhead structures, new production processes and new marketing strategies.

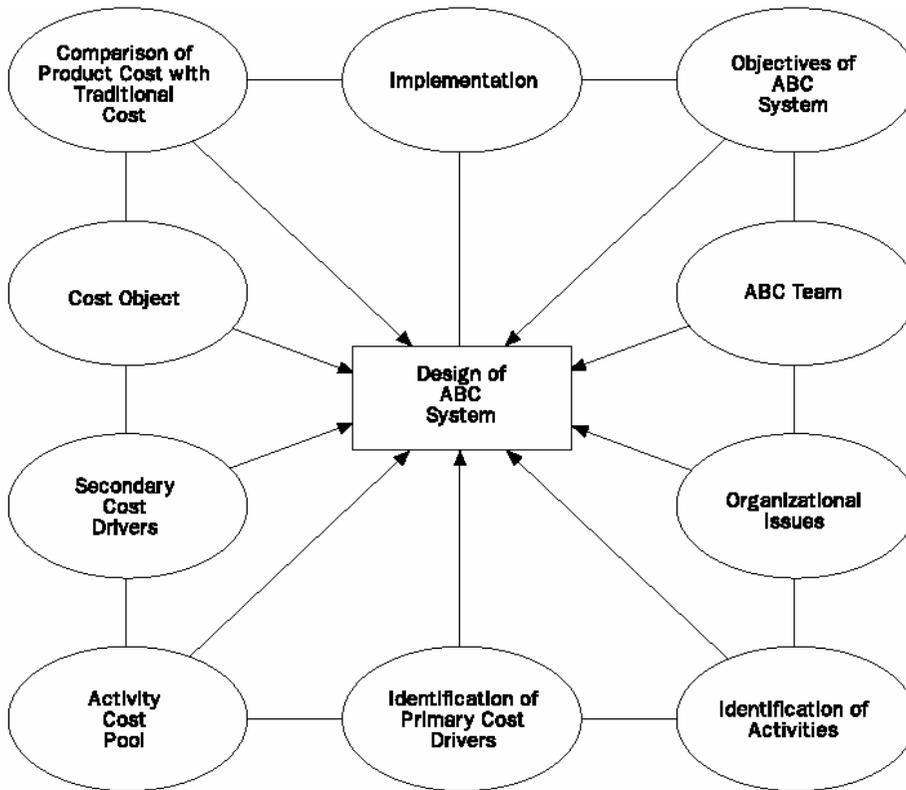


Figure 4. Design of activity-based costing: a framework

Source: [5.]

Factors not favouring ABC implementation [5.]:

- First of all, the decision on the implementation of an ABC system should well be considered because the change not only needs resources in the form of man hours and capital (in buying the necessary equipment), but also the involvement of employees;
- Secondly, the difficulties of implementing ABC are lost production, congestion on the factory floor and lack of involvement. If cost drivers are used to measure the performance of employees in developing a reward system, then the consequence is that manager and especially the employees will focus too much on the cost drivers.

The objective that designers of an ABC system should set for themselves is to provide the most benefit possible at the lowest overall cost. To achieve that goal, five design steps should be taken [9.]:

- Aggregating activities. The number of actions performed is typically so vast that it is economically unfeasible to use a different cost driver for each action. Ordinarily,

therefore, many actions must be aggregated into each activity. A single driver is then used to trace the costs of activities to products. Treating collections of actions as activities removes the need to measure and track the performance of individual actions. Unfortunately, as more and more actions are aggregated into activity, the ability of a cost driver to trace accurately the resources consumed by products decreases;

- Reporting the cost of activities. Once ABC system's activities are selected, the next issue is the level of aggregation used in reporting the resources each activity consumes. For example, the cost of resources consumed by the set-up can be reported separately or collectively. The system might report set-up costs for product X of 120 PLN, an amount that included both set-up and material movement costs. Alternatively, the system might break the costs down and report a machine set-up cost of 80 PLN and a separate material movement cost of 40 PLN;
- Identifying activity centres. An activity centre is a segment of the production process for which management wants to report the cost of the activities performed separately. For example, the receiving department might be treated as the activity centre "receiving". The product costs reported by the system are not affected by this design choice. The only effect is how they are reported. The system might report a total cost of 100 PLN. Alternatively, this total could be broken down and reported as 60 PLN for manufacturing and 40 PLN for receiving;
- Selecting cost drivers. The advantage of a two-stage procedure over a single-stage tracing procedure is that different measures of resource consumption can be used at each stage. Having two stages is frequently beneficial because the information available about the consumption of resources at the centre level is often superior to that available at the product level:
  - *First-stage drivers*  
The first stage traces the costs of inputs into cost pools in each activity centre. Each cost pool represents an activity performed in that centre. The cost drivers used to trace costs into cost pools determine the dollars traced to each pool and, therefore, the accuracy of reported costs.
  - *Second-stage drivers*  
The choice of cost driver for second-stage allocations determines the level of distortion introduced into reported product costs. Of these five design decisions, the one most affected by a switch to ABC is the selection of second-stage cost drivers. Selecting cost drivers calls for two separate but interrelated decisions: how many cost drivers should be used; and which cost drivers should be used. These decisions are interrelated because the type of cost drivers need to achieve a desired level of accuracy.
- Judgement and analysis. In practice, identifying how many cost drivers to use in an ABC system calls for both judgement and analysis. The first step is to identify the inputs with large dollar values. The second is to consider how diverse the products are and in what batch sizes they are produced.
- Factors to consider. Once the minimum number of required cost drivers is determined, appropriate cost drivers can be selected. Three factors should be taken into account: how easy it is to obtain the data required by the cost driver (i.e. measurement costs); how the actual consumption of the activity correlates with the consumption.

Management must match capacity to demand and not the other way around. Thus, changes in spending or supply of a resource is therefore not related to a change in the resources, as in volume-based costing systems, but rather a change in activity consumption, which in turn

causes change in resource consumption. In other words, products consume resources indirectly via their consumption of activities. From a managerial perspective this fact implies that costs cannot be managed – rather, one must manage activities, which, in turn, impacts costs. Often, this requires a change in mindset, but although it is possible to implement ABC and continue with “business as usual”, this is rarely what happens [8.].

However, the most visible difference between volume-based cost assignment and activity-based cost assignment is that activity-based assignment employs drivers that keep track of how cost objects consume activities (activity drivers) and how activities consume resources (resource drivers), whereas volume-based assignment relies on simply unit-level characteristics such as labor hours, machine hours, and so on. In other words, the drivers keep track of the transactions, which is useful because transactions drive overhead costs whereas the unit-level characteristics ignore this fact and simply relate everything to volume. The drivers may occur at many different levels, for example, unit-level drivers (triggered every time a unit of a product is produced) and batch-level drivers (triggered every time a batch of products is produced).

Recognition that cost may vary with something other than volume can make ABC a powerful tool for industrial marketers in three ways. First, it results in cost estimates to use in pricing that reflect significant differences among product specifications. Traditional cost behavior estimates assume that overall company resource usage is typical of resource usage for each product [13.]. Second, ABC provides the industrial marketer with guidance as to which product specifications may be adjusted in negotiations to yield significant cost reductions which may result in a more competitive price. Traditional cost behavior estimates only indicate changes in volume as a means to reduce costs. Finally, ABC indicates areas for change in operations to permit cost reductions that will allow the company to satisfy customer wishes better [10.].

For the successful implementation of an ABC system, management should be convinced to change the traditional costing system because ABC is quite different from existing systems. When ABC becomes available, a group of managers and engineers should meet to discuss the results. The ABC team can convince them by presenting results that in at least one major product for which they are responsible, the ABC differs significantly from those reported by the company's existing cost accounting system. The design of the ABC system should be explained to the managers so that they can understand how the new cost system differed from the existing one [3.].

The user should understand what information is available from an ABC system and how that information should be used in decision making. The primary aim of the new system is not to create an elegant and technically robust solution, but to provide a solution that will change the behaviour, and allow the management to make and improve the performance of the business [5.]. Therefore, the user should be trained to apply the ABC system.

## References

- [1.] AGRAWAL, S.P., MEHRA, S.: **Cost management system: an operational overview.** - Managerial Finance, Vol. 24, No. 1, 1998.
- [2.] BAYKASOGLU, A., KAPLANOGLU, V.: **A service-costing framework for logistics companies and a case study.** - Management Research News, Vol. 30, No. 9, 2007.
- [3.] COOPER, R.: **Explicating the logic of ABC.** - Management Accounting, November, 1990.

- [4.] EMBLEMSVAG, J.: **Using activity-based costing and economic profit to grow the bottom-line.** - Business Strategy Series, Emerald Group Publishing Limited, Vol. 8, No. 6, 2007.
- [5.] GUNASEKARAN, A.: **A framework for the design and audit of an activitybased costing system.** - Managerial Auditing Journal, No.14/3, 1999.
- [6.] GUNASEKARAN, A., MARRI, H. B., YUSUF, Y. Y.: **Application of activity-based costing: some case experiences.** - Managerial Auditing Journal, No. 14/6, 1999.
- [7.] HUSSAIN, M., GUNASEKARAN, A.: **Activity-based cost management in financial services industry.** - Managing Service Quality, Vol. 11, No. 3, 2001.
- [8.] KAPLAN, R.S.: **In defense of activity-based cost management.** - Management Accounting, November, 1992.
- [9.] KLEINER, B. H.: **How to implement activity-based costing.** - Logistics Information Management, Vol. 10, No. 2, 1997.
- [10.] LERE, J.C.: **Activity-based costing: a powerful tool for pricing.** - Journal of Business & Industrial Marketing, Vol. 15, No. 1, 2000.
- [11.] NOWICKA – SKOWRON, M., GRABOWSKA, M.: **Analiza zmiennych determinujących finansowe strategie gospodarowania kapitałem zasobowym przedsiębiorstwa.** - [in:] URBANCZYK, E. (ed.): **Strategie wzrostu wartości przedsiębiorstwa.** - Szczecin, Wyd. Kreos, 2007.
- [12.] SKOWRON – GRABOWSKA, B.: **Costs in the Financial Strategies of the Enterprises.** - [in:] KOSCIELNIAK, H.: **Processes of Capital Supply in Production Enterprises.** - Częstochowa, Prace Wydziału Zarządzania Politechniki Częstochowskiej, Serie Monographs, No. 1, 2006.
- [13.] ŚLUSARCZYK, B.: **The Analysis of the Costs of Activity with Respect to Restructuring Processes in a Motor Transport Company.** - [in:] microCAD 2007 International Scientific Conference, Section O: Economic Challenges II, Miskolc, 2007.
- [14.] TSAI, W.H.: **Activity-based costing model for joint products.** - International Journal of Computers and Industrial Engineering, Vol. 31, No. 3-4, 1996.
- [15.] TSAI, W. H.: **Quality cost measurement under activity-based costing.** - International Journal of Quality & Reliability Management, Vol. 15, No. 7, 1998.
- [16.] TURNEY, B.B.P.: **Activity Based Costing. The Performance Breakthrough.** - London, CLA, 1996.