International Review of Business Research Papers
Vol. 5 No. 4 June 2009 Pp. 91-101

How To Manage The Costs Of Service Departments Using Activity-Based Costing[#]

Boris Popesko[*]

This paper describes issues affecting the managing of service department costs and their accurate allocation to the principal departments of companies. Accurate service department cost allocation is considered the most important condition for precise product costing. The first part of paper contains a definition of service departments. This is followed by elementary costing techniques and a discussion on their usage for overhead and service costs. The activity-based costing method is considered the most beneficial for managing this group of costs. In addition, there is an explanation on delineating the structure of activities in ABC, as well as how to distinguish between primary and secondary activities. Afterwards, the allocation procedures within service departments are analyzed on the basis of case studies performed, plus the challenge represented by reciprocal outputs and the self-consumption of service departments' outputs is outlined. A number of allocation techniques are capable of effectively allotting service department costs. However, the most suitable is found to be the reciprocal method, and its application within the case study is described.

Key words: *Costing methods, activity-based costing, service department cost allocation*

JEL: *M1/M41*

1. Introduction

Contemporary managerial accounting is affected by the growing importance of effective overhead cost management, the cause of which lies in several factors. First and foremost, there has been a proportional increase in the overheads faced by companies, changing from around a portion of 10% in the 1950´s to what it is today, potentially representing approximately 40% of a manufacturing business's total costs. Another factor holding sway over the bearing of effective overhead cost management is pressure from competitors, forcing firms to extend the efficiency of their operations. Organizations with huge overhead departments and inflated overhead costs could have difficulties reaching the necessary level of operational effectiveness. Furthermore, there is the factor of increasing diversity of operations. This means that each product and every customer could differ in how they consume overhead department services within an organization. In such cases, any company's costing system should provide useful information on product and client costs, as well as giving data on the relations between costs, company activities, and cost objects, these being products and customers.

[#] The article is processed as an output of a research project "The methodology of activity-based costing system implementation and its influence on the efficiency of manufacturing industries", registered by the Grant Agency under registration number 402/07/P296.
[*] Boris Popesko, Ph.D., Assistant Professor, Tomas Bata University in Zlin, Faculty of Management and Economics, Mostni 5139, Zlin, 760 01, Czech Republic, E-mail: popesko@fame.utb.cz

Accountants and financial managers often overcome challenges like this by allocating overhead department costs to cost objects. However, the fixed nature of such costs complicates matters when allotting expenses in instances of fluctuating capacity utilization. In order to overcome this, a number of sophisticated costing methods have been developed in recent decades that help managers deal with issues of overhead cost allocation, processes which provide data for effective cost management. This paper presents these procedures and techniques that might prove useful for effective cost management for service departments.

2. What Are Service Departments?

The endeavor of every business enterprise is to create profit through satisfying the needs of customers, this being the result of various activities. Consequently, the activities of an enterprise effectively result in the conversion of inputs into outputs. The series of activities performed to add value to inputs with the aim of arriving at final outputs is referred to as 'the value chain'. This concept was originally identified and defined by Michael Porter (1985). Porter classifies a full value chain as nine interrelated primary and support activities. The first of these - primary activities - can be related to actions which an organization performs to satisfy external demands, while secondary activities are conducted to serve the needs of internal 'customers'. If a company carries out a sophisticated form of accounting, the costs of secondary activities are usually gathered within overhead departments or cost centers. Even if not all of the overhead costs are registered in these overhead departments, such as instances when overhead costs of operations are allocated to operation (non-overhead) departments, the costs of these overheads consume large portions of a company's costs. Dealing with procedures within the management of this group of costs is known as responsibility accounting; as described by some authors (Drury-2001, Král-2006). Therefore, according to Porter, company service departments provide a wide range of support activities necessary for effectively conducting primary activities and for the enterprise as the whole. Some examples of overhead departments include the company headquarters, departments such as IT, accounting, human resources, and R & D, a canteen and a firm's infrastructure.

3. The Costs Consumed By Service Departments

It would seem that a vast number of enterprises are faced with a rapidly rising overhead cost portion. This is due to a striking change in terms of developments within the cost structure of companies. In the first half of the 20th century, manufacturing related costs - materials, salaries of employees, etc. - accounted for well over 90% of total costs. In later years, after dramatic changes to the structure of companies' activities, the portion of direct costs decreased, e.g. material and personnel, but the portion of overheads went up. Direct labor had diminished, making way for automation and robotic systems. This trend occurred in conjunction with a sudden rise in the development of overhead activities performed, such as quality control, IT services, and reconfiguring production lines. Presently, the average portion of mean costs is over 50%.

These overhead costs can be split into two groups according to their relation to individual activities. The first group comprises costs linked with a company's primary activities; examples include the purchasing department and the operations or sales departments. These expenses, despite being overhead costs, contain a specific quantity of variable costs. To illustrate this, if a sales department handles a lower number of orders, there will be a reduction in telephone calls, transport costs, business trips, etc. The other group is made up of overhead costs linked with secondary activities, the characteristics of which are mostly fixed. The cost system of any company is able to take into account this grouping classification and separate company overheads into variable and fixed subdivisions. Nevertheless, it is service department costs, sometimes known also as general or administrative expenses, which consume the largest portion of company overheads. These could amount to as much as 40-50% of total overhead costs (Popesko, 2008), so management often desire these to be allocated and monitored precisely.

4. Cost Allocation Methods

Three elementary types of costing methods are generally used, differing in their means of allocating overhead costs to products, these being the traditional absorption costing method, plus the variable costing and activity-based costing methods. All of these have been written about at length by various authors (Drury-2001, Král-2006). Traditional costing techniques, represented by the absorption costing method, were used for the purposes of overhead cost allocation in the last century. These are based on simplified procedures using principles of averages. In recent decades, such conventional concepts have become obsolete due to two major phenomena. The first is ever increasing competition in the marketplace, the necessity to reduce costs and the effect of having more detailed information on company costs. The other is the alteration in the cost structure of companies, undeniably a very important factor affecting the use of this method. In terms of the majority of overhead costs, traditional allocation concepts, based as they are on overhead absorption rates, can often provide misleading information on product costs.

The absorption method usually places overhead department costs in the general or administration overhead, these having been allocated to a product using direct labor or a basis for direct cost allocation. Indeed, using such a foundation for allotting fixed overheads results in unsuitable arbitrary allocation (Drury, 2001). The absorption costing method could distort product costs, because it allocates overhead costs proportionally to the portion of direct costs. Its shortcomings have an important impact on the allocation of primary activity overheads. Glad and Becker (1996) defined a number of fundamental limitations in traditional costing systems:

- Labor, as a basis for assigning manufacturing overhead, is irrelevant as it is significantly less than an overhead and many overheads do not bear any relationship to labor costs of labor hours.
- The cost of technology is not assigned to products based on usage. Moreover, direct (labor) cost is replaced by an indirect (machine) cost(s).
- 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 profitability.

Even if these failings of absorption costing are mostly related to primary activity overhead costs, the major disadvantages of this costing method are connected with overhead department costs. As overhead department costs usually have fixed characteristics, their allocation to a product may cause a distinct growth should installed capacity not be utilized. This means a rise in average fixed costs, with such an output of cost calculation resulting in incorrect decisions being made at managerial level. One potential solution to the problem of allocating fixed overheads is the **variable costing method**. This is based on allotting variable and fixed costs separately, where fixed costs are not assigned to cost objects. The method is very effective when short-term decisions are required. Some authors have stated that the variable costing method is a means to providing useful, extra information for decision making (Drury, 2001). Generally, the most important limitations of the variable costing method are defined thus (Král, 2006):

- The construction of the method restricts managers to formulating short-term decisions which could clash with strategic objectives of the enterprises in question;
- Because fixed costs are not calculated, they are eliminated from consideration;
- Due to the fact that fixed costs are summarized, the causal relations between costs and objects are lost

Consequently, the variable costing process might help managers avoid making inaccurate decisions based on full product costs, but could lead to overhead costs being overlooked. It is often stated by management that they cannot do anything as regards overhead department costs other than generate income to cover them. The **activity-based costing** method is the tool which could bring about significant improvement in the quality of overhead cost allocation. The ABC process is able to incorporate both physical measures and causal principles in the costing system. The basic idea of ABC is to allocate costs to operations through the various activities in place that can be measured by cost drivers. In other words, cost units are assigned to individual activities, e.g. planning, packing, and quality control, at a preliminary stage using a resource cost driver, with the costs of these activities being allocated to specific products or cost objects. In reality, these are caused by the incurrence of overheads, using an activity cost driver in the second phase. Activity-based costing methodology has been described by many authors (Drury-2001, Kaplan, Cooper-1998, Glad Becker-1996 and Staněk-2003). The ABC process could vary from simple ABC, using only one level of activities, to expanded ABC, comprising various levels of activities and allowing for mutual allocation of activity costs. (Cokins, 2001)

5. Research Method Conducted

The expanded ABC model, featuring primary and support activity classification, was used for determining a model for accurately allocating overhead department costs.

The resultant findings are based on three projects of full ABC system implementation conducted by the author's research team. These projects were carried out at three industrial companies with a relatively complex structure of divisions but ordinary overhead departments. Having such a complicated departmental structure, which would make the shortfalls of traditional allocation concepts all too apparent, these firms were ideal for testing the sophisticated costing system basis of the ABC methodology.

6. Findings Of The Overhead Department Cost Allocation Model

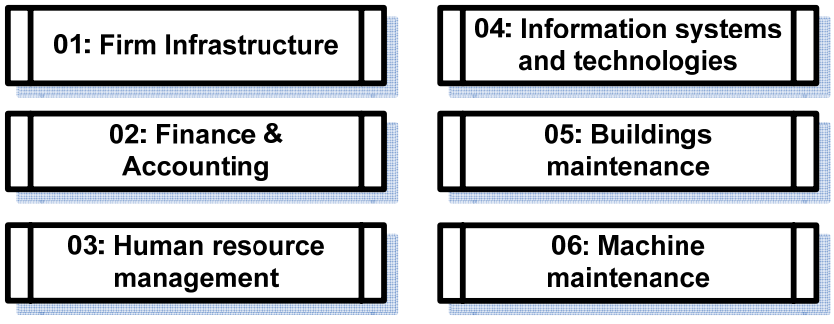
The problem of allotting overhead department costs may be solved through allocating overhead activities. The elementary model for defining the activity structure was developed by Porter (1985). He classified the full value chain as nine interrelated primary and secondary activities. These activities are then further delineated into primary activities that add value to the product from a customer point of view, and support or secondary activities, which ensure the efficient performance of the primary activities. (Porter-1985, Glad & Becker-1996) Even though Porter's model has received criticism for its tight focus on operational activities and for neglecting innovation and service processes, its foundation proves very suitable for the construction of a company costing system. (Hromková-2004, Popesko-2005)

A standard Porter model defines the four activities of the elementary secondary value chain as:

- Infrastructure
- Management of human resources
- Technology development
- Procurement

These value chain activities or processes make up part of the structural analysis of a business, helping to determine the individual activities that take place within it. In the following example, figure 1 shows the structure of secondary activities defined in the case study of ABC implementation in a company in the plastics industry (Popesko, 2008). This activity structure represents the operational model, and features the support activities necessary for the day-to-day running of the business.

Figure1: Example of structure of secondary activities (Popesko, 2008)



After determining the activities of a company, the next step is to transform the overhead costs gathered within the overhead departments into support activities. In some cases, the overhead activities defined could identically match several overhead cost centers, although it is usually necessary to carry out some means of cost allocation. This could take the form of placing all costs related to building depreciation, maintenance, and operation, under an activity called 'Buildings maintenance'. At this point, it worth noting that **only costs general (plant wide) in character should be gathered under secondary activities**. This means that if a company has two or more departments located in different facilities, putting together all costs relating to buildings could cause an undesirable averaging of costs.

Following this, ABC methodology requires the setting of an appropriate cost driver for each activity and calculating their output measures. Difficulties in doing this might arise, because overhead department costs have mostly fixed characteristics. This is where the activity labeled 'Firm Infrastructure' amasses the various cost elements, often proving equal to a company's general overhead. These particular business costs are sometimes called non-traceable costs, as they can be difficult to link to a specific activity or cost object. However, these costs can be allotted to cost objects in proportion to other expenditures, or may be covered by a small increase in the target margin (Glad & Becker, 1996). For other secondary activities, a cost driver can be set, which relatively accurately specifies the relation to objects being allotted. Once the cost drivers for individual activities have been fixed, the output measure for these activities has to be quantified. Activity cost drivers usually consist of three types (Drury, 2001):

Transaction drivers, which represent the number of elements chosen as cost drivers, e.g. the number of SAP licenses

Duration drivers, which denote the amount of time required to perform an activity

Intensity drivers, which directly charge for the resources used each time an activity is performed

In the example below (table 1), the cost driver of the 'Firm infrastructure' activity is excluded from first stage of allocation due to its general and non-traceable traits (Glad & Becker, 1996). Cost drivers for activities 02 – 05 are of the traditional transaction type. Whereas, for 'Finance & Accounting' the number of entries in accounting books were set as the cost driver, the number of employees for 'Human Resource Management', the quantity of SAP licenses for 'IS/IT', and the area in square meters for 'Building maintenance'. Costs for the 'Machine maintenance' activity are directly allocated to the machines that consumed them; intensity drivers were used in this instance.

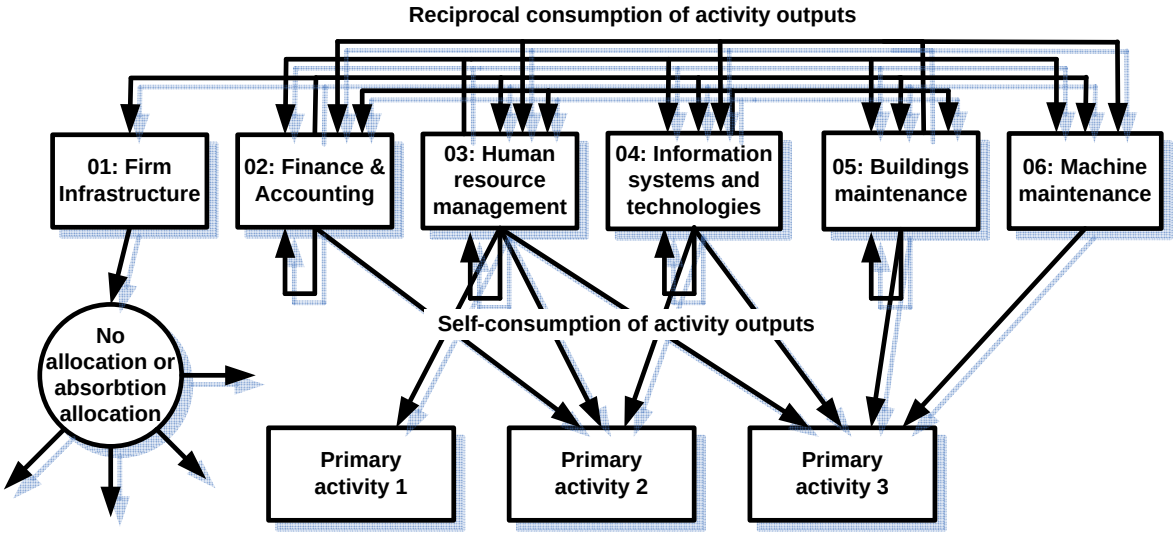
Table 1: Secondary activity analysis – case study (Popesko, 2008)

Activity	Activity costs	Cost drivers	Output measure	Primary rate
01 - Firm infrastructure	€ 938 069	Total costs	-	-
02 - Finance & Accounting	€ 118 345	Accountancy entries	1724	€ 69
03 - Human Resource Management	€ 295 891	No. of employees	429	€ 690
04 - IS/IT	€ 146 467	No. of SAP licenses	43	€ 3 406
05 - Building maintenance	€ 428 680	Area in square meters	10604.57	€ 40
06 - Machine maintenance	€ 80 685	Direct allocation	-	-

After the total activity costs and activity output a measure is determined, the primary rate can be calculated as the quotient of activity costs and output measures. Therefore, the primary rate represents activity unit costs. Following the calculation of primary rates, the next thing to do is allocate secondary activities to primary ones. It is possible to solve all of the problems relating to overhead department costs if the amount of secondary cost driver units can be quantified. These are consumed by individual primary activities, such as the number of employees, SAP licenses and square meters being consumed by a primary activity like 'Quality control'. The difficulty lies in that these secondary activities and their output measures are not solely consumed by primary activities but other secondary activities, as well as these activities themselves (Figure 2). This problem has also been discussed by some authors (Jacob, Mashall, Smith, 1993).

Figure 2 shows how any activities mutually consume other activity outputs. If we analyze, for example, the activity entitled human resources management, it is shown that this activity consumes outputs of other secondary activities as IS/IT, finance & accounting, amongst others. These types of activities, providing as they do additional outputs for other secondary activities, may be described as **reciprocal secondary activities**. Another challenge to be faced is self-consumption of activities. The human resources management activity provides services for other company departments and activities according to the number of employees. Consequently, the number of employees is chosen as the activity cost driver for this activity. However, this activity is performed by a specific quantity of employees. According to allocation principles, this activity (HRM) should be charged by the specific costs charge, as calculated by the activity primary rate, and then denoted as other activities. This type of secondary activity, which consumes its own outputs, might then be entitled a **cyclical secondary activity**, because mutually consumed and self-consumed activities cause a cyclical allocation of costs.

Figure 2: Example of mutually and self-consumed secondary activities in the cost model



Managers and accountants facing such a challenge have to find a way to perform this type of costing allocation, because the method in which service costs are allocated can significant affect product cost accuracy. The simultaneous consumption of service department outputs is a relatively well-known issue. The most common means for allocating service department costs to production departments (Jacob, Marshall, Smith, 1993) are the **direct**, **step** and **reciprocal methods**. Firstly, the direct method allots all service department costs directly to production departments, completely ignoring any services provided by any individual service department to another. In contrast, the step method considers some, but not all, provisions between service departments. Costs are allocated one department at a time via this method, but only to any remaining departments, i.e. those not yet allocated. Lastly, the reciprocal method explicitly recognizes all reciprocal services. It uses simultaneous equations to, firstly, reallocate service department costs among all the service departments, and then to production departments. The reciprocal method may effectively be used for service department cost allocation in ABC.

This allocation procedure initially demands the definition of the output and cost matrix to determine equations. Once they have been formulated, they are solved simultaneously, using matrix algebra, to provide reallocated service costs. These are then allotted to the production departments based on their usage of service departments output, being measured by a number of cost drivers (output measures).

This is how to apply the method: firstly, activity output measures are determined and an activity's reciprocally consumed costs (RCC) are calculated by the matrix (table 2). For example, activity 01 (Firm infrastructure) consumes 44 units (accounting entries) of activity 02 (Finance and accounting), 5.5 units (number of employees) of activity 03 (HRM), 1.9 units (SAP licenses) of activity 04 (IS/IT), and 50.6 units (square meters) of activity 05 (Building maintenance). The numbers of the units consumed by each activity are then multiplied in the second table by the primary rates calculated in table 1. As can be seen, no units of activities 01 and 06 are consumed by other secondary activities. In the model, these activity costs are directly traced to primary activities. The RCC is, consequently, the sum of these reciprocally

consumed costs. The important feature of this model is that self-consumed costs of activity (costs of IT consumed by the IT department) are not included in the calculation, because they actually represent imaginary (not real) costs. In the following step the transferred costs (TRC) – the costs which have been moved from one secondary activity to another, hat to be taken off, from the activity from which it has been moved, in order to avoid double calculation of any costs. Recalculated activity costs (RAC) are then calculated as the activity costs plus reciprocally consumed costs (RCC) minus transferred costs (TRC).

Table 2: Matrix model for secondary activity allocation

Number of output measures

Activity	Activity costs	Output meas.	Primary rate	01	02	03	04	05	06
01	€ 938 069	-	-	0	44	5,5	1,9	50,6	0
02	€ 118 345	1724	€ 69	0	40	3	3	23	0
03	€ 295 891	429	€ 690	0	51	4,7	2,7	971,5	0
04	€ 146 467	43	€ 3 406	0	9	0	2	8,17	0
05	€ 428 680	10604,57	€ 40	0	32	7,3	0,15	12	0
06	€ 80 685	-	-	0	32	4	0,72	32	0

Activity costs

Activity	01	02	03	04	05	06	AC	TRC	RAC
01	0	€ 3 020	€ 3 793	€ 6 472	€ 2 048	0	€ 15 334	€ 0	€ 953 403
02	0	€ 2 746	€ 2 069	€ 10 219	€ 930	0	€ 13 218	€ 11 532	€ 120 030
03	0	€ 3 501	€ 3 242	€ 9 197	€ 39 276	0	€ 51 973	€ 13 656	€ 334 207
04	0	€ 618	€ 0	€ 6 812	€ 330	0	€ 948	€ 28 851	€ 118 564
05	0	€ 2 197	€ 5 035	€ 511	€ 485	0	€ 7 743	€ 43 878	€ 392 545
06	0	€ 2 197	€ 2 759	€ 2 452	€ 1 294	0	€ 8 702	€ 0	€ 89 386

Next step is calculation of activity secondary rates, which represents the recalculated costs of secondary activity units, which will be allocated to the primary activities.

Table 3: Calculation of activity secondary rates

Activity	RAC	Output measure	Secondary rate
01 - Firm infrastructure	€ 953 403	-	
02 - Finance & Accounting	€ 120 030	1516	€ 79
03 - Human Resource Management	€ 334 207	404,5	€ 826
04 - IS/IT	€ 118 564	32,53	€ 3 645
05 - Building maintanance	€ 392 545	9507	€ 41
06 - Machine maintanance	€ 89 386	-	

In the following phases of service department (secondary activity) cost allocation, the consumption of secondary activity units by primary activities is determined. Only the output measures consumed by primary activities are calculated in this stage of the cost allocation process. For example, original output measure of activity 03 – HRM is 429. This number is reduced by the number of activity units consumed by secondary activities (24.5), which could be determined as the sum of column 03 in table 2. Then the total number of activity units (429 – 24.5), consumed by primary activities is used for calculation of secondary activity rates. As output measuring is not allotted in relation to the reciprocal consumption of secondary activities, it is possible to reach a

balance in the sum of total allocated costs. The secondary activity rates are calculated by dividing RAC by the output measure of the activities. The secondary activity rate is higher than that of the primary as it also includes recalculated secondary costs. The presented cost allocation model, which uses reciprocal secondary activity allocation correctly, recognizes all reciprocal service relationships, hence it provides for accurate product allocations. The implementing of all relationships between production and services departments also allows for more accurate cost analyses, following the ABC and ABM methodologies.

7. Conclusion

The objective of secondary activity cost allocation in ABC is not only to perform accurate service department cost allocation, but also to analyze the performance of activities and their relationships. The matrix model presented in table 2 allows for the analysis of resource consumption of individual activities. The allocation procedures for secondary activities might even vary widely. As seen in the case study, only activities 02 - Finance & Accounting, 03 - Human Resource Management, 04 - IS/IT, and 05 - Building maintenance, could be considered as general ones. This means that their outputs are consumed by all types of company activities as well as by the secondary activity itself. A very specific group of company costs are represented by activity 01 – Firm infrastructure. Various types of fixed costs are gathered within this activity, which are usually characterized as general overhead or non-traceable costs. These usually bear no relation to the activities performed by a company. The nature of the costs gathered together here usually precludes the setting of an appropriate cost driver for this activity. There is no other way than to use arbitrary allocation and designate costs. In the case study, the costs of infrastructure are allotted directly to primary activities via the absorption principle using the total activity cost as the allocation rate. The other type of activity is represented by activity 06 – Machine maintenance. This activity is specifically allocated only to a number of primary activities that consume their outputs. For this activity, the intensity driver is used, meaning that costs of this activity are directly assigned to the machines that consume output.

As competition in the marketplace increases and manufacturing systems become more complex, accurate product costing is desirable within the management decision process. Activity-based costing can improve product cost accuracy, but still requires the allocation of service departments where reciprocal services exist. A wide range of methods can tackle this issue, but the reciprocal process for allocating service departments explicitly recognizes all reciprocal service relationships, resulting in accurate allocation. This article has offered an elementary overview of the difficulty surrounding the allocation of service department costs and presented potential ways of arriving at a solution.

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