ACTIVITY BASED COST INFORMATION: ITS ROLE IN COST MANAGEMENT

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ABSTRACT

Activity based costing systems emerged in the West during the mid 1980s in order to improve product costing. However as activity analysis was applied to organizations it became apparent that the technique had a considerably wider potential than indicated by this single initial objective.

This paper explores a number of other areas within the field of cost management to which ABC has contributed. These comprise the analysis of cost behavior, customer profitability analysis, activity cost profiling, budgeting and cost control and performance mesurement.

While there is danger in viewing ABC as a panacea which will solve all costing problems at a stroke, it is an approach which offers interesting and valuable insights into how costs can be effectively managed.

KEYWORDS

Actibity Based Costing, Cost Behaviors, Cost Management, Budgeting, Performance Measurement

1. Introduction

The effectiveness of cost management will, to a large extent, be dependent on the quality of information available to those who have the responsibility for it. Relevant information should alert those involved to areas where their attention is merited and should guide effectively their subsequent decisions and action. Given its direct relevance to the area, cost accounting has traditionally generated a major part of the information flow for cost management. However, much of what we might term conventional cost accounting was developed in the late 19th and early 20th centuries within the context of a less complex and

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diverse industrial situation (Johnson and Kaplan [17]) and, particularly in the West, has been heavily influenced by the need to produce acceptable unit costs for inventory valuation (Kaplan [20]). In recent years the limitations of conventional cost accounting information for effective cost management in the contemporary business situation have been increasingly recognised (e. g. Shank & Govindarajan [26]; Cooper [6], [7]; Cooper & Kaplan [9]). This paper explores how activity based costing (ABC) can help overcome some of the indentified limitations and contribute positively to cost management in a modern business context.

2. Initial Development of ABC

The first reported cases of ABC occurred in large USA manufacturing concerns producing extensive product ranges (Cooper [7], [8], [10], [11]; Innes & Mitchell [13]). These firms developed ABC primarily as a basis for improving the accuracy of their product line costings. A new costing approach was deemed necessary by them for the following reasons:

- (1) Their production overheads had grown significantly as a cost element both in absolute and relative terms.
- (2) The compsiton of their production overheads had gradually changed to reflect costs which were driven by the complexity and diversity of their operations (e.g. quality, scheduling, logistics, flexibility) rather than merely by the volume of production output.
- (3) Direct labour costs, particularly within the electronics sector, had fallen in size but was still used as a basis for overhead absorption.

These three factors resulted in many overhead costs being unitised in a manner which did not reflect the underlying pattern of resource consumption. This, combined with the growing relative significance of these costs, meant that full product costs were viewed by management with increasing dubiety.

ABC, based on the premise that activities (e.g. quality control, maintenace, procurement, handling) consume resources and products consume activities, provided a framework for unitising these overheads in a more rigorous manner. First a review is undertaken to identify the major activities undertaken which gave rise to overhead cost. These are classified by the nature of the work contribution which is made rather than by the formal organisational or functional boundaries. Thus procurement activity can usually be found within the production, stores, adminstration and finance departments as it is an activity which cuts across them all. Second, costs are indentified and pooled for each activity. Third, a cost driver is ascertained for each cost pool. This latter stage involved selecting a variable which reflected the volume of resource consumption by the activity. For example, the number of purchase orders processed often represents a resonable cost driver for procurement activity. Dividing the activity cost pools by their respective cost drivers provids a series of cost driver rates which could be applied to individual products. The products then attract a share of the cost based on the volume of cost driver attributable to each of them.

In published cases on ABC, its application in this way resulted in substantial revisions of unit costs. In particular, the cost of small volume, customised products, which placed heavy demands on support activities, rose considerably while the cost of high volume, long production run products fell. Consequently the pattern of product line profitiability was revised and attention therefore directed on the existing sales mix policies (e. g. Cooper & Kaplan [10]).

These early cases therefore provided confirmation that ABC could, in certain circumstances, produce very different product costs from those generated in more traditional ways. Johnson & Kaplan [18] have promoted the ABC generated product costs as providing a measure of the firm's long term variable cost. They argued that this information would provide a more appropriate basis for strategic level decisions on the product range than the conventional variable cost and contribution based analysis which treats all costs not varying with production volume as fixed. However the value of unit cost information has proved to be one of the areas where ABC has attracted most criticism. The ABC approach does not avoid all of the arbitrariness of allocation and apportionment which underlie actual unit product costs. Moreover the explanatory power of the single cost drivers attributed to each activity will inevitably be limited (Innes & Mitchell [14]). It also remains a system designed to produce historic cost information, whereas decision oriented information should rely on the future revenue and cost implications of the decision (Paper & Walley [24]). The existence of joint processes at the level of the cost pool, non-zero fixed cost and non-linear cost functions negate the applicability of ABC product costs in product design and product mix decisions (Noreen [22]). Finally it is based on resource consumption while the financial aspects of decision making should also rely on spending and cash flow (Cooper & Kaplan [11]).

While the initial product cost orientation of ABC is not immune to criticism, its application for this purpose has led to the discovery that it is an approach which offers considerably more to users than simply a revised computation of their product costs. Indeed it has been suggested that it is in the broader areas of cost management information that ABC can make its most significant contribution (Innes & Mitchell [15]). This paper explores the ways in which the ABC approach has developed into a broad based novel approach to the provision of information designed to support cost management.

2.1 Cost Behaviour

If costs are to be managed effectively they must first be understood. This necessitates an appreciation of how and why they change, i. e., a knowlege of their behavior. ABC has helped considerably in this areas because (a) it dose not accept the conventional cost accounting assumption that a large portion of overheads are simply fixed, and (b) it recognises that volume is not a comprehensive explanator of cost behaviour. Moreover it provides, through the use of cost driver data, an indication of the key factor which influences each activity cost pool. Indeed, when presenting ABC based product costs some firms have found it useful to organise the cost drivers into a hierarchy of the levels at which the cost components vary. Cooper & Kaplan [11] have formalised this approach. Exhibit 1 shows how product costs can be layered in respect of the different levels at which their behaviour is determined.

A similar approach can be taken in the analysis of customer related costs (see Section 2 below). This type of information indicates the level at which managerial action is required in order to influence cost, and the requiste 'lever' (cost driver) which can be applied in order to effect policies. Attention is focused on a whole range of factors which are critical to cost incurrence within the firm. Through dissemination of its results the system can motivate and guide cost reduction efforts, and promote managerial cost consciousness particularly in the overhead area. In addition a basis is provided for modelling product costs in a way which will produce more realistic predictions and support more effective 'what if' analysis. An ABC based indication of average unit costs is provided, but this type of analysis emphasises that only a proportion of this cost is primarily driven by units of output and that as one

Exhibit 1

Layering of Product Costs

Level	Typical Costs	Typical Costs Drivers
Unit	Materials, power and other direct costs	Units of output, labour and machine hours
Batch	Set-up, material logistrics	Number of set-ups, set- up hours
process	Technical supervision, specialist maintenance	Number of employees, number of breakdowns
Product/Product Group	Management, part administration	Number of customers, number of parts
Facility	Occupancy costs, senior management	Area mesures

moves up the hierarchy the tenuousness of the linkage of costs to output increases. At the level of the facility costs the apportionments have a fairly high degree of arbitrariness and their inherent value can therefore be questioned but, at least in the ABC approach, they are separately indentified as requiring facility level decisions to change them.

2.2 Customer Analysis

ABC has been extended from a concentration on production cost to include *most* of the costs associated with meeting customer demand (Bellis-Jones [1]). Thus the ABC methodology has also focused on the individual customer as the cost object. The result allows an insightful analysis of how profit is distributed among customers. In one case, Kanthal (Cooper & Kaplan [10]), the analysis showed how a relatively small number of customers were apparently earning an extremely high proportion of the firm's profits. Marketing, pricing and cost control policies were reviewed in respect of different types of customer in the light of this finding. In another (Develin & Partners [12]), the identification of the specific costs generated by the trading relationship with a major customer led to a successful renegotiation of the trading relationship, turning a loss into a profit.

In order to achieve results such as these, non-production costs must also be classified by activities in a way which reflects how each activity has consumed resource. Then the cost pools are attributed to the customer on the basis of appropriate cost drivers (e. g. number of sales calls, customer location, number of sales returns, etc.). As with the product cost approach, it can assist the appreciation of cost patterns if the various rates are put into a meaningful framework which gives some indication of the level at which they are incurred. Exhibit 2 outlines a framework suggested by O'Guin and Rebischke [23].

The view of cost incurrence provided by this type of analysis, being based on the sales transaction with the customer, is particularly valuable to managerial marketplace strategy.

Exhibit 2

Layering of Non-Production Costs

Level	Typical Costs	Typical Costs Drivers
Order	Documentation	Number of orders, number of shipments
Customer	Credit control, expediting, administration, discounts	Number of customers, number of non-payments by due date
Channel	Staff, warehousing, transport	Promotion space, number of staff, managerial time
Market	Promotion, market research	Managerial time, number of customer surveys
Enterprise	Top management, general company promotion	Management time

Information is available on the most valuable customers and on those whose servicing actually costs the organisation money. Some indications of possible source of these variations can also be gleaned from the oeder, channel and market level costs. The insights gained from this information can help management in targeting distribution channels, market segments and customers in a manner informed by the potential impact of their decisions on costs and profit.

3. Profiling Activity Costs

ABC gives a different perspective on cost incurrence. This comes from the information which is generated on each activity cost pool. Often for the first time management are presented with cost information on key activities, e. g.

- the full cost of all the resources used in meeting a customer's order
- the full cost of all the resources used in purchasing supplies
- the total spend on quality, maintenance, engineering services and material scheduling.

This activity based cost information provides a profile of the cost purpose (activity) rather than simply the type of resource acquired (stationery, wages, etc.) It tells management what they are getting for their money in terms of the operational work contribution to the business (see Exhibit 3).

Activities are usually selected at a manageable level of aggregation and represent significant business processes which are relatively homogeneous in respect of the selected cost

Exhibit 3

Conventional vs Activity Cost Analysis (Purchasing Cost)

Traditional	$\pounds 000s$	Activity Based	$\pounds 000s$
Salaries	400	Vetting new suppliers	170
Equipment depreciation	110	processing orders	202
Stationery & Posts	24	Receiving orders	85
Travel	39	Expediting problems	218
Telephone/Fax	32	Making payments	94
Occupancy costs	$\underline{164}$		
	769		769

driver. However, from the data gathered at the stage of identifying activities, it is also normally possible to identify the composition of each activity in some detail. Thus, for example, vetting new suppliers could comprise: meeting management; inspecting premises; repeat visits; contacting other customers; travelling; report writing; presentation; correcting reports and answering questions.

As it is purpose oriented this type of analysis facilitates a managerial assessment of costs in terms of the value of the activities which they support, to the firm. The inventory of activities can be analysed in respect of those which are value added and those which are not (Berliner & Brimson [3]). Value added activities can be defined as those which are essential to the provision of product and service to the customer at a competitive price. Activities which do not fall within this remit are, prima facie, candidates for reduction or elimination. Consequently the identification of the cost of non-value added activities such as those relating to the holding of stock, the correction of errors, the expediting of events and the unnecessary movement of raw materials draw attention to areas where cost savings can potentially be made without an adverse effect on the service to the customer. Another similar type of analysis has been suggested by Bellis-Jones & Hand [2]. They advocate the analysis of costs into core, support and diversionary activities. Thus the activity of salesmen could include the core work of making sales to customers, the support work of travelling to customer locations and the diversionary work of acting as debt collectors on overdue invoices. Where support and diversionary costs are high, efforts can be made to reduce them and so free resources which can be used to increase core activity or to effect cost reductions.

4. Budgeting and Cost Control

Budgeting involves the accountant in expressing future plans in finacial terms. Cost estimates comprise an important component of this work. For those costs which are deemed variable and are primarily driven by volume, the establishment of planned production output means that setting the budget will be a relatively straightforward event. However the remaining costs, coventionally characterised as fixed (but usually exhibiting consistent growth) are less easy to translate into budget terms. Here the ABC approach can make a positive contribution simply by working back from the planned output mix to an identifi-

cation of the cost driver volume which it implies for each activity cost pool. Changes in the level of this volume give a basis for estimating the resource requirements of the activity stemming from increases and decreases in the real demand for the output which it provides. Thus a 10% increase in the number of purchase orders to be processed gives an indication that some increase in the budgeted cost of procurement activity may be merited. Of course account must also be taken of proposed changes in the technology and organisation of the activity, in the impact of inflation on the price of the relevant resources and in the scope for cost cutting of waste and unnecessary resource use.

The refinement of having information on activities, costs and cost drivers also permits an extension of the variance analysis that would normally be possible. This would be based on pre-determined cost driver rates and actual activity costs. Exhibit 4 illustrates the type of information which could be produced.

Exhibit 4

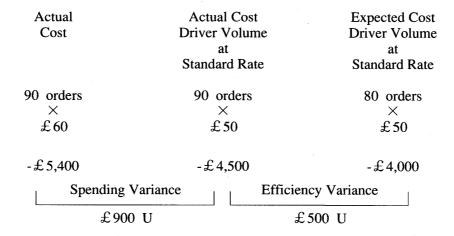
Purchasing Activity Variances

- Data: (i) In the XYZ Coporation two products, A and B, are manufactured. A major areas of overhead cost relates to the purchase of material and parts. A purchase order is raised when 100 units of A or 200 units of B are produced. The number of purchase orders is the cost driver for purchasing activity.
 - (ii) For March 1992 purchasing activity and cost is as follows.

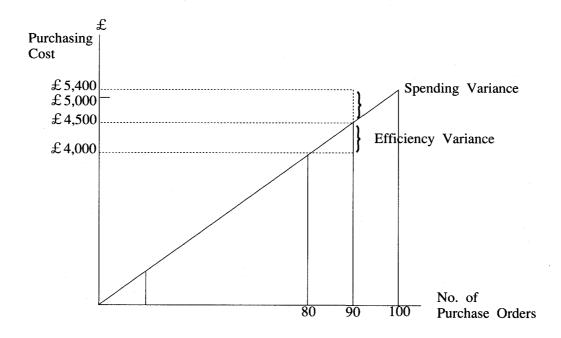
		Product A		product B
Budget:	Production Volume No. of Purchase Orders Purchasing Cost	$4,000$ units 40 orders 100 orders $\pounds 50$	£5,000	12,000 units 60 orders
Actual:	Production Volume No. of Purchase Orders Purchasing Cost	3,000 units 40 orders 90 orders @ £60	£5,400	10,000 units 50 orders
Expected:	Production Volume No. of Purchase Orders Purchasing Cost	3,000 units 30 orders 2.50 orders 2.50	£4,000	10,000 units 50 orders

Activity Based Cost Information

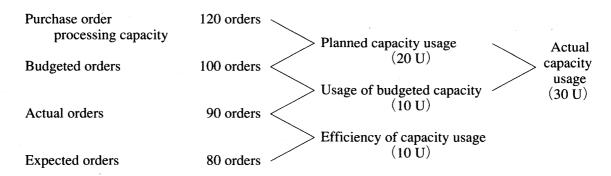
(1) Spending / Efficiency



or graphically:



(2) Volume Variance



The first set of variances is traditional in terms of segmenting the difference between the expected and actual cost of procurement activity for the period into that portion due to

overspending and that portion due to poor efficiency as reflected in the cost driver levels. The second set of variances reflects the usage of capacity within each activity. This can be conveniently measured in physical terms using the relevant cost driver volumes. From it management are informed about the capacity provided in each area and the expected and actual usage which has been made of it. This, when applied to all activity cost pools, provides a profile of the provision and use of resources in the overhead area. As with conventional variances they can be monitored over time and investigated on the basis of their size and trend. For example a consistent shortfall in the usage of practical and budgeted capacity for an activity should give rise to a consideration of resource cutbacks in that area. The potential saving in resource consumption can be given a preliminary quantification by applying the standard cost driver rate to the capacity shortfall.

Finally, the increased cost visibility which ABC provides can be used to motivate more effective cost control. This can be achieved by providing cost based objectives for each activity (Brimson & Fraser [4]). Operationally this may take the form of setting target costs (Maisel & Morrissey [21]), which can be based both on the elimination of non-value add activities and indeed on improving the value add areas as well, although care must be taken that the volume and quality of the service provided remains acceptable. However it should be remembered that an over-dependence on activity cost control and reduction through one variable (the cost driver) will be unwise as other important determinants of cost, e. g. staff training, work organisation and resource purchase procedures, may be neglected.

5. Performance Measurement

The establishment of an ABC system involves the generation of a considerable volume of data which can be used either formally or informally as measures of performance. These will provide a perspective for the first time on the performance of the activities selected as the basis for the system. Cost information provides a monetary reflection of the resources produced for the activity while the cost driver measures can often represent a non-financial measure of the service output provided. Thus the system can measure both the inputs (resource costs) and outputs (service volumes) of each activity and through the cost driver rate link the two in the form of an inverted productivity measure.

Performance measurement influences behaviour and in this respect the choice of activities and cost drivers is one that should be made with care. Simply focusing on an area of cost incurrence can lead to more cost conscious behaviour by those involved, but it is also desirable that ownership or responsibility for it are identified and accepted. Where an activity cuts across formal organisational departments this can be a problematic issue which may require change in the organisational structure to solve satisfactorily. The selection of cost drivers can also provide a forcus of attention, frequently on variables which are critical to the organisation's success (Johnson, [16]). Measures such as set up hours, lead times, material movements and schedule changes are all highly relevant to action which can improve the flexibility and efficiency of production. However the effect of their measurement and use on the motivation of employees should be thought through with particular care taken when they are combined with costs in a ratio. Where this is done to form cost driver rates it becomes possible to improve the resultant rate (see Exhibit 5) by

Exhibit 5

Options for improvement (i.e. reduction) of rate

$$\text{Cost Driver Rate} = \frac{\text{Activity Cost}}{\text{Cost Driver Volume}} \xrightarrow{\rightarrow} \text{(i) REDUCTION}$$

means which are dysfunctional to the organisation. This will happen where attempts are made to reduce the rate by increasing the denominator, for example by increasing the number of set-ups to reduce the cost per set-up! This will be possible where an element of the activity cost is fixed or semivariable with respect to the cost driver variable. The extra cost driver volume will actually detract from attempts to schedule production more efficiently, and total set-up cost will increase though by a less than proportionate amount than the cost driver rise. Rates which are viewed as performance measures can motivate in this way and therefore require careful handling.

6. Conclusion

ABC was originally designed to improve the way in which resource consumption was traced to individual product lines. Experience of it has shown however that its potential extends well beyond the generation of product cost information to offer a contribution to the range of attention directing and problem solving applications described above.

It is also a development which has occurred at a particularly appropriate time. Manufacturing operations have, in many Western countries, been undergoing substantial change through the introduction of flexible manufacturing systems combined with just in time and total quality management policies. The limitations of conventional costing systems in this new production environment have been given extensive publicity (e. g. Kaplan [19]; Cooper [6]; Shank & Govindarajan [25]). Management accounting practitioners needed a response in practical terms and ABC offers one. It provides a means of monitoring the scheduling and logistics overhead necessary to support the JIT philosophy and focus on factors such as set up times and material movement which are critical to its success. In addition, through its activity focus it can be applied to the gathering and analysis of costs associated with supplier delivery performance which is vital to JIT implementation (Innes & Mitchell [15]). For example, the full costs of supplies from one particular source could include not only the price paid but also the cost of activities and repercussions resulting from failure to deliver on time, to supply the quality required, to procure supplies, and to handle and move materials. In the area of quality the ABC approach supports the possibility of measuring quality costs (Clark [5]) in a way which can allow assessment of inspection and prevention activities and compare these with failure costs. In addition, through cost driver analysis it provides an assessment of work throughput which can be linked to internal 'customers' and assessed for customer satisfaction and quality of service.

Thus ABC provides a source of accounting innovation which can both initiate and contribute to more effective cost management in many ways. This paper has outlined several aspects of its role in this respect which have already been indentified by ABC users. They indicate a range of applications which will generate novel and valuable information for management. It has the potential to assist in targeting areas for cost reduction, in measuring critical success factors, and in supporting strategic level market oriented decisions. Providing its limitations are realised and it is not applied unthinkingly or treated as a panacea,

ABC is well worth consideration by those organisations where effective cost management is deemed important.

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アクティビティ・ベースの原価計算システムによる会計情報 - 原価管理のための原価情報 -

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〈論文要旨〉

アクティビティ・ベースの原価計算システム (Activity Based Costing System:以下, ABC システムと言う) は、伝統的原価計算システムをより一層精巧なものにする目的で、1980 年代の中頃に西洋で誕生した。ところが、ABC システムを実際に企業に導入してみると、伝統的原価計算システムを精巧にするという当初の目的のみならず、様々な可能性をもっていることが明らかになった。

本論文は、ABC システムがもっている様々な可能性の中で、特に、広義の原価管理面での可能性について明らかにしてみたいと思う。なかんずく、コスト・ビヘービアの分析、顧客のプロフィッタビリティー分析、アクティビティ・コストの明確化、予算や原価管理、さらに、業績測定等における ABC システムのコスト情報の役割について考察してみたい。

ここで、ABC システムを現在企業が抱えている原価計算の問題をすべて解決してくれる万能薬であると考えるのは、些か危険なことである。ABC システムは、原価をどのように効果的に管理できるかについて、有益かつ貴重な洞察力を我々に提供してくれる一つの手法であって、この点を十分注意しなければならない。

〈キーワード〉

アクティビティ・ベースの原価計算システム, ABC システム, 活動基準原価計算, コスト・ビヘービアまたは原価態様, 原価管理, 予算管理, 業績測定

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