Journal of Economic, Administrative and Legal Sciences
Volume (5), Issue (1): 30 Jan 2021
P: 166 - 177
ISSN: 2522-3372
مجلة العلوم الاقتصادية والإدارية والقانونية
المجلد (5)، العدد (1): 30 يناير 2021 م
ص: 166 - 177

The Role of Activity-Based Costing for Assessing and Performance Accounting Costs System to Products Costing Pricing in Manufacturing Environment A case study applying on gadget co

Ezzat Kamal Abdalla Mousa
Faculty of Business || University of Bisha || KSA
Faculty of Business Administration || Garden City University || Khartoum || Sudan
Faculty of Business || Ahfad University for Girls || Khartoum || Sudan

Abstract: The study builds for accounting Activity-Based Costing (ABC) analysis supporting decision-making concerning product modularity and the accounting cost system for whether assessing performance to pricing basic and control to the product cost and allocate the activity. the paper aims to investigate the merits. of the Activity-Based Costing (ABC) as a method for assessing the cost consequences of better applied in modularization. This is done through a case study followed by reflections on how ABC (might) need to be developed to be able to serve as the relevant costing tool for assessing and performance in cost system and to whether allocate cost to each unit. The second aim some general rules on the cost efficiency of modularization from the case study the main problem study ABC is not sufficient enough to applying at any organization that may lower overhead costs. the result of this study The ABC provided the more accurate cost per unit as results good price, sales strategy, performance management and decision making that should be improved It provided much better insight into what drivers overhead costs. ABC recognizes that overhead costs are not all related to production and sale volume applying ABCTD in the manufacturing cost and to whether this more study about ABC in public sectors.

Keywords: activity-based cost, performance, price, Product costing.

دور أسلوب التكلفة على أساس النشاط لتقييم أداء النظام المحاسبي لتكلفة المنتجات وتسعيرها في بيئة التصنيع دراسة تطبيقية على شركة جاد للزجاج

عزت كمال عبد الله موسى
كلية إدارة الاعمال || جامعة بيشة || السعودية
كلية الاعمال || جامعة جاردن سيتى || الخرطوم || السودان
كلية الاعمال || جامعة الاحفاد للبنات || الخرطوم || السودان

الملخص: قامت هذه الدراسة على أسلوب التكلفة على أساس النشاط كأسلوب محاسبي يدعم اتخاذ القرارات المتعلقة بالمنتجات الصناعية ومدى دور النظام المحاسبي في تقييم الأداء وأسس تسعير المنتجات والرقابة على تكلفة المنتجات من خلال تخصيص التكلفة، قامت مشكلة الدراسة بأن أسلوب التكلفة لا يطبق على جميع المنظمات الصناعية ذات التكاليف غير المباشرة المحدودة. وقد هدفت الدراسة إلى التواصل إلى أن أسلوب التكلفة على أساس النشاط لديه أفضلية في تطبيقه في مجال التصنيع وهذا ما تم تطبيقه في دراسة الحالة التي أوضحت بأن أسلوب التكلفة على أساس النشاط يجب تطبيقه وتطويره وملاءمته لأدوات التكلفة في تقييم وزيادة أداء نظم

التكاليف وتخصيص التكلفة لكل الوحدات وتوصلت الدراسة إلى أن أسلوب التكلفة على أساس النشاط أكثر دقة في تحديد تكلفة الوحدة على أساس سليم في كل من تسعير واستراتيجيات المبيعات، والأداء الإداري وتحسين القرارات كما يدعم التكلفة على أساس النشاط بالنظر في مسببات التكلفة غير المباشرة وعلاقاتها بالمنتجات، كما توصلت الدراسة التطبيقية إلى أن أسلوب التكلفة على أساس النشاط أن التكاليف غير المباشرة ليست الوحيدة المرتبطة بالمنتجات وحجم المبيعات، واستنادا للنتائج أوصت الدراسة بإجراء مزيد من الدراسات في تطبيق أسلوب التكلفة على أساس النشاط الموجه بالوقت في البيئة الصناعية يدعم تحميل المنتج بنصيبه على أساس مختلفة تماما عن أسلوب التكلفة على أساس النشاط، كما يجب إجراء مزيد من الدراسات حول أسلوب التكلفة على أساس النشاط الموجه.

الكلمات المفتاحية: أسلوب التكلفة على أساس النشاط، الأداء، التسعير، تكلفة المنتجات.

Introduction

The origin of ABC dates back to 1983–1984 (Kaplan, 1983, 1984a, b, 1985a, b, 1986) although the term "Activity-Based Costing" The origin grew out of dissatisfaction with the dominating costing procedures at the time, variable costing and traditional full costing, which were argued to be obsolete in modern manufacturing environments (Cooper and Kaplan, 1988a). (Kaplan, 1998) in which ABC was developed. While Cooper and Kaplan initially searched for an improved full-cost product-cost calculation, the model grew into a more full-fledged costing system for hierarchies of activities and cost objects. The current state-of-the-art of ABC is reflected in Kaplan's and Cooper's book "Cost and Effect" (1998) and supplemented with Time-Driven ABC in Kaplan and Anderson (2004).

Basically it is a two-stage procedure in which cost of resources in the first stage are allocated to activities to form Activity Cost Pools, which in the second stage are allocated to cost objects based on these objects' use of the different activities. Cost object is the generic term of ABC for products, services and customers. In order to differentiate between the different allocations at the two stages, the first-stage allocation bases are termed "resource cost drivers" and the second-stage bases "activity cost drivers". Activities and cost objects are placed in a hierarchy to avoid arbitrary allocations of costs.

In order to maintain competitiveness manufacturing companies in general aim to offer a wide selection of products to meet customers' increased demands for variety units. However, even though empirical results are not consistent (Anderson, 1995, p. 364), it is generally accepted that increased variety, or more correctly increased heterogeneity in the product mix, impacts negatively on costs and operational performance ; Kaplan and Cooper, 1998). The company will have to source, produce and sell in smaller batches and support functions will have to be expanded to accommodate increased internal demand for activities such as planning, set-ups, documentation, customer services etc. To mitigate the negative effects from increased variety, manufacturing firms may pursue process- based and/or product-based strategies (Fisher et al, 1999). Product-based strategies, which are the topic of this paper, focus on product designs that allow for high product variety at reasonable cost but in the case in multi different products should be allocated based allocation. One such strategy is that of modularization (e.g. Heikkila¨ et al, 2002). When individual modules can be used in different end products, the manufacturing firm can

offer variety at lower levels of component heterogeneity by combining modules and at the same time preserve some of the benefits of mass production (Perera et al, 1999).

review of the literature on the concept and multiple effects of modularity, and paradigmatic ** approaches to manage modularity (Jorgensen, 2004) reveals that the concept of modularity has many faces (Hansen et al, 2003) and that a number of the economic benefits of modularization are taken for granted although the methods applied in identifying and assessing these consequences have something to be wished for.

The paper proceeds as follows: Section 2 searches the literature on management accounting and costing to identify those parts of the (internal) value chain where cost effects of modularization are likely to occur. Section 3 provides a brief introduction to ABC, and Section 4 accounts for the ABC case study and points out some general characteristics of situations where modularization is cost effective. Section 5 reflects on problems of the ABC method in analysing the consequences of modularization beyond the specific case context

1. Revenue and/or cost consequences of modularization

In order to assess the economic consequences of modularization it is essential to distinguish between modularization efforts where only cost effects are necessary to analyse and efforts where it is also necessary to account for differential revenues. Generally speaking, the consequences of modular ization can be confined to costs, when the number of end products and their features—in the eyes of the customer—are the same whether produced with or without the use (or increased use) of modules. In that respect Fisher et al. (1999) suggest that components should be categorized according to their influence on quality in its widest sense and cost including the customers' perceptions of the product. Fisher et al. argue that components having high impact on customer-quality perceptions should have additional the cost incurred not relate the production volume should be added

The basic rationale for introducing modular products is to obtain cost reduction (and reduced time-to-market) within an unchanged product variety. But as we shall see, one cannot uncondi- tionally infer that the net effect is a cost reduction. In the following paragraphs three categories effect- ing costs are discussed: "economies of scale", "inventory carrying cost" and "cost of support activities" in terms of their increase the product and cost

2. Inventory

Concerning inventory cost it is argued that introducing modularity will decrease holding costs as fewer parts need to be inventoried (e.g. Fisheret al, 1999). This is typically explained by reduced safety stock from the increased commonality (Coll-ier, 1982), or delayed product differentiation (Lee and Tang, 1997). In an assemble-to-order production regime fewer components need to be inventoried to accommodate a specified service level (a certain lead time), if products are based on modules, as the same number of modules may be combined into different products (Mirchandri and Mishra, 2001). This is the

well-known risk-pooling phenomenon (Eynan and Rosenblatt, 1996; Weng, 1999; Thonemann and Brandeau, 2000). However, although the number of units inventoried can be reduced, the cost of these units will normally be higher and, therefore, the net effect can only be determined in relation to a specific situation (Labro, 2004).

3. Cost of support activities

The third category—support activities and associated costs—is a complex category. It may comprise the following subcategories from every part of the value chain:

- ✓ Design costs
- ✓ Procurement overhead costs
- ✓ Production overhead costs
- ✓ Quality costs
- ✓ After-sales service costs.

In the literature it has been argued that each of these—and more—cost categories have been influenced by product costs increaseing. For example, design costs will decrease as the volume of designs are reduced when shifting from a number of unique components to one common component (Krishnan and Gupta, 2001), and production overhead costs will decrease as fewer material handlings and set-ups are required (Kaplan and Cooper, 1998). The latter is an example of the more general argument that a reduction in the number of transactions (Millerand Vollman, 1985) and complexities of operations (Johnson and Kaplan, 1987) will reduce overhead costs. Finally, Fisher et al. (1999, p. 299) argue that quality costs will decrease due to learning and quality improvements associated with increased volume.

Again, while it may very well be true that increased commonality will decrease the number of times activities in the support functions are called upon, it may be equally true that the duration and complexity of performing these support activities are costlier to perform (Labro, 2004). Thus, the benefits from burdening support functions less frequently may to some extent be offset by the increased costs of each support function burdening incidence.The conception is that each level contains different activities and that these activities in essence are decoupled, i.e. the consumption in any higher- level activity is unaffected by, i.e. do not vary with, activities at the lower levels. In other words, the higher-level costs are always common to all activities at lower levels, and therefore should not be allocated to these lower levels. Especially the allocation of all costs to the unit level will create misinterpretations because "when batch and pro- duct level costs are divided by the number of units produced, the mistaken impression is that the costs vary with the number of units" (Cooper and Kaplan, 1991b, p. 132).

Kaplan and Cooper, 1998, pp. 95–97). To illustrate with batch cost using a transaction cost driver means allocation of these costs based on the "number of batches",

e.g. set-ups, assuming implicitly that all set-ups are equally resource demanding. If this is unrealistic, then duration of set-up might give a better estimate of set-up cost per product provided that

the cost of each set-up hour is approximately the same. If not, it may in certain situations be necessary to measure resource consumption for each individual set-up, which is the most accurate driver type, but also the costliest to measure.

1.2. Basic feature:

Avoidability and the treatment of unused capacity

In order to avoid arbitrary allocation of costs of unused capacity to cost objects, only the corre- sponding cost of the used part of the resources supplied are allocated to cost objects. The distinc- tion between used and unused requires an estimate of the practical capacity in an activity, or, alter- natively, the capacity of a resource (Kaplan and Cooper, 1998, pp. 111–130). The benefit of this procedure is—in principle—that the calculated cost of serving any cost object is independent of the capacity utilization of the current period. Finally, one should be aware that ABC allocates overhead costs to cost objects even when the resources are shared by the cost objects, and whether or not these costs are avoidable in the event the cost object were removed/given up. The

In strategic activity-based management and ABC has been used for a variety of purposes, e.g. assessment of product-line and customer mix, supplier and customer relationships, market segmentation and distribution channel configuration. To some extent it has also been used in product design documented in Harvard Business School cases (Cooper andTurney, 1988a, b; Kaplan, 1992, 1995) and in a few articles, e.g. Ness and Cucuzza (1995) and Ben-Arieh and Qian (2003), and in a related area, total cost of ownership (Ittner and Carr, 1992). However, in this paper we look for an alternative way of communicating the outcome of ABC calculations, and to identify prerequisites for these calculations to be valid.

Case: The ABC trial at gadget co

The company has three product lines: three types motorcycle at same factors the 500Cc sunshine and 250Cc roadster and 1000Cc the fireball it sell the motorcycle throughout the world in response to market pressures the company gadgetsCo. has invested heavily in new manufacturing technology in the recent year and as results has significantly reduced the size of its workforces, histrotical the company has allocated all overhead costs using the total direct labour but is now considering introducing activity based costing (ABC) gadget CO accountants has produce the following analysis

Table (1)

Kind	Annual output unit	Annual dirctlabour hours	Selling price per unit	Raw material per unit
Sunshine	2000	200, 000	4000	400$
Roadster	1600	220, 000	6000	600$
fireball	400	80000	800	900$

The three cost driver that generate overheads are.

- Deliveries to retailers –the number of deliveriesof motorcycle to retail showrooms
- Setups –the number of times the assembly line process is reset to accommodate at production runs of different type of motorcycle
- Purchase orders –the number of purchase orders

Table (2) The annual cost driver volume relating to each activity and for each type of motorcycle are as fellow:

products	Number of delivers to retailers	Number of set-up	Number of purchase
Sunshine	100	35	400
Roadster	80	40	300
Fireball	70	25	100
Total of number	250	100	800

Table (3) The annual overhead cost relating to these activities are as follows:

Delivers	2, 400, 000$
Set-up costs	6, 000, 000$
Purchase	3, 600, 000$

All direct labour is paid $5 perhours the company is not holding inventory, at the board meeting there was some concern over the introduction of the activity based costing

Table (4) When resolve problem is Cleary on old traditional method (as allocation cost bases labours hours),

	2, 400, 000$
Total overhead cost	6, 000, 000$
	3, 600, 000$
	12, 000, 000$

Table (5)

	Sunshine	200, 000 hours
TOTAL labour hours		
	Roadster	220, 000 hours
	Fireball	80, 000 housr

Table (6) Unit of production and sale

Overhead absorption rate / labors=	12, 000, 000/500, 000hours 24$ per hours

Unit of production and sale

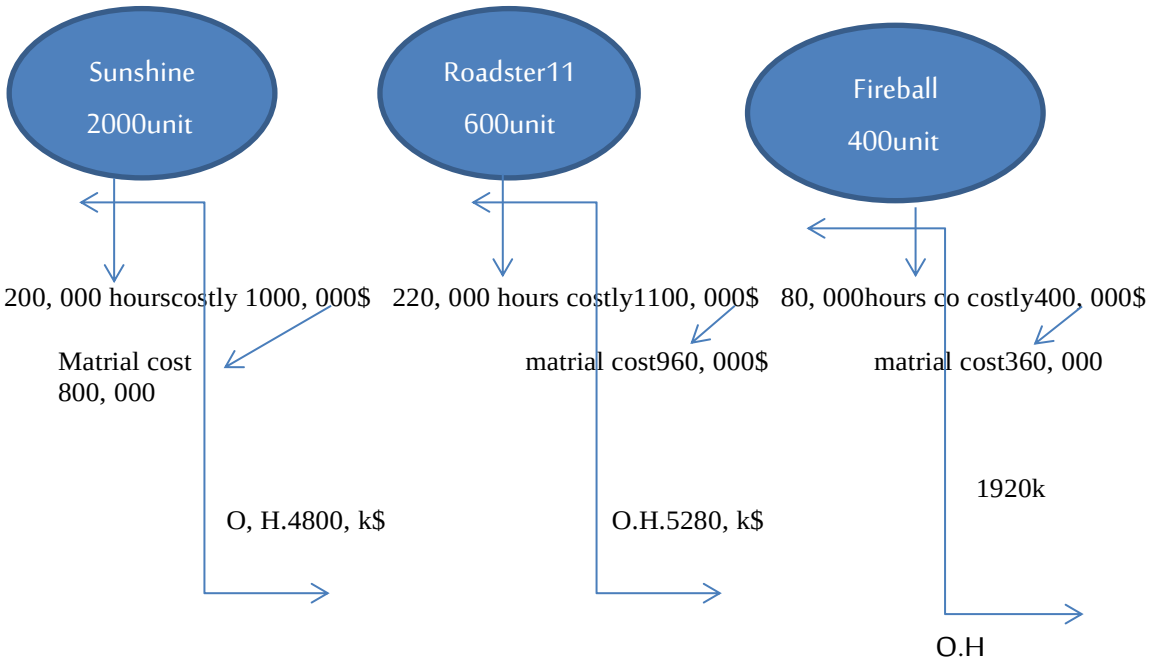


Table (7) Unit of production and sale

SORT	TOTAL COST	COST PER UNIT	SELLING PER UNIT	PROFIT	TOTAL PROFIT
SUNSHINE	6, 600, 000$	3300	4000	700	1400, 000$
ROADSTER	5, 280, 000$	4587.5	6000	1412.5	2, 260, 000$
FIREBALL	1, 920, 000$	6700	8000	1300	520, 000$
TOTAL PROFIT 4, 180, 000$					

With compareing ABCwith traditional method the cost will be allocate at different rate so activity may used different resource that vary with product.

Table (7) the ABC model given different results as shown below:

Overhead	Sunshine motorcycle	roadster motorcycle	Fireball motorcycle	Totally Number overhead	% respectively reprsented
No Delivery to retailers	100	80	70	250	0.40, 0.25, 0.32
No. Setup	35	40	25	100	0.35, 0.40, 0.25
No Purchase order	400	300	100	800	0.50, 0.375, 0.10
total					

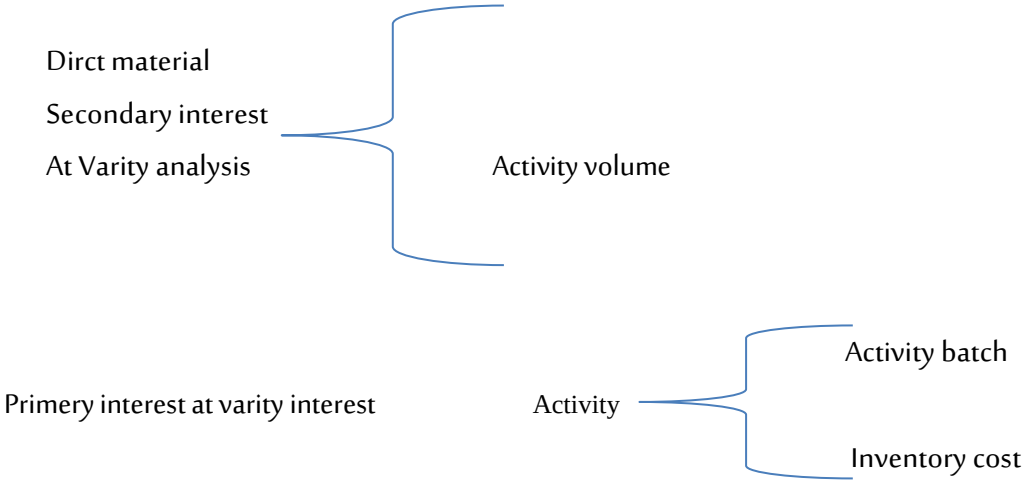
Table (8) The using labour hours method of allocation the fireball make on overall

products	Sunshine motorcycle($)	roadster motorcycle $	Fireball motorcycle $
Dirctlabour	1000, 000	1100, 000	400, 000
material	800, 000	960, 000	360, 000
Overhead cost:			
Deliveries(100:80:70)	960, 000	768, 000	672, 000
Set up (35:40:25)	2, 100, 000	2, 400, 000	1, 500, 000
Purchase order(400:300:100)	1, 800, 000	1, 350, 000	450, 000
Total cost	6, 660, 000	6, 578, 000	3, 382, 000
Cost per unit	3330	4111.25	8455
Selling price	4000	6000	8000
Profit (loss) per unit	670	1888.75	(455)
Total profit (loss)	1, 340, 000	3, 022, 000	(182000)

profit 520, 000$ but using ABC it make also of 128000$ there is significant difference in the level of cost allocation and so in profitability between to method the major reasons for the difference appears to be that while labour hours are not all that significant for fireball production the low volume of fireball sale cause relatively high amount of set-ups, deliveries and purchase process and this is recognized by ABC

If the fireball models to is to continue a review of the assembly and distribution systems may be need in order to reduce cost

The benefit return to ABC used for the decisions relating market conditions such as the pricing of the new motorbike rental contract what is really needed is the incremental cost to determined break even position while ABC may be closer to this concept than labor hours allocation basis it accuracy depends upon identifying appropriate cost drivers added there may be interdependencies between costs and revenue s that ABC is unlikely to captures where costs are truly common to more than one product then this may be difficult to capture by any given single activity also as with labor hours allocations it is the future that matters any relationship between cost and activities based upon historic experience and observation may be unreliable as guide to the futures



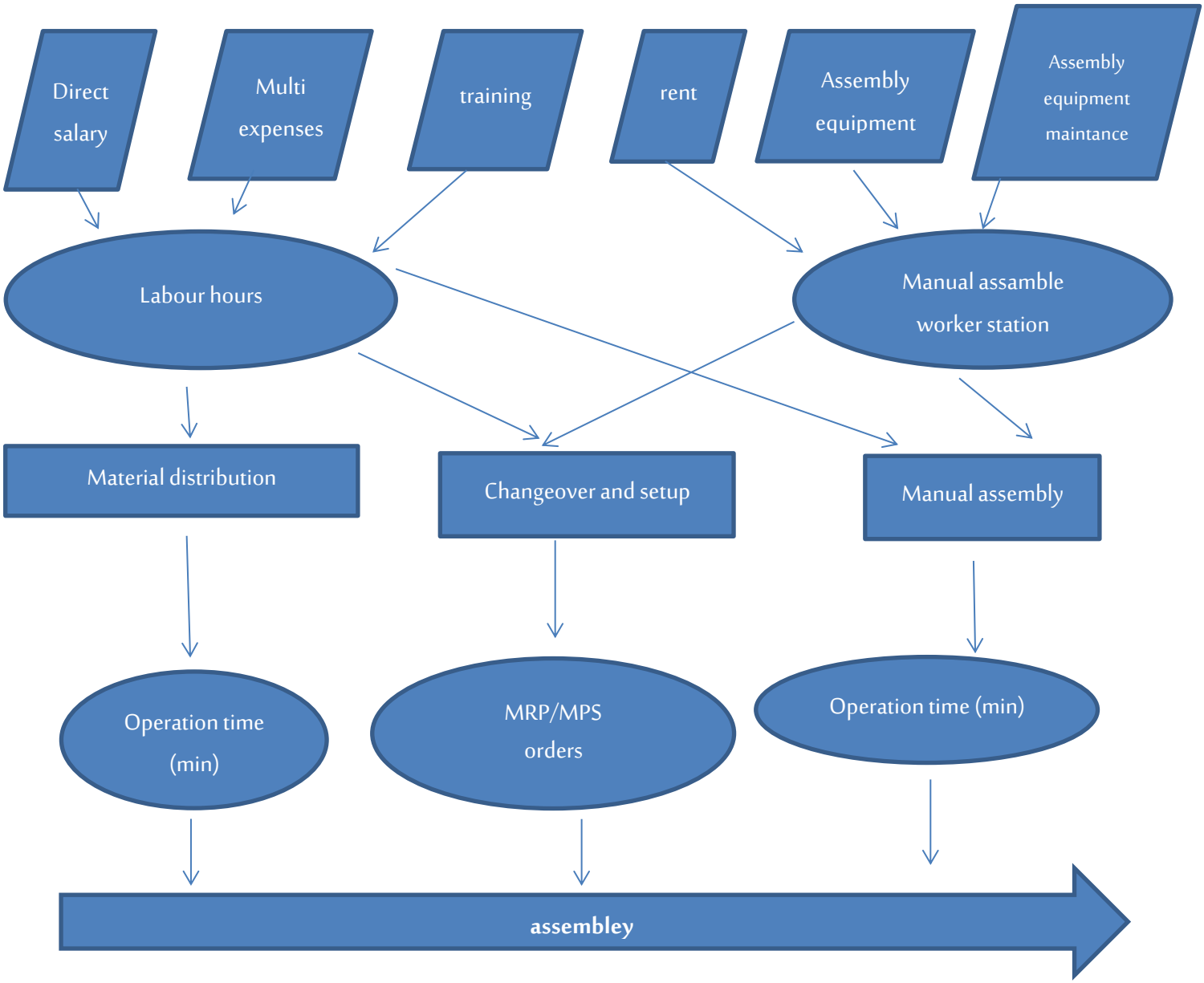
1.1 case study

1.2 The allocation of cost from activity centres to activities within these centres is based on interviews that captured the percentages of time devoted to each activity, and costs are allocated proportionally. Allocation of resources directly engaged in production and assembly. In the production and assembly resource costs have to be allocated to the specific activities performed. The initial identifica- tion of activity centres within the production and assembly departments (from print production to assembly) are based on the already existing struc- ture within the organization.

1.3 As an example of the resource cost allocation, the assembly activity centre is illustrated in Fig. 8.

1.4 The identification of the activities within each of these activity centres has to be sufficiently detailed. The activity catalogue has to capture a number of activity differences:

1.5 The fellowing the model to explain cost in the organization the cost department to following:



The model.

1. hierarchy of activities, i.e. unit, batch and sustaining activities.

Thus, the outcome of the first step is the allocation of cost of resources to the individual activity centres and activities within these centres.

2. Problems with ABC beyond the case application

This section points out two potential problems using ABC in the cost assessment of modularity which is not addressed in the case. The first addresses the handling of R&D cost within the ABC model, and the second discusses the added complexity of product-profitability descriptions, when the degree of modularization is extended.

Results and Recommendation:

Reults:

1. The ABC provided more accurate cost per unit as results price, sales strategy, performance management and decsions making shuold be improve
2. It provided much better insight into what drivers overhead costs
3. ABC recognizes that overhead costs are not all relate ton production and sale volume
4. In may business overhead costs are significant proportion of total costs and management needs to understand the drivers of overhead in order to manage the business properly. O.H.cost can be controlled by managing cost drivers
5. Abc applied to all overhead cost not just production O.H

Recommendations:

1. applying ABCTD in the manufacturing cost and to whether this increase strategy sales
2. more study about ABC in public sectors
3. review on diagram policy and to whether help firm achieve there objective

References

- Anderson, S.W, Measuring the impact of product mix heterogeneity on manufacturing cost. The Accounting Review 79, 363–387. 1995
- Balda, D, Gustafson, D, Cost estimation models for the reuse and prototype software development life-cycles. ACM SIGSOFT Software Engineering Notes 15, 42–50. 1990
- Ben-Arieh, D, Qian, L, Activity-based cost management for design and development stage. International Journal of Production Economics 83, 169–183. 2003
- Cooper, R, Kaplan, R.S, a. How cost accounting distorts product costs. Management Accounting US (April), 20–27. 1988
- Cooper, R, Kaplan, R.S, a. The Design of Cost Manage-ment Systems, first ed. Prentice-Hall, Englewood Cliffs, NJ. 2004
- Cooper, R, Kaplan, R.S, b. Measure costs right: make the right decisions. Harvard Business Review 66, 96–103. 1988
- Cooper, R, Kaplan, R.S, b. Profit priorities from activity-based costing. Harvard Business Review 69, 130–135. 1991
- Cooper, R, Turney, P.B.B, 1988a. Tektronix: portable instru- ments division (A) and (B). Harvard Business School Cases #9-188-142 and -143.
- Cooper, R, Turney, P.B.B, b. Hewlett-Packard: Roseville networks division. Harvard Business School Cases #9-189- 117. 1988

- R.D, Potter, G, Schroeder, R.G, An empirical analysis of manufacturing overhead cost drivers. Journal of Accounting and Economics 19, 115.1995
- Skinner, W, 1986. The productivity paradox. Harvard Business Review 64, 55–59.
- Starr, M, Modular production—a new concept. Harvard Business Review 43, 131–142. 1965
- Thonemann, U, Brandeau, M, Optimal commonality in component design. Operations Research PP.48, 1–19. 2000
- Weng, Z.K, Risk pooling over demand uncertainty in the presence of product modularity. International Journal of Production Economics 62, 75–85. 1999
- Zhou, L, Grubbstro¨ m, R. Analysis of the effect of commona- lity in multi-level inventory systems applying MRP theory. International Journal of Production Economics 90, 251–263., 2005