IMPLEMENTING AN ACTIVITY-BASED COSTING MODEL

by

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Submitted in partial fulfilment of the requirements for the degree of Masters in Cost and Management Accounting at Nelson Mandela Metropolitan University

Date of Submission: December 2004

Promoter: Dr S Krause

DECLARATION

This work has not been previously accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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ACKNOWLEDGEMENTS

Grateful thanks are extended to all those individuals and organisations that contributed to the successful completion of this study. In particular, the assistance of the following are acknowledged:

I would like to direct my sincere gratitude to Dr S Krause, my promoter and mentor, for his valuable and patient assistance, advice and encouragement – without which this master's thesis would never have seen the light of day.

The staff of the Management Unit at the Port Elizabeth Technikon who were at all times helpful.

The respondents of the study who made the effort to complete the questionnaires as well as those who sacrificed their time in order for me to interview them so as to gain valuable knowledge that assisted with my research.

My wife, Gail, and daughter, Romy, who sacrificed a great deal, thus enabling me to successfully complete my studies. Without their patience and support I would not have been able to achieve this.

Renée van der Merwe for her language editing and Sharon van Eeden for editing and formatting the thesis.

ABSTRACT

Activity-based costing (ABC) is a forward-looking product costing method. Unlike traditional volume-based approaches, which are historically oriented, ABC concepts guide managers in seeking the best strategies to pursue in the future. This product costing method can be a valuable tool in planning and managing costs not only in the manufacturing area, but also in all aspects of business operations, from product design to distribution. Although its main advantage is its ability to provide more realistic product cost information for financial reporting purposes, use of ABC can lead to a better understanding of the strategic linkages existing between the various cost areas in the organisation. It enables managers to have a holistic view of cost management.

ABC was developed to better understand, manage and control the overheads. The brief fundamental of ABC is: Products consume activities, activities consume resources, and resources consume costs. Based upon this fundamental principle, ABC can trace the cost from resources to activities that are consumed by product manufacturing processes as well as from activities to products. ABC investigates the transactions that trigger cost instead of concentrating solely on measures of physical volume or a certain amount of labour hours. Compared to the traditional costing systems, ABC can not only answer how much product cost is but also tell executives the factors triggering costs and the way to manage costs. ABC helps managers make better decisions about product design, pricing, marketing, and mix and encourages continual improvement.

Unlike the traditional method, instead of using the single pre-determined overhead rate to absorb the indirect cost to products, ABC uses actual incurred cost to

determine the product cost. By tracing the absorption process of indirect cost, ABC would provide more information to management and help it find better ways to manage costs. However, the cost drivers used in ABC are constants but the cost driver rates are continually changing. ABC still uses predetermined cost drivers so it has the same fundamental problem as the traditional methods for estimating.

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CHAPTER 1

INTRODUCTION TO THE STUDY

1.1 INTRODUCTION AND BACKGROUND TO THE PROBLEM

According to BBP Publishing (2000:140), activity-based costing (ABC) has been developed as an alternative costing system to traditional overhead absorption costing for the following reasons:

- More accurate product costs can be obtained;
- The cost of serving individual or different categories of customers can be determined; and
- Better long-term decisions will be made.

The ABC approach is to relate costs to the factors that cause or drive them to be incurred in the first place and to change subsequently. These factors are called cost drivers.

ABC is a valuable concept that can be used to correct the shortcomings in the cost systems of the past. It is a means of creating a system that ultimately directs an organisation's costs to the products and services that require those costs to be incurred. ABC can be used in this way because it provides a cross-functional, integrated view of the company, its activities and its business processes. As a result, in many organisations, ABC has evolved beyond the point of simply developing more accurate and relevant product, process, service and activity costs. Many organisations use ABC as a means of improving operations by managing the drivers of the activities that cause

costs to be incurred. Organisations are using ABC to support major decisions on product lines, market segments and customer relationships, as well as to simulate the impact of process improvements. Organisations involved in Total Quality Management (TQM) processes are using both the financial and non-financial information of ABC as a measurement system (AICPA, 2004:1).

In the 1980's a number of companies such as Boeing, TRW, Texas Instruments and Corning became dissatisfied with how overheads were being allocated. For the most part they were still using direct labour hours as the basis for making allocations to products. This was despite the fact that there were very few direct labour hours being worked and that the overheads being allocated were many times greater than the costs of labour. Rather than simply moving to a different basis of allocation, they developed a new and more complex method. This has come to be known as ABC (Anderson & Nix, 1994:109).

According to Anderson and Nix (1994:109), overhead costs are incurred for many different reasons. ABC identifies the cost of all the activities being carried out. It then finds a suitable base for allocating those costs to products. ABC is a technique to more accurately assign the indirect and direct resources of an organisation to the activities performed based on consumption. ABC uses a two-stage cost assignment approach. In the first stage, resource costs are assigned to activities based on the amount of resources consumed in performing the activity. An activity cost would equal the sum of all the resources consumed in performing the activity. In the

second stage, activity costs are traced to the products, services, or customers based on how frequently the activity is performed in support of these cost objects (La Londe & Ginter, 2000:1).

According to AICPA (2004:2), the basic distinction between traditional cost accounting and ABC is as follows: traditional cost accounting techniques allocate costs to products based on attributes of a single unit. Typical attributes include the number of direct labour hours required to manufacture a unit, purchase cost of merchandise resold or the number of days occupied. Allocations, therefore, vary directly according to the volume of units produced, the cost of merchandise sold or the days occupied by the customer. In contrast, ABC systems focus on activities required to produce each product or provide each service based on each product or service's consumption of the activities. Using ABC, overhead costs are traced to products and services by identifying the resources, activities and their costs and quantities to produce output. A unit or output (a driver) is used to calculate the cost of each activity consumed during any given period of time. An ABC system can be viewed in two different ways. The cost assignment view provides information about resources, activities and cost objects. The process view provides operational (often non-financial) information about cost drivers, activities and performance.

Most ABC applications have focused initially on the manufacturing environment owing to the need to accurately determine product costs. However, many service industries, including logistics, have also begun to implement ABC with most cases being reported only within the last five

years. Drucker (1995:54) suggests that ABC may have its greatest impact within the service industries since they have had practically no cost information at all. Drucker (1995:55) further suggests that ABC is a tool executives will seriously need to manage in the future.

ABC Magazine (2004:2) states that ABC provides managers with useful information they need regarding the contribution that each customer makes to overall profitability. Also, ABC allows managers to see how to maximise performance and implement sound profit-growth strategies. ABC also makes it very clear that integrated costs associated with the services that the customer demands play a crucial role in determining each customer's contribution to net profit. ABC Magazine (2004:2) further states that in order to determine how much a customer is costing an organisation, the organisation must first identify the activities that relate to each customer and then determine the total cost absorbed by those activities. These activities or "cost drivers" should be considered when measuring the level of activity absorbed by each customer. The ultimate purpose of implementing ABC is to separate these activities into individual cost drivers. Then, all that needs to be done is to measure each customer's participation in the specific cost.

Traditional cost accounting divides the cost of goods and services into three components: direct labour, direct materials, and overheads. The costs of the first two components are fairly simple to derive. Generally, overheads are allocated to products or services based upon the number of direct labour hours used, the total cost of labour, or the number of machine hours expended. Occasionally square meterage serves as the basis for allocation.

Subsequent analysis of efficiency with respect to these different costs are generally analysed as:

- Materials price and quantity variances;
- Labour rates and efficiency variances; and
- Overhead volume, efficiency, and spending variances.

These variances compare actual costs incurred and quantities used with predetermined standard costs and quantities for given levels of output. As many private sector companies moved away from manufacturing into service industries, and as fixed costs such as overheads increasingly accounted for larger proportions of the total cost of goods and services, traditional cost accounting and variance analysis lost much of its usefulness.

ABC is a costing technique that is designed to more accurately reflect the demands that products, customers and other cost objects make on overhead resources (Garrison & Noreen, 2000:94).

In traditional cost accounting, all manufactured costs are assigned to products, even manufactured costs that are not caused by the products. For example, a portion of the factory nursing sister's salary would be allocated to each product even though the nursing sister's salary is totally unaffected by which products are made or not made during a period. In ABC, a cost is assigned to a product only if there is good reason to believe that the cost would be affected by decisions concerning the product (Garrison & Noreen, 2000:323).

According to Anthony and Young (1999:172), ABC is needed when a single activity, such as machine hours in a factory, is inadequate to assign the organisation's overhead costs to products. Chadwick (2001:31) states that ABC is founded on the belief that activities cause the costs and that the cost objects, such as products and services; create the demand for those activities. The activities have to be identified and a cost pool established for each activity (Chadwick, 2001:31). There can be numerous activities. These can be allocated to a product/ service where they are specific to that product or service. In cases where they serve a number of products/services they will have to be apportioned using cost drivers as illustrated in Table 1:

Table 1: Examples of activity based cost drivers

Activity cost pool	Activity cost driver
Set-up costs	Number of production runs
Despatch costs	Number of customer orders delivered
Production scheduling	Number of production runs
Inspection costs	Number of inspections or inspection hours
Purchasing	Number of purchase orders
Receiving	Number of goods received notes

Source: Chadwick (2001:31).

According to Chadwick (2001:31), the amount assigned to each product/service will depend on the use made of the activity pool via an appropriate activity cost driver. ABC causes management to focus on what creates the demand for the resources and the redeployment or elimination of excess resources. ABC attempts to estimate the resources consumed by products.

Miller and Vollman (1985:41) provided a useful system for analysing the activities (transactions) which cause costs to be incurred. This is set out in Table 2.

Table 2: Analysing activities

Type of transaction	Detail
Logistical transactions	Those activities concerned with organising the flow of resources throughout the manufacturing process
Balancing transactions	Those activities which ensure that demand for and supply of resources are matched
Quality transactions	Those activities which relate to ensuring that production is at the required level of quality
Change transactions	Those activities associated with ensuring that customers' requirements are met

Source: Miller and Vollman (1985:41).

ABC counts the actual activities that go into making and delivering a specific product or service, attempting to calculate the costs of those activities. Rather than arbitrarily allocating the total cost of a machine across a range of products using an imprecise formula, an ABC methodology establishes how much machine time each unique product consumes and then accurately reassigns the costs accordingly (Cooper & Kaplan, 1992:22).

Garrison and Noreen (2000:324) state that many companies use departmental overhead rates rather than a plant-wide rate. Cooper (1988:20) state that departmental overhead rates will not correctly assign overhead costs in situations where a company has a range of products that differ in volume, batch size or complexity of production. Cooper and Kaplan (1992:23) state that the reason for this is that departmental approach usually

relies on volume as the factor in allocating overhead costs to products. According to Garrison and Noreen (2000:324), ABC is a technique that is designed to reflect the diverse factors affecting the allocation of costs more accurately by identifying the major activities such as batch setups, purchase order processing, and so on, that consume overhead resources. An activity is any event that causes the consumption of overhead resources. The costs of carrying out these activities are assigned to the products that cause the activities.

One of the most important decisions that a manufacturing company should make is to determine the product mix that will maximise profits. Given that a company has capacity constraints, it may not be able to produce every unit of product demanded by the market. The best action to take in this case is to focus on the most profitable products for the company and to use all the existing resources of the company to produce these products. In this way the company can increase its profitability because it will use its existing resources to produce the most profitable products (Cooper & Kaplan, 1992:25).

The product mix problem is one of the best known applications of linear programming (Sullivan, 1998:187). The problem includes determining both the quantity and the identification of each product to produce. The main structure of the problem is to maximise profit from the mix of manufactured products subject to constraints on the available capacity of resources (McNair, 1994:12).

Determining the best product mix of a company correctly is an important requirement to increase the profitability of a company. To make the right decisions, management needs more accurate information about the optimal product mix and the restrictive bottlenecks of a company. ABC, together with the theory of constraints (TOC) philosophy and mathematical programming, can provide management with more accurate information about the optimal product mix of a company and can help to identify the bottlenecks that should be focused on to improve the system.

According to Murray (1999:2), one of the keys to ABC implementation success is the attention placed on stimulating the non-accountants and end-users to buy into the ABC concepts and data. There must be active stimulation of the end-users to apply ABC information in their daily decisions and analysis. The biggest problem with an ABC implementation has been a lack of understanding and appreciation for the benefits. Most companies have been occupied with the ‘what’ and ‘how-to’ of the method, and they have neglected the ‘why’. ABC project managers must remove the theory and supposed complexity of ABC from their project environment. They require a practical step-by-step approach to implementation. Trying to install ABC software and database interfaces without first implementing the project that will bring about the changes and awareness for ABC necessary for installation, is a recipe for failure.

According to Rockford Consulting Group (1999), one of the basic issues surrounding ABC is the difficulty of implementation. Identifying activities or processes to be allocated properly is cumbersome and takes a lot of effort. It

requires that processes be adequately mapped throughout the organisation. For a company that has undertaken a quality effort, or an effort to re-engineer business processes, a major part of the work may already be completed. But for those who have not, it is likely to be a major undertaking. ABC is no panacea, nor should it be embraced as a religion, or a fad. It is an operational strategy that needs to be carefully reviewed for applicability. The best way to approach the situation is to first rationalise a facility and its processes, identify the opportunities and then conceptualise a solution. If this fits, use it (Rockford Consulting Group , 1999).

1.2 PROBLEM STATEMENT

The problem statement is as follows: **"How to develop a model to overcome the difficulties when implementing an ABC system".**

1.2.1 Sub-problems

- What are the steps involved in ABC?
- What are the benefits of ABC versus traditional methods?
- What are the limitations of ABC?
- What do literature studies reveal regarding the practical use of ABC?
- What are the steps involved in designing a model for implementing ABC?

1.3 DEFINITION OF KEY CONCEPTS

The following concepts are described in terms of their direct or indirect reference in the title and the problem statement:

Activity-based costing:

The Chartered Institute of Management Accountants (CIMA) defines this as "cost attribution to unit costs on the basis of benefit received from indirect activities e.g. ordering, setting-up, assuring quality" (CIMA Official Terminology, 2003:3).

Barfield, Rainborn and Kinney (1993:37) define ABC as a process of using multiple cost drivers to predict and allocate costs to products and services; an accounting system collecting financial and operational data on the basis of the underlying nature and extent of business activities; and an accounting information and costing system that identifies the various activities performed in an organisation, collects costs on the underlying nature and extent of those activities and assigns costs to products and services based on consumption of those activities by products and services.

Cost drivers:

A cost driver is "any factor which causes a change in the cost of an activity, for example the quality of parts received by an activity is a determining factor in the work required by that activity and therefore affects the resources required. An activity may have multiple cost drivers associated with it" (CIMA Official Terminology, 2003:3).

Resource costs:

People, equipment and technology, space, supplies, capital as measured by hours, units, or money are all resource costs (Harvey, 2003).

Theory of constraints:

The theory of constraints (TOC) is a system's management philosophy developed by Goldratt and Cox (1992). In their book, called "The goal: A process of ongoing improvement," Goldratt and Cox (1992:32) state that a firm's goal is to make money now and in the future. A company will not exist if it is not making money. Any activity that does not help make money is a waste of time and resources (Kee, 1998:25). TOC is implemented through three measures: throughput, operating expenses and inventory.

1.4 ABBREVIATIONS

ABC	Activity-based costing
ABM	Activity-based management
AICPA	American Institute of Certified Public Accountants
CIMA	Chartered Institute of Management Accountants
CPA	Customer profitability analysis
GAAP	Generally Accepted Accounting Practice
GL	General Ledger
HKSE	Hong Kong Stock Exchange
LIFFE	London International Financial Futures and Options Exchange
JIT	Just-in-time management
KPI's	Key performance indicators
LP	Linear programming
LSE	London Stock Exchange
P&L	Profit and Loss
MTN	Mobile Telephone Networks
NYSE	New York Stock Exchange
OLAP	Online analytical processing

ROI Return on investment

TOC Theory of constraints

TQM Total quality management

1.5 THE NEED FOR RESEARCH

In today's competitive world of business, having accurate information may be the key factor in distinguishing between the loser and the winner. Using more accurate cost information while determining the optimal product mix of a company may lead management to make better decisions, and as a result, may have a great effect on the success of a company.

Cooper and Kaplan (1992:21) state that the goal is not to have a more accurate costing system. It should be to have the best costing system – one that balances the cost of errors made from inaccurate estimates with the cost of measurement.

Mabin and Gibson (1998:921) argue that theory of constraints (TOC) and spreadsheet linear programming (LP) approaches can complement each other and provide effective decision aids. Mabin and Gibson (1998:921) argue that the linear programming technique can be used together with the TOC philosophy to model product mix problems. They consider LP as a good starting point for the production plan and suggest that the five-step improvement process of TOC be used to improve the system based on the results obtained from LP. Although combining TOC and LP should improve product mix decisions, the information obtained from this combination may be incorrect, especially for companies with high overhead costs and a large

variety of products, if a traditional overhead cost allocation method is used in calculating the profitability of a product.

The result of an LP solution may even suggest that management should produce unprofitable products. What is needed is a model that will help managers in determining the optimal product mix by using the more accurate product cost information. This new model must be able to give management the right information about the capacity-constrained product mix of a company. It must also be able to determine the right processes that management should focus on to improve the performance of the system. Finally, it must be able to demonstrate the effects of various alternatives, such as outsourcing one or more of the activities performed in the company or increasing the capacity of the bottleneck operation by using an inefficient method to produce products, on the performance of the whole system.

1.6 DELIMITATION OF THE RESEARCH

In order to ensure that the research project is of a size that is manageable, it is necessary to limit the research to a maximum of twenty companies. By delimiting the research the implication is not that research on the same topic is not needed in other regions, but that the same principles can be applied universally.

1.6.1 Demarcation of organisations to be researched

The focus of the research will be manufacturing companies that have implemented or are considering implementing ABC.

The companies to be researched amongst others are:

- Vodacom;
- MTN;
- Bevcon (subsidiary of Coca-Cola Fortune);
- Cell-C;
- Synerma Inc;
- SAB Miller;

1.6.2 Geographic demarcation

Owing to the fact that very few companies are using ABC in South Africa, the study will cover companies worldwide. It is assumed that universal principles are applied.

1.7 ASSUMPTIONS

It is assumed that there are certain universal methods that can be used to implement ABC. It is also assumed that these methods are independent of any organisation and operate in the same way, irrespective of the type of organisation.

1.8 SIGNIFICANCE OF THE RESEARCH

The purpose of this study is to investigate which are the practical problems in implementing an ABC system within all types of companies that handle everyday transactions through an operational and a financial information system. ABC provides the tool with which to go beyond gross margins and penetrate the real economics of all aspects of cost and profitability, including

that of servicing customers. The analyses provided by ABC can provide solutions to many of the critical business issues facing the manufacturing industry.

1.9 OUTLINE OF THE STUDY

The research study has been divided into the following chapters:

Chapter 1	Introduction and background to the study
Chapter 2	Understanding activity based costing
Chapter 3	Implementing an activity based costing system
Chapter 4	Research methodology and design
Chapter 5	Empirical study and presentation of results
Chapter 6	Final summary, conclusions and recommendations for further research

CHAPTER 2

UNDERSTANDING ABC

2.1 EVOLUTION OF ACTIVITY- BASED COSTING

According to Troxel and Webber (1990:14), manufacturing cost involves the conversion of raw materials into finished products through the efforts of workers and the usage of production equipment. The cost of a manufactured product consists of three basic elements: direct material, direct labour and manufacturing overheads. This is supported by Antos (2003:2).

Direct materials are those materials that become an integral part of a company's finished product and that can be conveniently traced to the finished product. Direct labour is reserved for those labour costs that can be physically traced to the creation of products in a "hands-on" sense, and can then be easily traced without undue cost or inconvenience. Manufacturing overheads can be simply defined as all costs of manufacturing except direct materials and direct labour. Included in this classification are such costs as indirect materials, indirect labour, heat and light (utilities), property taxes, insurance, depreciation on factory facilities, repairs, maintenance and all other costs of operating the manufacturing divisions of a company (Troxel & Webber, 1990:14). This is supported by the ABC Guidebook (1995:2), which states true cost accounting operations were established to capture and distribute costs to the output goods or services. These cost accounting operations use the classic model of cost distribution which was designed around the major factors of production: direct labour, direct materials and overheads.

Product costs consist of the costs involved in the manufacturing of goods such as direct labour, direct material and manufacturing overheads. To cost the product using the cost structure base illustrated above, direct labour, direct materials and manufacturing overheads are attributed or allocated to the single unit of product (Troxel & Webber, 1990:15).

Traditional methods trace the direct labour and direct material into the certain single product unit by the product volume. That is:

$$\text{Total unit direct cost} = \frac{\sum \text{Direct labour cost} + \sum \text{Direct material cost}}{\text{Product volume}} \quad \text{.....1}$$

Source: Troxel & Weber (1990:15).

2.2 TRADITIONAL PRODUCT COSTING

King (2000:2) states that traditional cost systems focus on the product in the costing process. Costs are traced to the product because each product item is assumed to consume the resources. Therefore traditional allocation bases measure only attributes of the individual product items. For example, these would be the number of direct labour hours or machine hours or the value of materials consumed. However, in many modern manufacturing operations, overheads are not homogeneous in terms of being primarily influenced by volume. Indeed it could be argued that the majority of overheads in a modern manufacturing operation are largely unaffected by changes in production volume.

According to ABC Technologies (1996:1), traditional cost accounting systems have evolved primarily to serve the function of inventory valuation satisfying

the GAAP standards of objectivity, verifiability and materiality. ABC Technologies (1996:1) states that traditional systems for product costing have many failings, especially when used for internal management purposes. Two important failings of traditional product costing systems as stated by ABC Technologies are:

- Their inability to report individual product costs to a reasonable level of accuracy;
- Their inability to provide useful feedback to management for the purpose of operational control.

As a result, managers of companies selling multiple products are making important decisions about pricing, product mix, and process technology based on inaccurate and inappropriate cost information (ABC Technologies, 1996:1).

Traditional cost systems focus on the product in the costing process. Costs are traced to the product, because each product is assumed to consume the resources in proportion to the volume produced. Therefore volume attributes of the product item, such as the number of direct labour hours, machine hours or material value are used as drivers to allocate overhead costs. These volume drivers, however, fail to account for product diversity in the form of size or complexity. There is also not a direct relationship between production volume and cost consumption (ABC Technologies, 1996:1).

By contrast, ABC focuses on activities in the costing process. Costs are traced from activities to products, based on the products' demand for these activities during the production process. Another important distinction between traditional cost systems and ABC is the scope of operations. Traditional systems, being concerned primarily with inventory valuation, track only those costs incurred within the factory wall. ABC theory contends that, because virtually all of a company's activities exist to support production and delivery of goods and services, they should all be included as product costs (ABC Technologies, 1996:1).

A study by Miller and Vollman (1985:25) categorises overheads into four groups, which cover functions such as purchasing and materials movements, set up and scheduling, quality control and tracking and monitoring of production.

According to Harrison and Sullivan (1996:55), manufacturing overheads cannot be directly traced to the manufacturing process or the unit product. Manufacturing overheads need to be distributed or allocated to the unit product. Therefore, manufacturing overheads are prorated on some basis to all products manufactured. Traditional methods assume that direct labour or direct materials trigger costs. Thus typical vehicles of product costing are direct production hours and direct machine hours. According to Harrison and Sullivan (1996:55), a term named predetermined overheads rate or burden rate was introduced as a result of this and is calculated as follows:

$$\text{Predetermined overheads rate} = \frac{\sum \text{Manufacturing overheads}}{\sum \text{Manufacturing labour hours}} \quad \text{.....2}$$

Source: Harrison & Sullivan (1996:55).

Harrison and Sullivan (1996:56) state that the overheads rate must be generated by centre, department or plant. It is often generated or predetermined in advance by using estimates of expenses and working hours. Once the overheads/burden rate has been built, it can be used to allocate the manufacturing overheads into the single unit of product.

The total unit manufacturing cost is defined as:

$$\text{Total cost of product} = \frac{\text{Total unit direct cost} + \text{Overheads rate} \times \text{Product direct labour hours}}{\text{Product volume}} \quad \text{.....3}$$

Source: Harrison & Sullivan (1996:56).

2.3 ACTIVITY- BASED COSTING PRINCIPLES

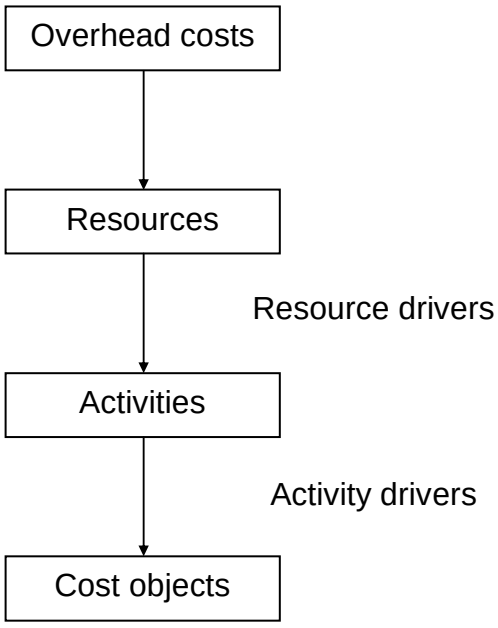
In the opinion of Cokins, Straton and Helbling (1993:14), the emergence of ABC was the consequence of the following three factors:

- The changes in companies' cost structures, meaning the increase of the overheads as opposite to the decrease of the direct labour costs and material costs;
- The cross-functional behaviour within companies are gaining ground – more than ever managers are becoming aware of the relationships between their departments; and
- The appearance of relational databases and fourth generation languages, which allow for quick data organisation.

According to Cooper and Kaplan (1991:40), ABC is an evolutionary extension of the two-stage procedure of the modern cost systems that segregates the organisation's resource costs by activities, and then uses drivers to assign those expenses to activities.

Unlike traditional cost systems that misallocate the overhead costs, ABC traces costs by using resource and activity drivers that reveal activities' and objects' consumption patterns on the basis of the cause and effect relationship. In activity costing systems, there are three building blocks: the resources, the activities and the cost objects (Figure 1):

Figure 1: Building blocks in activity based costing



Source: Cooper and Kaplan (1991:41).

2.4 THE MAJOR ADVANTAGES OF ABC

Barfield et al. (1993:35) state that one of the perks that ABC provides is that it functions as an element to improve product cost to aid decision-making in management as well as to make several enhancements in performance

measurement. The outcome in the long run will improve the company's performance.

Since ABC is focused on controlling the activities, there is therefore a better control of the cost of these activities, and Barfield et al. (1993:36) also state that this is due to the cost reduction efforts that can be directed at specific cost drivers. ABC moves a large amount of overhead costs from standard, large volume products (the costs were actually allocated based on the traditional method) to premium special order, low volume products.

Moreover, ABC enhances a process to a more realistic view and background of the incurred cost, without disturbing the cost accumulation procedure. The process view of the costing also liberates management to detect and eliminate any wastage. As a supplementary incentive, any feedback on product development and potential improvements can be extracted. Overall, ABC supports qualitative measures of activity and performance, thus enhancing managerial decision-making (Louis, 2003:4).

According to Zhu (1999:12), ABC does not allocate the cost simply by using a single allocation base such as labour hours or machine hours. Instead, it uses different allocation bases for particular activities. Table 3 shows the allocation base in an ABC system versus a traditional system. It should be noted that in an ABC system one does not allocate costs: one assigns costs. Allocating costs suggests arbitrarily spreading them to different cost centres. In an ABC system one attempts to trace costs to their sources. Assigning costs implies a thoughtful application of costs.

Table 3: Allocation bases for traditional method and ABC

Indirect Cost	Activity-based costing	Traditional
Production control	No. of process operations	Direct labour hours
Inspection	No. of inspections	Direct labour hours
Warehousing stores	Receipts and issues	Direct labour hours
Purchasing	Purchase orders	Direct labour hours

Source: Zhu (1999:13).

Table 4: Activity-based costing procedure on purchase cost analysis

Cost name	Total	
Purchase costs	R 200 000	
Purchase orders	1 000	
Cost per purchase order	R200	
	Product A	Product B
Production volume	40	4 000
Purchase orders	4	40
Purchase cost	R800	R8 000
Purchasing cost rate (cost/product item)	R2,00	R2,00

Source: Zhu (1999:13).

According to Zhu (1999:13), ABC reflects a company's economies of scale. When setup, planning, material handling and warehousing costs are amortised across large production runs, these costs are very small per piece. Table 4 above shows an ABC procedure used to calculate the cost of purchase for products A and B. Product B, with 10 times the number of purchasing transactions, creates 10 times more purchasing work as opposed to product A. Table 5 can be used to compare the results of both traditional costing and ABC on the assignment of setup costs.

Table 5 demonstrates the cost distortion that the traditional system causes in high-volume and low-volume products. If the setup costs are assigned on labour hours, the high-volume products receive most of the setup costs. If, on the other hand, setup costs are based on the number of setups required, high-volume products receive proportionally small setup costs. The system accounts for the fact that low-volume products require a disproportion of setup costs. The ABC system shows that the low-volume products increased unit costs by 586%, while the high-volume products decreased unit costs by 38%. However, ABC assumes the setups for products A and B are equal or comparable on the same level.

Table 5: Illustration of setup cost comparison between traditional method and ABC

	Product A	Product B	Total
Volume	1 000	20 000	21 000
Direct labour hours per unit	400	300	700
Number of setups	30	40	70
Total setup costs			
If assigned:			
On labour hours			
(Traditional)	R 280	R 4 200	R 4 480
On number of setups (ABC)	R1 920	R 2 560	R 4 480
Traditional setup			
Cost per unit	R0,28	R0,21	
ABC setup cost per unit	R1,92	R0,13	
	Product A	Product B	Total
Change after ABC	+586%	-38%	
Versus traditional method			

Source: Author's own construction (2004).

The change is calculated by using the following formula:

$$\text{ABC cost change} = \frac{\text{ABC cost} - \text{traditional cost}}{\text{Traditional cost}} \times 100 \quad \text{.....4}$$

Source: Zhu (1999:13).

The distortion caused by traditional costing is very dangerous for the product pricing and management strategy. The traditional cost system, by allocating all overheads costs to products on volume measures, systematically "decreases" unit cost of low-volume products and "increases" unit cost high-volume ones. This distortion can direct a company to drop profitable products in favour of products losing money. The traditional cost system does not cause the distortion only on setup cost. It also performs poorly between complex and simple products.

To manufacture a complex product with many part numbers and intricate functions requires more support activities such as planning shop orders, processing engineering changes, placing purchase orders, conducting system tests and moving materials, than a simple product. Complex products, therefore, place high demands on support functions. These demands trigger many more activities per unit than simple products, and are much more expensive. Yet the traditional direct labour-based costing system makes no such distinction. The traditional system allocates overheads costs on direct labour or machine hour content, which is a poor measure of product complexity. ABC on the other hand, by tracking the triggering of support activities, identifies the real costs of these products. A complex product with many part numbers will require many purchase orders, more production

planning, more inspection points, and so on. Each of these activities, by being traced to the product, is reflected in product cost.

The benefits of ABC are as follows:

- The complexity of many businesses has increased, with wider product ranges, shorter product lifecycles, the greater importance of quality and more complex production processes. ABC recognises this complexity with its multiple cost drivers, many of which are transaction-based rather than volume-based (BBP Publishing, 2000:145).
- In modern manufacturing systems, overhead functions include a lot of non-factory floor activities such as product design, quality control, production planning, sales order planning and customer service. ABC is concerned with all overhead costs, including the costs of these functions, and so it takes cost accounting beyond its traditional factory floor boundaries (BBP Publishing, 2000:145).
- Many companies sell products at a loss, subsidising their customers because they do not understand the true cost of the product. In today's competitive environment, companies must be able to assess product profitability realistically. To do this, they must have a good understanding of what drives overhead costs. ABC gives a meaningful analysis of costs, which should provide a suitable basis for decisions about pricing, product mix, design and production (BBP Publishing, 2000:145).
- ABC helps with cost reduction because it provides an insight into causal activities and allows organisations to consider the possibility of outsourcing

particular activities, or even moving to different areas in the industry value chain (BBP Publishing, 2000:145).

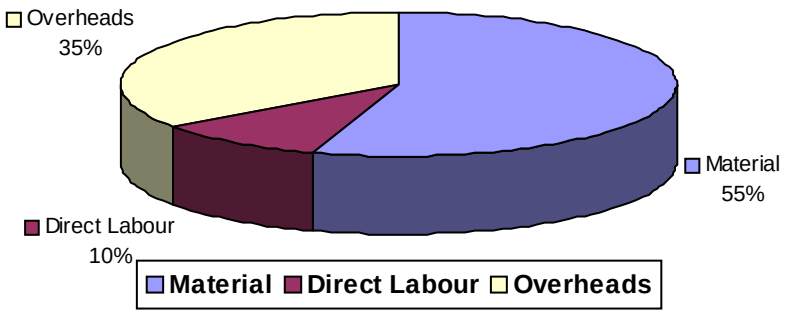
- Many costs are driven by consumers (delivery costs, discounts, after-sales service), but traditional cost accounting does not account for this. Companies may be trading with certain customers at a loss but may not realise this because costs are not analysed in a way that would reveal the true situation. ABC can be used in conjunction with customer profitability analysis (CPA), to determine more accurately the profit earned by serving particular customers (BBP Publishing, 2000:145).
- Improving profitability by monitoring total lifecycle cost and performance (Brimson, 1998:20).
- Improving the effectiveness of budgeting by identifying the cost/performance relationship of different service levels (Brimson, 1998:20).
- Encouraging continuous improvement and total quality control because planning and control are directed at process level (Brimson, 1998:20).
- Linking corporate strategy to operational decision making (Brimson, 1998:20).
- Facilitating elimination of waste by providing visibility of non-value added activities (Brimson, 1998:20).
- Improving make/buy, estimating, and pricing decisions that are based on product cost that mirrors the manufacturing process (Brimson, 1998:20).

2.5 WHY ABC IS NEEDED

Sullivan (1998:189) lists the characteristics of the new manufacturing environment and states that in today's world manufacturing companies are changing and becoming more information intensive, highly flexible, and

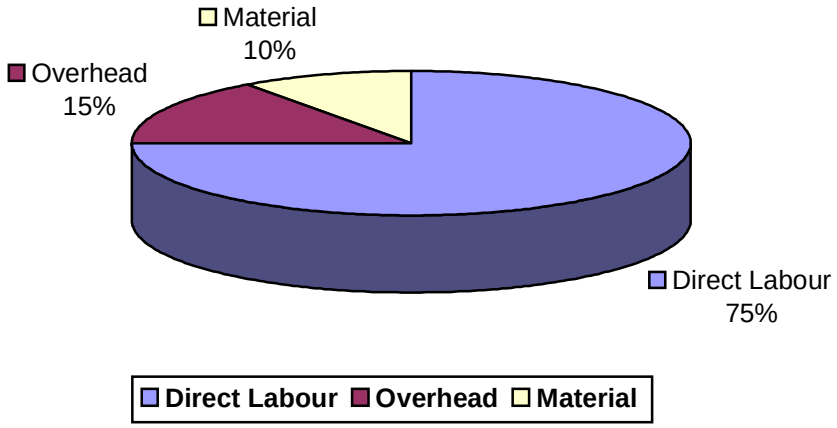
immediately responsive to customer expectations. Owing to the changing manufacturing environment, traditional cost accounting is rapidly disappearing. Traditional accounting systems were developed at a time when direct labour was a large percentage of the total product costs. Changes in manufacturing technologies, such as the just-in-time philosophy, robotics and flexible manufacturing systems decreased the direct labour component of production and increased overhead costs. In today's manufacturing environment, direct labour accounts for only 10% of the costs, whereas material accounts for 55% and overheads 35% (See figures 2 and 3). As a result, product cost distortion occurs due to allocating overhead costs to the products arbitrarily on the basis of direct labour hours used by each product (Harsh, 1993:32).

Figure 2: The proportion of material, direct labour and overheads in today's world



Source: Harsh (1993:32).

Figure 3: Where traditional cost systems focus their attention



Source: Harsh (1993:32).

Cooper (1988:21) reports several situations that can cause distortions to occur, such as production volume diversity, complexity diversity, material diversity, and setup diversity. To understand why, the author will illustrate this by showing two hypothetical plants (Plant 1 and Plant 2) producing simple ballpoint pens. The factories are the same size and have the same capital equipment. Every year, Plant 1 produces one million blue pens. Plant 2 also produces blue pens, but only 100 000 per year. To fill the plant, keep the work force busy, and absorb fixed costs, Plant 2 also produces a variety of similar products: 60 000 black pens, 12 000 red pens, 10 000 lavender pens, and so on. In a typical year, Plant 2 produces up to 1 000 variations with volumes ranging between 500 and 100 000 units. Its aggregate annual output equals the one million units of Plant 1, and it requires the same total standard direct labour hours, machine hours and direct material.

Despite the similarities in product and total output, a visitor walking through the two plants would notice dramatic differences. Plant 2 would have a much

larger production support staff – more people to schedule machines, perform setups, inspect items after setup, receive and inspect incoming materials and parts, move inventory, assemble and ship orders, expedite orders, re-work defective items, design and implement engineering change orders, negotiate with vendors, schedule materials and parts receipts, and update and program the much larger computer-based information system. Plant 2 would also operate with considerably higher levels of idle time, overtime, inventory, re-work and scrap (ABC Technologies, 1996:2).

Plant 2's extensive factory support resources and production inefficiencies generate cost system distortions. Most companies allocate factory support costs in a two-step process. Firstly, companies collect the costs into categories that correspond to responsibility centres (Production Control, Quality Assurance, Receiving etc.) and assign these costs to operating departments. ABC Technologies (1996:2) states that many companies carry out the first step very well, but the second step, tracing costs from operating departments to specific products, is done simplistically. Most companies, according to ABC Technologies (1996:2), still use direct labour hours as an allocation base. Others, recognising the declining role of direct labour, use two additional allocation bases. Materials-related expenses (costs to purchase, receive, inspect and store materials) are allocated directly to products as a percentage mark-up over direct material costs. Machine hours or processing time are used to allocate production costs in highly automated environments.

Whether Plant 2 uses one or all of these approaches, its cost system invariably, and mistakenly, reports production costs for the high volume product (blue pens) that greatly exceeds the costs for the same product produced in Plant 1. People do not need to know much about the cost system or production process in Plant 2 to predict that blue pens which represent about 10% of output, will have about 10% of factory costs allocated to them. Similarly, lavender pens, which represent 1% of Plant 2's output, will have about 1% of factory costs allocated to them.

2.6 HOW ABC WORKS

According to Innes and Mitchell (1992:41), an ABC system involves a two-step process. This is supported by O'Guin (1991:15). Firstly, overheads are pooled in accordance with the activities which cause them. Secondly, a link known as a cost driver is found between each activity cost pool and product output. The computation of cost driver based rates (activity cost/period cost driver volume) then provides the means of actually attaching the overhead to the products.

O'Guin (1991:15) states that in the first stage it assigns all costs of resources to the activities in activity centres based on the resource drivers. The amount paid for a resource and assigned to an activity is called a cost element. In the second stage, costs assigned to the cost pools are then assigned to the products based on the product's consumption of each activity and the level of the activity in the ABC hierarchy, which will be discussed in the following section. The final costs assigned to a product are called a cost object. Cost drivers are used to assign the costs of activities to products. A cost driver is

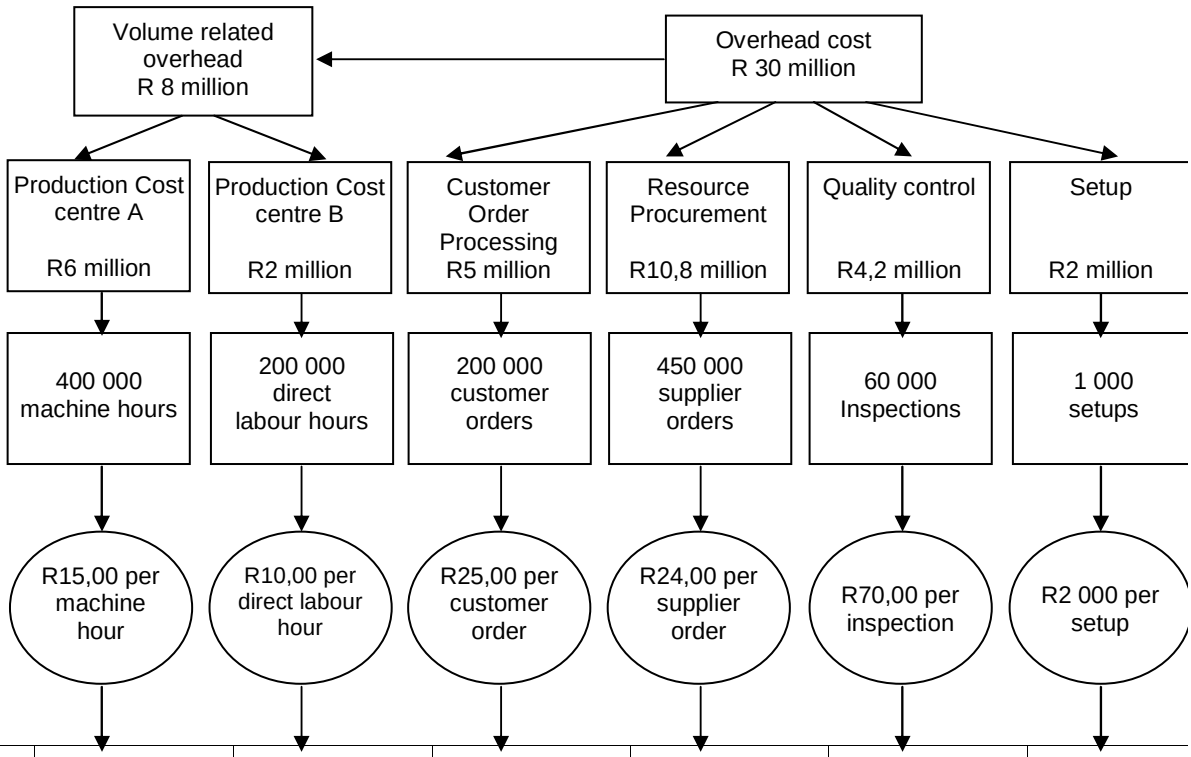
any factor that causes costs to be incurred, such as number of machine setups, number of engineering change notices and number of purchase orders. At least one cost driver is required for each activity. More can be used to increase the accuracy of the information (Raffish, 1991:36).

It is the second stage described above that separates ABC from traditional systems. In traditional systems, costs are allocated to products based on just one cost driver, direct labour hours, instead of using more realistic cost drivers (Harsh, 1993:34).

Another unique feature of ABC is that the focus of this approach is on activities and the cost of those activities, rather than on products as in the traditional costing systems. It is this feature of ABC that gives management the necessary information to identify opportunities for process improvements and cost reductions. By using ABC information, managers can see the cost of each major overhead activity performed in a plant separately, and therefore can give right decisions about where to focus efforts to reduce costs (Canada, Sullivan & White, 1996:35).

An overview of how such a system would work is provided in Figure 4:

Figure 4: An overview of ABC mechanics



Product A	150 000 machine hours × R15,00 = R2 250 000	60 000 direct labour hours × R10,00 = R600 000	40 000 customer orders × R25,00 = R1 000 000	150 000 supplier orders × R24,00 = R3 600 000	25 000 inspections × R70,00 = R1 750 000	400 setups × R2 000,00 = R800 000
Product B	200 000 machine hours × R15,00 = R3 000 000	100 000 direct labour hours × R10,00 = R1 000 000	70 000 customer orders × R25,00 = R1 750 000	200 000 supplier orders × R24,00 = R4 800 000	20 000 inspections × R70,00 = R1 400 000	350 set-ups × R2 000,00 = R700 000
Product C	50 000 machine hours × R15,00 = R750 000	40 000 direct labour hours × R10,00 = R400 000	90 000 customer orders × R25,00 = R2 250 000	100 000 supplier orders × R24,00 = R2 400 000	15 000 inspections × R70,00 = R 1 050 000	250 setups × R2 000,00 = R500 000

Source: Innes and Mitchell (1992:42).

Activity-Based Cost Accounting for Operational Readiness (2002:4) states that ABC focuses on the activities of a production cycle, and it is based on the premise that outputs (products or services) require activities to produce, and that activities consume resources. It recognises the causal relationship of cost drivers to activities. An output is defined as something “put out” at the

end of a production process. It can be a good or service, and it must be measurable or quantifiable.

To determine an organisation's outputs, a company must look at its core activities or processes; the things that it does. For example, an output at a motor dealership's accounting department might be an invoice paid. In addition, unit cost activities also often fall into the service category as opposed to the manufacturing category. This can make the identification of outputs more difficult, as there is not always a physical product provided to the customer (Activity-Based Cost Accounting for Operational Readiness, 2002:4).

2.7 COMPONENTS OF ACTIVITY-BASED COSTING

Before performing ABC, a baseline or a starting point is needed for business process improvement and a baseline can be expressed in some form of model. A baseline is a documentation of the organisation or agency's policies, practices, methods, measures, costs and their interrelationships at a particular location at a particular point in time. Through baselining, activity inputs and outputs across functional lines of business can be identified. ABC is the only improvement methodology that provides output or unit costs (Business Process Improvement, 1995:1).

According to Business Process Improvement (1995:1), an important function of ABC is for the organisation's activities to be defined as value added or non-value added. Value added activities are those for which the customers are usually willing to pay (in some way) for the service. Non-value added

activities are those that create waste, result in delay of some sort, add costs to the product/s, or for which the customer is not willing to pay. Resources are assigned to activities to allow them to be conducted; performing the activity results in a cost that can be priced, and which can be assigned to the primary output. It is through ABC that an organisation can begin to see actual monetary costs against individual activities, and find opportunities to streamline or reduce the costs, or eliminate the entire activity, especially if there is no value added.

2.8 IDENTIFYING COST DRIVERS

According to Hilton (1997:36), an important step in understanding the cost behaviour in any organisation is identifying the cost drivers upon which various types of costs depend. A cost driver is a characteristic of an event or activity that causes costs to be incurred by that event or activity. In most organisations different types of costs respond to widely differing cost drivers. For example, in a manufacturing firm the cost of assembly labour would be driven by the quantity of products manufactured as well as the number of parts in each product. In contrast, the cost of machine setup labour would be driven by the number of production runs. The cost of material-handling labour would be driven by material-related factors such as the quantity and cost of raw material used, the number of parts in various products and the number of raw material shipments received.

Hilton (1997:36) further states that in identifying a cost driver, the managerial accountant should consider the extent to which a cost or pool of costs varies in accordance with the cost driver. The higher the correlation between the

cost and the cost driver, the more accurate will be the resulting understanding of the cost behaviour. Another cost consideration is the cost of measuring the cost driver. Thus, there is a cost-benefit trade-off in the identification of cost drivers. As the number of cost drivers used in explaining an organisation's cost behaviour increases, the accuracy of the resulting information will increase. However, the cost of the information will also increase.

Analysing and identifying the resource and cost drivers is a crucial step in building a model for an ABC project. A general rule to follow in selecting resource and cost drivers is to pick drivers that will show a cause-and-effect relationship. After resource and cost drivers are determined, resources are allocated to the activity centres. Finally activities in activity centres are allocated to the products depending on the types of activities (Compton, 1996:21).

In the opinion of Zhu (1999:15), cost drivers have the most important roles in ABC systems. In order to link the resource costs to activities or link activity costs to product or service outputs, a cost driver has to be identified for each cost pool. The cost driver is a quantitative measure associated with the workload of the activity. It normally reflects the output of the activity. It should give a good explanation of the behaviour of costs in the pool and should be identifiable with each product line for the final stage of product costing.

Palmer (2000:3) states that costs are caused by activities. In some cases these add value, in some cases they do not. In many cases the value added

does not justify the cost. A key benefit of ABC, according to Palmer (2000:3), is that it helps to identify low value activities. Once the indirect costs are known and the cost drivers have been identified, the costs can be allocated across the units of production specified. This enables a fairer allocation of costs than many of the more conventional allocations based on headcount, revenue or space allocated. In particular it highlights the cost of complexity. Palmer (2000:3) states that every effort should be made to identify items where the cost of complexity is high and to remove them.

2.8.1 Categories of cost drivers

ABC systems designers must give careful consideration when selecting the activity cost drivers to reflect the extent to which cost objects consume activities. Kaplan and Atkinson (1998:15) and Cooper (1988:46) identified three categories of cost drivers which can be chosen in an ABC model: transaction drivers, duration drivers and intensity drivers. This is supported by Von Beck and Nowak (2000:2). The three categories of cost drivers are discussed below:

- Transaction drivers – these are the least expensive category of cost drivers because they reflect how many times an activity has been performed and are used when the activities are consumed in the same extent by cost objects (Cooper, 1988:46). Transaction drivers assume the same amount of a resource is used every time an activity is performed. Typical transaction drivers include the number of setups, number of receipts and orders. Data are usually available for these drivers, thus they are easy and inexpensive to apply in an ABC and simulation model (Von Beck & Nowak, 2000:2).

- Duration drivers – the use of transaction drivers causes a distortion into reported cost objects when the amount of activities required for different cost objects differs significantly from one cost object to another. In this case, duration drivers are the right choice, but more expensive to implement, since the model needs to track the period of time during which each activity is performed (Cooper, 1988:46). Duration drivers are slightly more expensive than transaction drivers to measure and record, but deliver more accurate results. Duration drivers are used when significant variation exists between the amount of an activity required for different cost objects. For example, some setups take 10 -15 minutes, while others take six hours. Use of the number of setups (a transaction driver) would distort the costs, as a 15-minute setup would cost the same as a six-hour setup. Setup time would be a better activity driver to use in this case (Von Beck & Nowak, 2000:3).
- Intensity drivers – these directly charge the resources used each time an activity is undertaken. These are the most accurate cost drivers, but at the same time, the most expensive. A model that uses intensity drivers has to have implemented a job order system to record all the resources used by an activity performed.

Kaplan and Atkinson (1998:16) propose a weighted index approach, which the ABC designers can use to stimulate an intensity driver. The approach consists of asking employees to evaluate the difficulty of performing the tasks for a product, a customer, a service or another cost object, on a 1-10 point scale. A standard cost object is assessed with a weight of 1 and at the other extreme, a very difficult cost object is graded with a weight of 10.

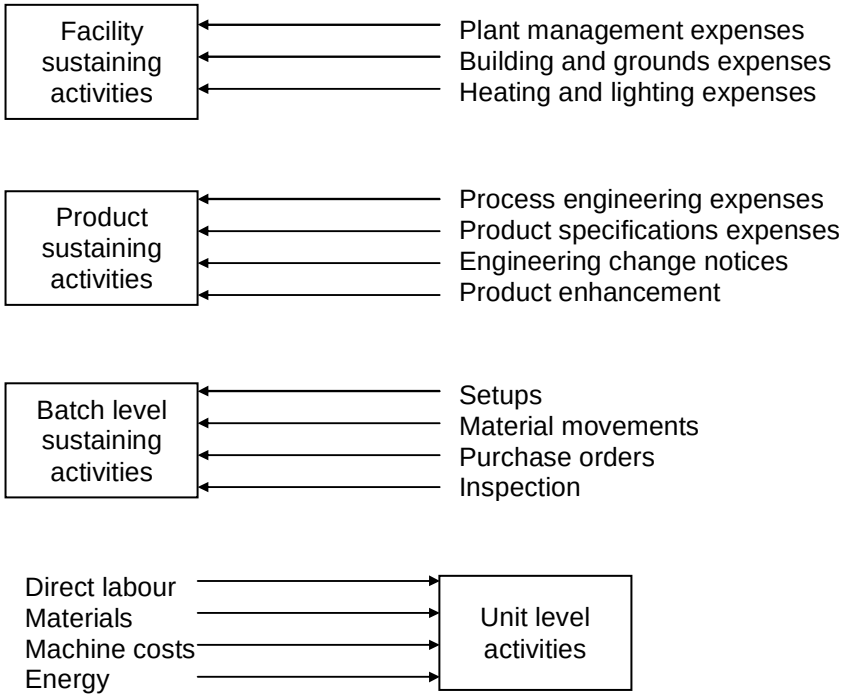
2.9 ACTIVITY HIERARCHY

When separating activities, a hierarchy occurs and activities are classified into:

- Unit-level activities: these are performed for each unit of product;
- Batch-level activities: these are undertaken every time a batch is produced;
- Product-sustaining activities; and
- Facility-sustaining activities (Figure 5).

As depicted in Figure 5, direct labour, materials, machine costs and energy are classified as unit-level costs, whereas the setups and purchase orders activities belong to the batch-level class. Maintaining engineering change notices or process engineering are product-sustaining activities. Plant management, buildings and grounds maintenance, heating and lighting are activities that sustain the factory (Cooper & Kaplan, 1991:18).

Figure 5: The hierarchy of factory operating expenses



Source: Cooper and Kaplan (1991:19).

2.10 SIMPLE ACTIVITY COST MODELS

According to Tarr (2001:4), there is no one way to proceed with improving the cost system. It should be approached as a continuous improvement project with the model being developed until the resulting incremental improvements no longer justify the additional development or data collection expense. In its simplest form ABC can be nothing more than separating a major cost element from the overhead pool and assigning it to cost objects based on some less arbitrary means than direct labour. Subsequent improvements could extract other cost pools, gradually subdividing the overhead pool into four, five or more pools and assigning the costs to products using a unique measure, or driver, for each cost pool. Models at this first level are called cost decomposition models. They primarily deconstruct the chart of account overhead cost pools to improve the product cost model. Activity cost models can help address the following issues:

- Improving individual product costs or costs of product families. This can lead to:
  - Improved pricing strategies;
  - Better and more informed product mix decisions;
  - Understanding how volume affects product costs; and
  - Limited predictive ability for the cost of future product strategies;
- Attaching below the line costs to the product cost model;
- Identifying process dysfunction and process improvement;
- Benchmarking; and
- Business process reengineering.

From an implementation point of view, the advantage of cost decomposition is that improvements in product cost, sometimes dramatic, can be made relatively quickly and with little analysis. Also, the data required to run the model is typically already available and being collected somewhere in the organisation. The ABC model can often be built using the existing general ledger (GL) package or spreadsheet software. Because of these factors, it is a relatively low cost, low risk strategy. This can be valuable in an environment where the value of ABC must be “proven” or in a pilot project where few resources are allocated or available to the project.

2.11 STEPS INVOLVED IN ACTIVITY-BASED COSTING DESIGN

Cooper and Kaplan (1992:25) state that ABC systems achieve product costs that are more accurate than those reported by using multiple cost drivers to trace the costs of the activities of a manufacturing process to the products that consume the resources used in those activities. 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:

- Aggregate the different activities;
- Report the cost of activities;
- Identify activity centres;
- Select first-stage cost drivers; and
- Select second-stage cost drivers.

2.11.1 Aggregating the different 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 (Cooper & Kaplan, 1992:26).

In this stage all the activities performed are identified. It is imperative to distinguish between activities and tasks that people perform. An activity is defined as a process having definite starting and end points; that which takes an input, adds some or the other value to it and converts them into outputs (Mohan & Patil, 2003:1).

2.11.2 Report the cost of activities

Once ABC systems 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 setup costs for product A of R12, an amount that includes both setup and material movement costs. Alternatively, the system might break the costs down and report a machine setup cost of R8 and a separate material movement cost of R4.

2.11.3 Identify 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 R100. Alternatively, this total could be broken down and reported as R60 for manufacturing and R40 for receiving (Cooper & Kaplan, 1992:27).

2.11.4 Select first-stage cost 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 monetary value traced to each pool and, therefore, the accuracy of reported costs (Cooper & Kaplan, 1992:27).

According to Zhu (1999:23), a first-stage driver is the cost driver used to differentiate the resource costs to a number of cost pools, each of which is based on a particular activity. First-stage drivers reflect how activities consume resource costs. Typical first-stage drivers and corresponding cost resources are illustrated in Table 6:

Table 6: Illustration of typical first-stage cost drivers

First-stage cost driver	Resource costs	Target activities
Square meterage	Occupancy (rent, leases, taxes, fire insurance)	Process department
No. of pay cheques	Payroll office	Process department
No. of employees	Personnel	Process department
No. of tools/dies	Tooling department	Process department
No. of inspections	Inspection	Process department

Source: Zhu (1999:23).

2.11.5 Select second-stage cost drivers

The second stage of the costing process consists of selecting activity cost drivers that link the cost objects to the performed activities consumed by individual cost objects. The purpose of this stage is to trace activity costs to cost objects and the way to reach the goal is to choose the appropriate activity cost 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 needs to achieve a desired level of accuracy (Cokins et al., 1993:16).

According to Zhu (1999:17), second-stage drivers are the measures of activity used to assign activity centre costs to products or customers. It is the second-stage driver that differentiates the ABC system from the traditional

costing systems. In the traditional cost system, second-stage drivers are usually direct labour hours, material in monetary value, machine hours, number of setups, number of purchase orders or some other measure of volume. In the ABC system, second-stage drivers can be the traditional drivers such as direct labour hours, machine hours, the number of setups, setup time or non-traditional drivers such as the number of inspections, the number of warehouse moves, the number of sales calls, or the number of customer orders. Second-stage drivers reflect how products or customers consume activity centre costs (Zhu, 1999:18).

To identify an appropriate cost driver for a certain activity cost pool is a difficult job. There could be several cost drivers to select for one activity. In order to identify the correct cost driver, the selected cost driver should be able to directly associate activities and products. For instance, maintenance and repair activity cost pools (including material cost, cost of parts replaced and upgrade cost etc.) could use either machine hours or job performing time as the cost driver. However, job performing time can only associate the activity with the specific equipment but not with a specific product whereas machine hours can associate products with the equipment directly. Thus, machine hours is an appropriate cost driver for allocating maintenance and repair activities (O'Guin, 1991:16).

2.12 ACTIVITY CENTRES

According to No and Kleiner (1997:69), ABC first assigns all costs to the major manufacturing or business processes called activity centres. This first stage assignment does not differ greatly from traditional systems. The ABC system's first-stage drivers usually are more rigorous and depend more

heavily on activity measures than traditional systems. From these activity centres, the system assigns these costs to products. It is the second-stage drivers (the truly distinguishing feature of the ABC system) that separate it from the traditional cost system.

The ABC system recognises that many costs are not proportional to the number of batches processed. As such, the ABC system assigns costs to batches of parts. In addition, some costs, such as design engineering, are not related to units or even batches, but to entire products. Therefore, some costs are assigned to products. These activity centres come in two groups: product-driven centres where costs are assigned to products, and customer-driven activity centres. In this way, ABC identifies the costs of serving different customers and groups of customers. However, design-engineering costs are not always the product level overheads. For instance, some “hot products” produced directly by the design group would account for the costs that are allocated from the certain special build activity to unit product level. In this case, design engineering has a special build activity related at the unit level cost (Turney, 1988:23).

The activity centres are either homogeneous processes like punch press, machining, or assembly, or a business process like procurement, distribution, or marketing. In either case, a product or customer directly consumes the activity centre’s costs. A punch press part consumes an operator and his machine time. Likewise, a pallet of steel bars (part of the product) consumes purchasing time and effort (Turney, 1988:23).

2.13 DETERMINING ACTIVITY COSTS

According to Zhu (1999:16), there are five activities that need to occur in order to determine activity costs. These are: analyse activities; gather costs; trace costs to activities; establish output measures; and analyse costs. This process can take anywhere from a few days to a few months, depending on the level of detail, the complexity of an organisation's processes, and commitment of team resources.

2.13.1 Analyse activities

When an activity is identified in a process flow or activity model, it represents all of the effort that it takes to perform the identified task. It can be subdivided into subordinate activities, which will enhance detailed understanding and further define the work done to complete this task.

The activity interacts with other activities in the process flow and activity model. It processes inputs (materials or information) from other activities or outside the organisation and has outputs (products or information), which are used by other activities or the ultimate customer (Business Review, 2002:5).

A determination is then made whether an activity is value or non-value added; also whether the activity is primary or secondary, and required or not needed. Value-added is determined if the output of the activity is directly related to customer requirements, service or product, as opposed to an administrative or logistical outcome that services the providing organisation. For instance, if the output of an activity were an inventory report or update for products (for which there are customers), the output would be non-value

added, but necessary to the organisation, i.e. “overhead.” A major goal of re-engineering is to reduce non-value added activities and eliminate those that are not necessary. Primary activities directly support the organisation’s mission while secondary activities support primary activities. Required activities are those that must always be performed while discretionary activities are performed only when allowed by the operating management (Zhu, 1999:16).

2.13.2 Gather costs

In this step costs are gathered for the activity producing the products or services provided as the outcome. These costs can be salaries, expenditures for research, machinery and office furniture. These costs are used as the baseline activity costs. When documents for the costs incurred are not available, cost assignment formulas may be used (Zhu, 1999:17).

2.13.3 Trace costs to activities

In this step the results of analysing activities and the gathered organisational inputs and costs are brought together, which produces the total input cost for each activity. A simple formula for costs is provided; outputs consume activities that in turn have consumed costs associated with resources. This leads to a simple method to calculate total costs consumed by an activity: multiply the percent of time expended by an organisational unit, e.g. branch or division, on each activity by the total input cost for that entity. Here we are not calculating costs, just finding where they come from (Zhu, 1999:17).

2.13.4 Establish output measures

In this step the actual activity unit cost is calculated. Even though activities may have multiple outputs, only one is identified as the primary output. Activity unit cost is calculated by dividing the total input cost, including assigned costs from secondary activities, by the primary activity output volume: the primary output must be measurable and its volume or quantity obtainable. From this, a bill of activities can then be calculated which contains or lists a set of activities and the amount of each activity consumed. The amount of each activity consumed is extended by the activity unit cost and is added up as a total cost for the bill of activity (Zhu, 1999:18).

2.13.5 Analyse costs

In the final step, the calculated activity unit costs and bills of activity are used to identify candidates for improving the business processes. Managers can use the information by stratifying, for a Pareto analysis, the activity costs and identifying a certain percentage of activities that consume the majority of costs. The factor to keep in mind is that the identification of non-value added activities occurs through this process with a clarity that allows us to eliminate them, and at the same time permits the product or service to be provided to the customer with greater efficiency (Zhu, 1999,18).

2.14 AN EXAMPLE OF ABSORPTION-BASED COSTING VS ACTIVITY-BASED COSTING

Suppose that a company manufactures four products: A, B, C and D. Output and cost data for the period ended 30 September 2003 are as follows:

Table 7: Output and cost data of four different products

Product	Output units	Number of production runs in the period	Material cost per unit	Direct labour hours per unit	Machine hours per unit
A	15	2	50	1	1
B	15	3	60	2	2
C	65	5	40	1	1
D	85	5	90	3	3

Source: Author's own construction (2004).

The direct labour costs per hour are R50,00.

Overhead costs	Rands
Short run variable costs	15 100
Setup costs	100 000
Scheduling costs	85 000
Material and handling costs	70 000
	270 100

Source: Author's own construction (2004).

Using a conventional absorption costing approach and an absorption rate for overheads based on either direct labour hours or machine hours, the product costs would be as follows:

Table 8: Product costs using conventional absorption costing

Product	A	B	C	D	Total
Direct material	750	900	2 600	7 650	11 900
Direct labour *	750	1 500	3 250	12 750	18 250
Overheads *	11 100	22 200	48 100	188 700	270 100
Total	**12 600**	**24 600**	**53 950**	**209 100**	**300 250**
Units produced	15	15	65	85	
Cost per unit	852	1 640	830	2460	

Source: Authors own construction (2004).

Direct labour = output units $\times$ direct labour costs per hour 5

* Machine hours $= \frac{\text{Total direct labour}}{\text{Hourly labour rate}}$ 6

$= \frac{18\ 250}{50}$

$= 365$

* Direct labour or machine hour $= \frac{\text{Total overheads}}{\text{Total hours}}$ 7

$= \frac{270\ 100}{365}$

$= \text{R}740$

* Overhead costs per product

$= \frac{\text{Direct labour hours} \times \text{output units} \times \text{direct labour}}{\text{Hours per unit}}$ 8

Source: BBP Publishing (2000:147).

Using ABC and assuming that the number of production runs is the cost driver for setup costs, expediting and scheduling costs and that machine hours are the cost driver for short-run variable costs, unit costs would be as follows:

Table 9: Calculation of unit costs

Product	A	B	C	D	Total
Direct material	750	900	2 600	7 650	11 900
Direct labour	750	1 500	3 250	12 750	18 250
Short-run variable overheads (W2)	620,55	1 241,10	2 689,05	10 549,30	15 100
Setup costs (W3)	13 333,30	20 000,00	33 333,35	33 333,35	100 000
Expediting, scheduling costs (W4)	11 333,30	17 000,00	28 333,35	28 333,35	85 000
Material handling costs (W5)	9 333,30	14 000,00	23 333,35	23 333,35	70 000
Total	**36 120,45**	**54 641,10**	**93 539,10**	**115 949,35**	**300 250**
Units produced	15	15	65	85	
Cost per unit	2 408,03	3 642,74	1 439,06	1 364,11	

Source: Authors own construction (2004).

Workings

W1 $$\text{Machine hours} = \frac{\text{Total direct labour}}{\text{Hourly labour rate}}$$

$$= \frac{18\ 250}{50}$$
$$= 365$$

W2 $$= \frac{\text{R15 100}}{\text{365 machine hours}}$$

= R41,37 per machine hour

W3 $$= \frac{\text{R100 000}}{\text{15 production runs}}$$

= R6 666,67 per run

$$W4 = \frac{R85\ 000}{15 \text{ production runs}}$$

= R5 666,67 per run

$$W5 = \frac{R70\ 000}{15 \text{ production runs}}$$

= R4 666,67 per run

Table 10: Comparing traditional unit costs calculations with ABC unit costs calculations

Product	Traditional unit cost	ABC unit cost	Difference per unit	Difference in total
	R	R	R	R
A	852	2 408,03	+1 556,03	+23 340,45
B	1 640	3 642,74	+2 002,74	+30 041,10
C	830	1 439,06	+ 609,06	+39 588,90
D	2 460	1 364,11	-1 095,89	-93 150,65

Source: Authors own construction (2004).

The abovementioned figures suggest that traditional volume-based absorption costing is flawed due to the following:

- It under-allocates overhead costs to low-volume products (A & B) and over-allocates costs to high-volume products (D); and
- It under-allocates overhead costs to smaller sized products (A & C with just one hour of work needed per unit) and over-allocates overheads to larger products (B & D).

2.15 WHY ABC IS IMPORTANT

According to Activity-Based Cost Accounting for Operational Readiness (2002:1), ABC is a cost accounting methodology that can provide definitions of processes, identify what the cost drivers of those processes are, determine the unit costs of various products and services, and create various reports on agency components that can be utilised to generate activity- or performance-based budgets.

A major advantage of using ABC is that it avoids or minimises distortions in product costing that result from arbitrary allocations of indirect costs. Unlike more traditional line item budgets, which cannot be tied to specific outputs, ABC generates useful information on how money is being spent, whether a department is being cost-effective, and how to benchmark (or compare oneself against others) for quality improvements (Activity-Based Cost Accounting for Operational Readiness, 2002:1).

ABC also provides a clear metric for improvement. It encourages management to evaluate the efficiency and cost-effectiveness of programme activities. Some ABC systems rank activities by the degree to which they add value to the organisation or its outputs. This helps managers identify what activities are really value-added; those that will best accomplish a mission, deliver a service, or meet customer demand, thus improving decision-making through better information, and helping to eliminate waste by encouraging employees to look at all costs. That is why an essential aspect of any ABC endeavour is to get a clear picture of the activities a business area performs. When employees understand the activities they

perform, they can better understand the costs involved (Activity-Based Cost Accounting for Operational Readiness, 2002:2).

The ABC system uses cost drivers to assign the costs of resources to activities. ABC can use unit cost as a way of measuring an output. Unit cost is simply the "average total cost" of producing one unit of output. It is calculated by dividing the total cost of production by the total number of units of output produced (Activity- Based Cost Accounting for Operational Readiness, 2002:2).

Maskell (1991:366) states that ABC seeks to address some of the shortcomings of traditional management accounting, in particular the following:

- Traditional management accounting is driven by the needs of financial accounts (specifically the need to value inventory) and does not address the development of meaningful cost information for other purposes.
- Labour costs now form a small part of the total product costs for most manufacturing companies, yet labour costs are still the most popular method of allocating overheads to products through the production process. Some companies use other allocation factors and introduce significant distortions into the product costing results.
- As the marketplace becomes more competitive and production processes more complex and technologically sophisticated, a clearer understanding is needed of the source of product costs. Using only the traditional elements of material, labour, outside process and overhead burdens is no longer

meaningful. Being able to understand where costs are coming from and what activities generate these costs are not of prime importance.

Hardy and Hubbard (1992:12) state that ABC seeks to address some of the shortcomings of traditional management accounting. In particular:

- It provides a more accurate method to calculate costs absorption by activities and products;
- ABC is a better decision support system, by providing better product cost information and by allowing transparency in monitoring cost behaviour;
- ABC aims at finding a causal relationship between cost objects and the costs incurred;
- ABC offers better information for cost-based pricing, product mix and make-or-buy decisions; and
- ABC can be used for inventory valuation for financial statement purposes.

2.16 LIMITATIONS OF ABC

According to BBP Publishing (2000:146), ABC has some serious flaws and concern is now growing that ABC is seen by many as a panacea for management accounting ills, despite that fact that its suitability for all environments remains unproven:

- The cost of obtaining and interpreting the new information may be considerable. ABC should not be introduced unless it can provide additional information for management to use in planning or controlling decisions;

- Some arbitrary cost apportionment may still be required at the cost pooling stage for items like rent, rates and building depreciation. If an ABC system has many cost pools , the amount of cost apportionment needed may be greater than ever;
- Many overheads relate neither to volume nor to complexity. The ability of a single cost driver to fully explain the cost behaviour of all items in its associated pool is questionable;
- There will have to be a trade-off between accuracy, the number of cost drivers and complexity; and
- ABC tends to burden low-volume (new) products with a punitive level of overhead costs and hence threatens opportunities for successful innovation if it is used without due care.

2.17 SUMMARY

Chapter 2 consists of a literature survey discussing how ABC was developed, traditional cost accounting principles, ABC accounting principles as well as developing an ABC model to compare to traditional cost accounting. This chapter discusses the shortcomings of traditional cost accounting methods and how ABC provides for more accurate product costing.

The major advantages of ABC are discussed and illustrative examples are given proving that ABC is a more accurate product costing system. The mechanics of ABC as well as the components of ABC are discussed.

This chapter also discusses how to identify the cost drivers, the classification of cost drivers and determining activity costs. It provides an illustrative example by comparing traditional costing with ABC.

The chapter finally discusses the importance of ABC as well as the limitations thereof.

Chapter 3 will discuss how to implement an ABC system.

CHAPTER 3

IMPLEMENTING AN ACTIVITY- BASED COSTING SYSTEM

3.1 THE RATIONALE TO IMPLEMENT ABC

According to Rafiq and Garg (2002:1), ABC must not be considered as the ubiquitous panacea. It is and always will be simply data communicating the rate at which resources are being consumed and how they are being consumed. ABC has significantly improved on the deficiencies of traditional product costing techniques caused by the misallocation of overhead costs. As such, ABC may be thought of as the highest evolution of cost accounting to date. ABC simply provides improved data to the business in financial metric form; how this is used for business and strategic policy-making is solely under the control of management and the business.

ABC can be implemented by businesses for a variety of reasons – some more innovative than others. Rafiq and Garg (2002:2) believe that ABC can have three primary uses:

- As a tool to aid strategic decision-making;
- As a lens into the business process, allowing resources to be more efficiently allocated and to enable cost-reduction; and
- As an allocation mechanism: transfer pricing internal and external to the organisation.

The use of ABC as tool for strategic decision-making or cost reduction has been well documented in the ABC literature. ABC acts as an enabler for

management to make decisions from an informed and objective basis. It can illuminate the path of corporate decision-making. If undertaken thoughtfully, the significance of this can be immense. Like a powerful flashlight, ABC provides information that allows vastly improved insight into the potential impact of decisions and structural business issues.

3.2 IMPLEMENTATION

A joint study by Cooper and Kaplan (1992:23) identified four primary steps for designing and building an organisation's activity-based cost model:

1. Identify and analyse activities performed
2. Trace the usage of organisational resources to these activities
3. Define the outputs produced
4. Link the activity costs to the outputs

3.2.1 Identify and analyse activities performed

According to La Londe and Ginter (2000:9), this is the planning phase for the ABC system where the needs of the organisation are established. People who have a strong understanding of the operations of the business – finance department, engineers, logistics and operations people – should be involved. A multi-functional team is more productive than just working with a finance staff. In this stage the company's critical issues and difficult decisions are assessed. Senior management buy-in is essential for a successful implementation of the ABC system. Accuracy and adequacy of the existing cost system are assessed. Two factors – the organisation's culture and current approach to financial management – are critical success factors and an essential part of the design process.

In the first step of developing an ABC system, the organisation identifies the set of activities being performed by its indirect and support resources. According to the ABC Guidebook (1995:2), the name, “Activity-Based Costing” implies that the managerial cost data cannot be applied until the activities are defined for the organisation model or the selected portion of the organisation under review by the project team. The creation of the activity model is not traditionally considered as an integral part of the activity accounting structure, but cost allocation cannot take place without it, hence it is the first step, and therefore, necessary knowledge to the activity accountant.

The ABC Guidebook (1995:2) further states that when an activity is identified in a process flow or activity model, it represents all of the effort that it takes to perform the identified task. It can be subdivided into subordinate activities, which will enhance detailed understanding and further define the work done to complete this task. The activity interacts with other activities in the process flow and activity model. It processes inputs (materials or information) from other activities or outside the organisation and has outputs (products or information), which are used by other activities or the ultimate customer. Outputs are produced using resources (mechanisms) within designated restrictions (controls and standards). Restated, an activity is the transformation of inputs into outputs performed by mechanisms under the constraints set by controls.

Activities are described by verbs and associated objects: schedule production, purchase materials, inspect items, and so on. The identification

of activities culminates with the construction of an activity dictionary that lists and defines all the major activities performed in the organisation. By focusing on the custom-designed activities, the ABC system provides periodical reports that are more informative than those produced from the natural accounts in the general ledger. For instance, in the traditional view, salaries are incurred. However, in the ABC view, there are obviously salaries involved in the activities, such as administering the department, or processing special orders. The emphasis, however, is on the dynamic nature of the action, not on the passive incurrence of the journal entry, salaries. The ABC method helps to explain how and why the cost is incurred, rather than just how much is incurred (ABC Guidebook, 1995:3).

Activities are identified by carrying out an activity analysis. Innes and Mitchell (1992:45) suggest that a useful starting point is to examine a physical plan of the workplace (to identify how all work space is being used) and the payroll listings (to ensure all relevant personnel have been taken into account). This examination normally has to be supplemented by a series of interviews with the staff involved, or having staff complete a time sheet for a specific time period explaining how their time is spent. Interviewers will ask managers and employees questions such as which staff works at the location and what tasks are performed by the persons employed at the location. Many detailed tasks are likely to be identified in the first instance, but after further interviews, the main activities will emerge.

The activities chosen should be at a reasonable level of aggregation based on costs versus benefits criteria. For example, rather than classifying

purchasing of materials as an activity, each of its constituent tasks could be classified as separate activities. However, this level of decomposition would involve the collection of a vast amount of data and is likely to be too costly for product costing purposes. Alternatively, the purchasing activity might be merged with the materials receiving, storage and issuing activities to form a single materials procurement and handling activity.

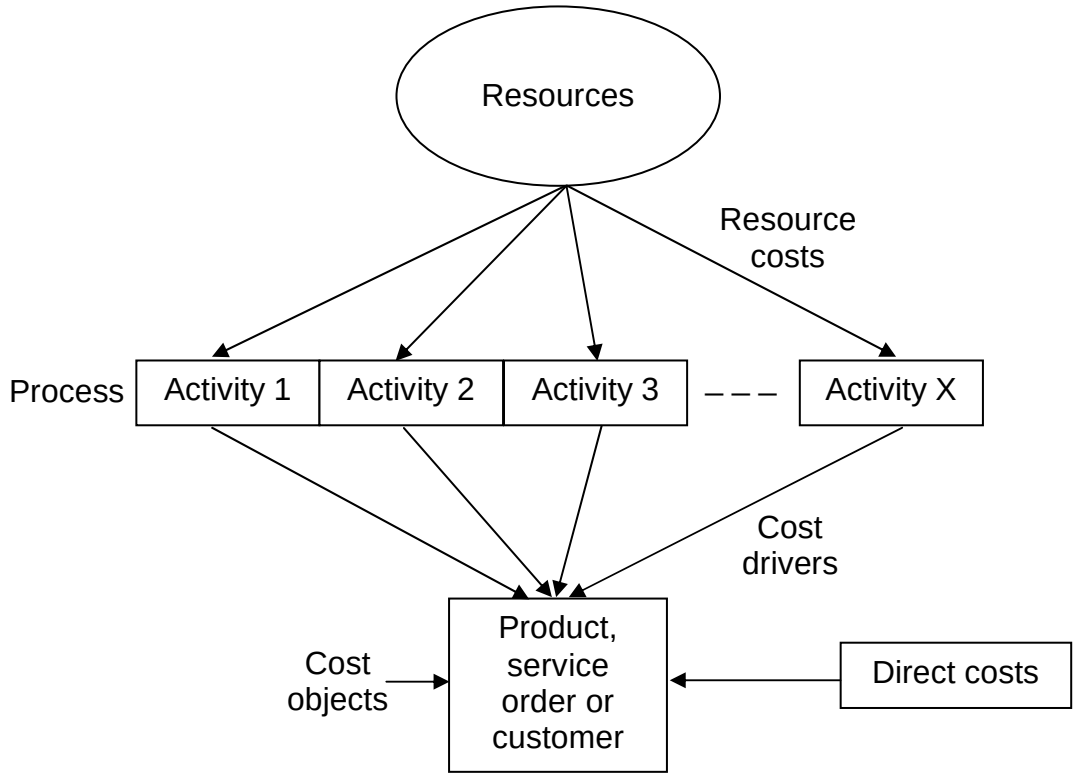
This is likely to represent too high a level of aggregation because a single cost driver is unlikely to provide a satisfactory determinant of the cost of the activity. For example, selecting the number of purchase orders as a cost driver may provide a good explanation of purchasing costs but may be entirely inappropriate for explaining costs relating to receiving and issuing. Therefore, instead of establishing materials procurement and handling as a single activity, it may be preferable to decompose it into three separate activities; namely purchasing, receiving and issuing activities and establish separate cost drivers for each activity (Innes & Mitchell, 1992:46).

Activity dictionaries can be relatively brief, for instance 10-30 activities, especially where the prime focus of the ABC system is to estimate product and customer costs. In other applications, ABC systems continue to be built with hundreds of activities. Typically, such highly detailed systems have been constructed to serve as the foundation for process improvement and process redesign efforts. The number of activities, therefore, is a function of the purpose of the model and the size and complexity of the organisational unit being studied (Innes & Mitchell, 1992:45).

3.2.2 Trace the usage of organisational resources to these activities

According to Cooper and Kaplan (1992:26), a resource usage driver should be used to trace resource costs to activities and a cost driver should be used to trace activity costs to individual customers or customer groups. Cost drivers should be chosen because the activity cost that they represent tends to increase when they increase (Figure 6).

Figure 6: ABC Model



Source: Cooper & Kaplan (1992:26).

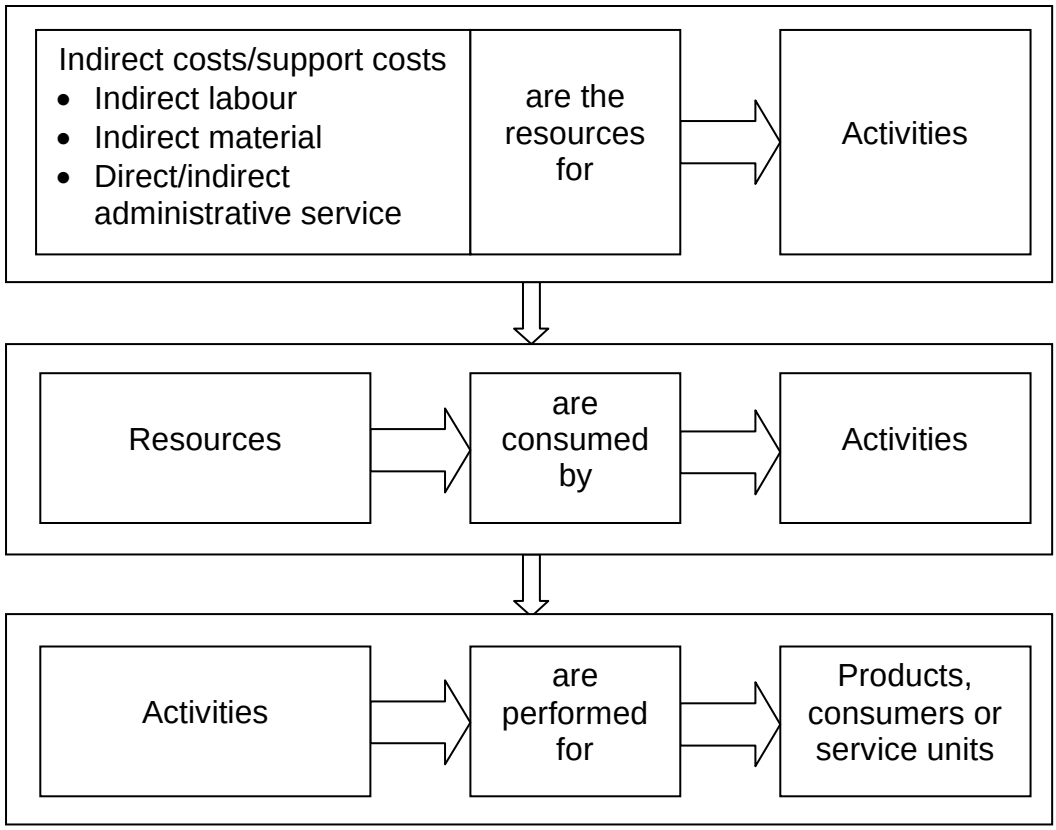
According to the ABC Guidebook (1995:3), the costs should be gathered and allocated within the organisation at the lowest possible structural layer. This will normally be the smallest element that has an assigned manager, whether it is a team, unit, or branch. Where there are multiple teams or units with similar missions within a single branch or element, it is not necessary to

differentiate, since the functions performed are more important than the organisational components. Having all of the costs as the lowest level greatly facilitates translation from the organisation to the activity model. If costs are at too high a level, it will be harder to subdivide costs by functions. Costs are usually allocated based on interviews with managers on the functions. Estimates become more reliable when managers are closer to the actual work.

Though it may not always be practical or possible, the objective is to align cost data at the lowest organisational element. If this cannot be accomplished, it will lead to more difficulty later in the process when costs are allocated in the activity model.

Spending and expenses, as captured in the organisation's financial or general ledger system, are linked to the activities performed. The philosophy of the procedure is showed in Figure 7.

Figure 7: Activity-based costing philosophy



Source: Lewis (1995:124).

In fact, this procedure does not really differ substantially from that done by a standard costing system. The main difference is that standard costing systems drive indirect expenses only to other responsibility centres, typically production cost centres. ABC systems can also drive expenses to production cost centres where the activity is part of the actual product conversion process. But, in addition, the ABC system drives operating expenses to activities that are not directly involved in converting materials into intermediate and finished products, i.e. setup machines, schedule production runs (Lewis, 1995:125).

After the activities have been identified the cost of resources consumed over a specified period must be assigned to each activity. The aim is to determine

how much the organisation is spending on each of its activities. Many of the resources will be directly attributable to specific activity centres but others (such as labour and lighting and heating costs) may be indirect and jointly shared by several activities. These costs should be assigned to activities on the basis of cause-and-effect cost drivers, or interviews with staff that can provide reasonable estimates of the resources consumed by different activities (Lewis, 1995:126).

Arbitrary allocations should not be used. The greater the amount of costs traced to activity centres by cost apportionments at this stage, the more arbitrary and less reliable will be the product cost information generated by ABC systems. Cause-and-effect cost drivers used at this stage to allocate shared resources to individual activities are called resource cost drivers (Lewis, 1995:126).

3.2.3 Define the outputs produced

The outputs in the ABC system are the cost objects, such as products, customers, territories, services or special projects. In this step, outputs with distinct, identifiable activities must be carefully specified. If the activities are ambiguous, the assignment of resource costs to activities will be inaccurate. All outputs must be identified so that the total activity costs will be accounted for and not charged to the wrong output.

3.2.4 Link the activity costs to the outputs

An activity-cost driver is a quantitative measure of the output of an activity and it links activity costs to cost objects. There are three ways to link activity

costs to the outputs: direct charge, estimation and arbitrary allocation. In manufacturing processes, only direct material and direct labour are charged directly to the product. According to Cooper and Kaplan (1991:39), a variety of coding schemes is used in designing the ABC system in order to summarise the classes of activities. Activity attribute is the name of concept coding schemes that facilitate reporting of activity costs. Consider an activity dictionary with 100 activities. Activity attributes enable the activity cost information to be reported at higher levels of aggregation than tabulating or charting data for 100 individual activities. Three types of activity attributes are most common: cost hierarchy, business process and value-added vs non-value-added.

According to Cooper (1990:35), business activities can be classified along an important cost hierarchy dimension. Most common are unit, batch, product sustaining and customer-sustaining activities as indicated below:

- Unit-level activities are the activities that have to be performed for every unit of product or service produced. The quantity of unit-level activities is proportional to production and sales volumes, i.e. inspection.
- Batch-level activities are the activities that have to be performed for each batch or setup of work performed. Batch activities include setting up a machine for a new production run, purchasing materials and processing a customer order.
- Product-sustaining activities are performed to enable the production of individual products or services, i.e. maintaining and updating product specifications.

- Extending this notion outside the factory leads to customer-sustaining activities. These activities enable the company to sell to an individual customer but are independent of the volume and the mix of the products and services sold and delivered to the customer, i.e. technical support provided to serve individual customers (Cooper, 1990:35).

3.3 IMPROVED FINANCIAL PERFORMANCE

According to Rafiq and Garg (2002:2), the purpose of management is to improve financial performance and there is growing academic evidence that links ABC adoption with improved financial performance. Although none of these have focused exclusively on financial services companies, they are indicative of a general hypothesis that a positive relationship exists between improved financial performance and ABC adoption. Two examples of reputable case studies and statistical evidence that demonstrate this are as follows:

- In a review of the potential of ABC published in the Harvard Business Review, Ness and Cucuzza (1995:14), in examining the experience of Chrysler and Safety-Kleen implementing ABC, found that the cost savings were significant – from 10 to 20 times the cost of the ABC implementation.
- In a study of 205 large corporations, Cagwin and Bauwman (2000:27) found that there was a statistically significant robust relationship between ABC and financial performance as measured by three- and five-year returns on investment (ROI). Further synergies were found when ABC was used in conjunction with other initiatives such as just-in-time management (JIT).

3.4 EFFECTIVE SPONSORSHIP

Effective sponsorship is a prerequisite for any ABC initiative to be a success. Whoever sponsors the initiative, and his/her position within the organisation, will have a significant bearing on the rationale behind the initiative and its ultimate success. The sponsor and where he or she is within the organisation will largely determine the use of ABC. A survey by BusinessFinanceMag found that two-thirds of organisations said that for senior management to buy-in, resource constraints and time constraints were the biggest obstacles to global deployment of ABC – illustrating that organisational dynamics are the still the main factor in the success or failure of a project. In the financial services industry this demarcation is clear to see – the front office predominates against the middle and back offices (including finance and accounting) simply because they are the revenue earners (Rafiq & Garg, 2002:3).

Rafiq and Garg (2002:3) have found that if an initiative is sponsored by the front office, it is more likely to be strategic in nature, whereas if it is sponsored from the middle or back offices, it is more likely to focus on resource allocation or cost cutting. Empirical insight is provided by a survey of 385 corporations using ABC. The survey found that two-thirds of sponsors were at the director level or higher, indicating that ABC is considered an important business tool. Furthermore, just over half (53%) of ABC efforts were sponsored by finance or accounting. Operations, engineering or other corporate functional areas were responsible for sponsoring the remaining efforts. Sponsorship of ABC efforts has moved beyond accounting and

finance to become embedded in the operations of many companies (BusinessFinanceMag.com, 1998:8).

3.5 COSMETIC CHANGES OR CULTURAL EVOLUTION

According to Rafiq and Garg (2002:4), the message employees perceive will impact on the credibility of the initiative and the ABC model since employees are typically responsible for feeding information to the ABC model. The level of sponsorship could mean that employees perceive implementation of ABC in one of two ways:

- ABC is perceived as a “cosmetic” change in the way that they do their everyday work. There are no fundamental shifts in the way they perceive the nature of their work and accountability with respect to efficiency and productivity. Filling time sheets is just another task in their list of activities for the day; or
- ABC engenders a “cultural” evolution in the business place. Employees are better able to relate their activities within a business value chain. They are able to conceptualise their input and their role within the bigger picture. In addition, through time tracking, accountability and productivity are highlighted and are used to benchmark the performance of employees. Quantitative rather than qualitative assessment is possible through activity-based management (ABM) measures and benchmarks.

For ABC to be successful and to produce any meaningful results, employees must be made to embrace ABC and be held accountable. Effective sponsorship and how the rationale for ABC adoption is communicated to

employees are important. If these do not occur, ABC will be nothing but a house built on sand.

3.6 PRACTICAL DETERMINATIONS OF THE ABC MODEL

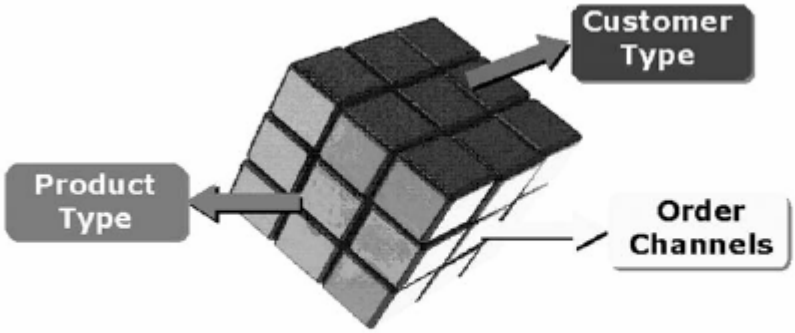
ABC will only produce relevant data if that is how it is structured. The question that must therefore be answered before implementing ABC is: What does a firm wish to understand and how does it view its business? From an economic and a business perspective this means understanding the business and its "drivers." Fundamental also is to identify those factors that cause a variation in cost per transaction unit – the "deltas." Identifying and understanding these "deltas" will essentially determine the business views that need to be analysed by the ABC process and will provide management with useful information (Rafiq & Garg, 2002:5).

Rafiq and Garg (2002:5) further state that in viewing the business, ABC can provide "double click" functionality. That is, a business may be viewed at a very high summary level or a more detailed level. For example, ABC may produce data from an aggregate customer perspective, or could be drilled down into more detail for a particular type of customer, or to a particular customer itself. However, which perspective or view of the business is required must be determined to a certain extent initially. Is it important to analyse the business only from a customer, product or order channel perspective? Or are they all important?

ABC provides the means to have a multi-faceted view of the business from a cost and measurement basis. This concept can be explained well by using the analogy of a Rubik's cube. Think of the business in terms of a Rubik's

cube with each side representing a unique view of the business (as shown in Figure 8 below). Rotating the pieces in the cube allows one to see the business from a multi-dimensional perspective. Although the cube represents only a three-dimensional view of the business, ABC can incorporate as many views as are deemed meaningful. Defining these views usually is an iterative activity between the various project stakeholders but this must begin before the model setup and build.

Figure 8: Multifaceted view of business

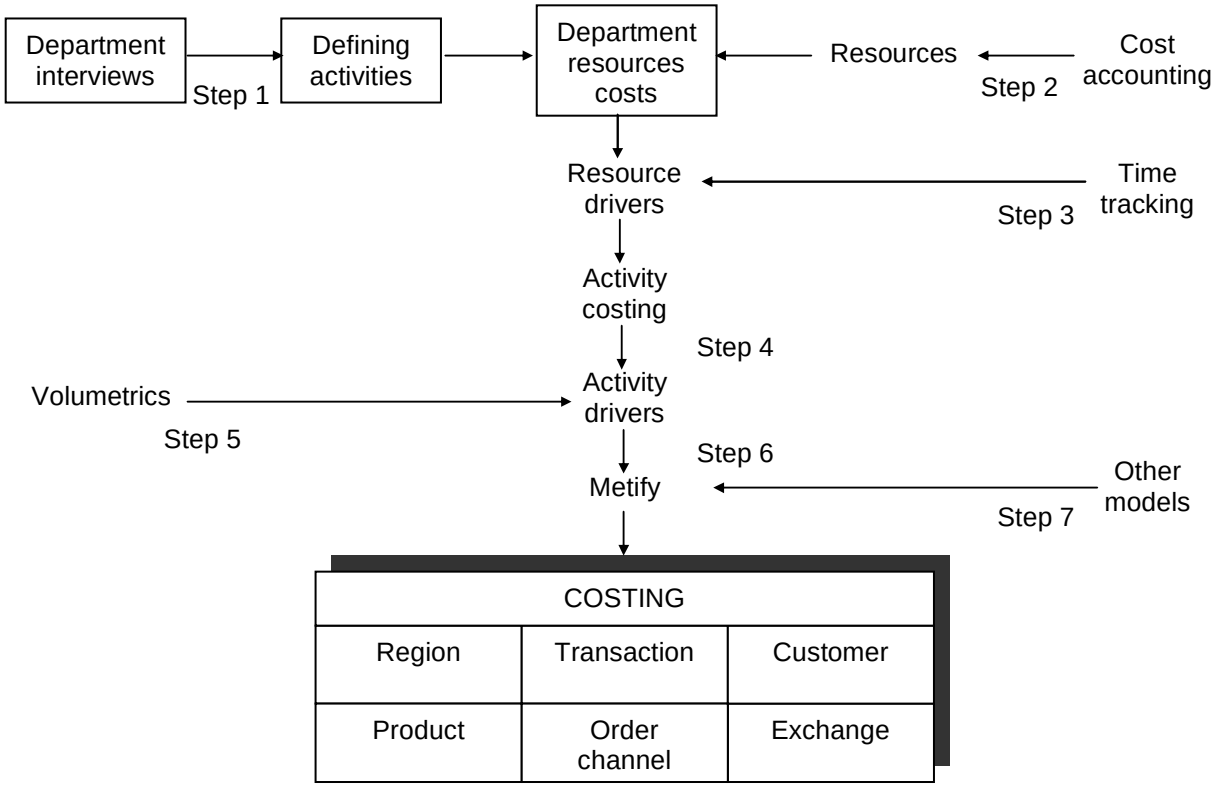


Source: Rafiq and Garg (2002:5).

3.7 IMPLEMENTATION STEPS

Rafiq and Garg (2002:7) have developed a framework for ABC implementation, encapsulated in an eight-step methodology. The framework illustrates the various steps that may be involved in ABC implementation and the author discusses below the component parts and the various issues that may arise in ABC implementation.

Figure 9: Framework for ABC implementation



Source: Rafiq and Garg (2002:7).

3.7.1 Department interviews

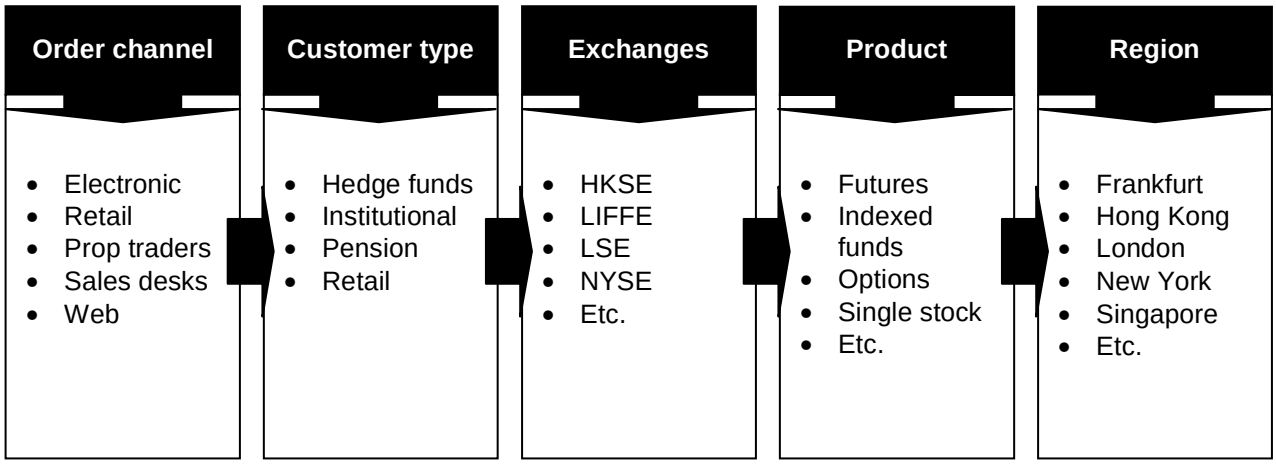
According to Compton (1996:20), a vital component of the ABC implementation is identifying the information requirements of its users. Each phase of information gathering should include a member of the implementation team and the user. The requirements of the system and the information needed should be explored. Questions each user should attempt to answer include the following: "What key decisions must I make, and how often do they arise? What other cost information would be useful in carrying out my responsibilities?" Documentation and note-taking of reviews of records, observations, interviews, questionnaires and interfaces with the

existing information systems are some of the techniques that can be used in this step.

According to Rafiq and Garg (2002:8), performing the interviews to capture department activities is fundamental not only for determining the relevant views of the business, but also in defining activities for time tracking. The definition of these activities is the bedrock of all subsequent analysis: activities defined and chosen should be a parsimonious representation of the business process. The deliverables from the interviews should be a provisional list of activities identified and documented.

Rafiq and Garg (2002:8) state that it is wise at this point to pay heed to the "5% rule" which states that if any activity does not account for 5% or more of each department's time, then it should probably be aggregated with another activity. This is to prevent the unnecessary proliferation of activities, a list of activities so long that little meaningful analysis can be done and no conclusions reached. The final deliverable of the interviews should be defining the relevant business dimensions of the business that are to be captured. Rafiq and Garg (2002:8) found it to be immensely useful to graphically illustrate each dimension and its various elements in isolation as shown in the graphic below. The graphic below shows the business views that may be relevant in the equity brokerage business, but which can be adapted to suit the needs of any type of business.

Figure 10: Business views relevant in equity brokerage business



Source: Rafiq and Garg (2002:7).

3.7.2 Cost accounting

Pettigrew (1998:2) states that cost accounting is a set of analytical techniques for better informed decision-making in order to encourage efficiency and innovation and to enhance economic, environmental and social goals. These techniques include benefit/cost analysis, economic impact analysis, fiscal analysis and cost effectiveness analysis. Benefits of using full cost accounting include: benefits and costs of projects, policies and programmes are better understood; politically sensitive issues tend to be put into perspective; and stakeholders' interests are placed on a level playing field. Even initial steps to implement full cost accounting will provide a better understanding of the relationships between the benefits and costs of projects, policies and programmes, including resources that may be lost as a result of their implementation.

Rafiq and Garg (2002:8) state that the cost accounting analysis, an often under-estimated cog in the overall process, can be a very time-intensive process. To maintain consistency within the components of the cost accounting information, cost information is usually extracted from the general ledger and this should always be the preferred approach. It was found that this is one of the most crucial times of the initiative – getting the wrong number or failing to understand the costing information will have serious repercussions further down the process. It is common to find that the costing information is fairly substantial and the level of detail running to account and sub-account level can very well be in excess of 500 separate and unique items.

Further, Rafiq and Garg (2002:8) found that drilling down into the cost items pays huge dividends when constructing the model within the ABC system for accurate allocation.

3.7.3 Time tracking system

Implementing time tracking in a business that has never done this before poses certain challenges. From an implementation perspective it does not have to be a very daunting exercise. The key issues that have been identified by Rafiq and Garg (2002:9) are as follows:

- Selecting the appropriate system: The marketplace has a variety of solutions. Some are stand-alone systems whilst some come with ABC software packages. Of key importance here is the ability of the time tracking system to interface data with other systems.

- Configuring the system appropriately: Once the time tracking system is up, individuals may have to record their time to activities that are relevant to them on a daily/weekly basis. To ensure compliance, managers can be made responsible for reviewing and approving timesheets for all personnel within their departments. Systems can be set up to notify managers when individuals in their departments have failed to track or approve their time.
- Roll-out of the system: Most time tracking systems are fairly intuitive. Rollouts across a business unit need not take more than a week with sessions on how to use the system being carried out across departments. It is ideal to have a pilot period for at least 2-4 weeks whilst bugs are ironed out of the system, personnel become used to the system and activities are adequately refined (added or deleted).

3.7.4 Activity costing

With the data from time tracking and department budgets, each activity can be costed appropriately. This provides an immediate benefit to the management of the group from a business process reengineering perspective. The business can now be analysed from a process perspective. Managers can now see how time is being spent, whether it is on value added or non-value added activities and some initial insource versus outsource decisions can also be made (Rafiq & Garg, 2002:9).

Mohan and Patil (2003:9) state that with the data from departmental budgets and time tracking, each activity can be costed appropriately. The business is now ready to be analysed from a process perspective. Managers can now see how time is being spent – whether on value add items or non-value

added activities. It also evokes thoughts on outsourcing of non-value adding, resource-heavy activities. Coupled with this exercise, the data needs to be captured on a very granular level. In particular, volumetric data, such as the number of policies needs to be made available at this stage in order to be able to run an ABC model. Typically, the costing information can be captured in process specific data marts. These marts will necessarily have a cross-functional jurisdiction. The data marts will include the individual transactions at the most atomic level, coupled with the cost drivers associated with them. The data model in these marts will be dimensional in nature with customers, products, locations and resources acting as core (or conformed) dimensions. This dimensional nature of the model will lend itself to support the multi-view approach.

3.7.5 Volumetrics

Rafiq and Garg (2002:9) state that in order to be able to run an ABC model, data needs to be captured on a very granular level. In particular, volumetric data such as the number of orders for a brokerage business needs to be available on this level. Availability of cleansed and reliable volumetric data is usually the binding constraint in ABC analysis. Obtaining this volumetric data is usually the most time-intensive task – the Achilles heel of any ABC project. The availability of this data must be determined early on from the relevant information systems.

According to Knowledge Management Solutions Inc (2001:75), when costs are volumetrically applied to products, marketers add products with a high degree of manufacturing complexity to the product line by evaluating their

economics on an incremental cost basis, believing that any new volume, regardless of production complexities, would decrease the unit cost. By applying costs using activity drivers instead, ABC exposes the weakness of the old school of thought.

3.7.6 ABC model system

According to Rafiq and Garg (2002:9), once the model has been conceptually created and the various volumetric and time tracking data is available, the next step is to migrate the model to an ABC system. There are a number of ABC systems (software tools) available for building ABC models, which are either stand-alone or part of a suite of programs available to the business. The exercise of building a model can be very time-intensive and due allowance should be made for this exercise.

Mohan and Patil (2003:10) state that once the data is in place, the next step is to migrate the model to an ABC system. The atomic data in the warehouse can now be analysed using various online analytical processing (OLAP) tools. These tools can render information in a user-friendly and secure fashion for consumption by the decision-makers. The users can fire ad hoc queries for pivoting the information in various ways. An ABC system can either be stand-alone or as part of a suite of software available to the business.

3.7.7 Ensuring consistency with other ABC models

Rafiq and Garg (2002:9) state that if an ABC model is being maintained by another part of the business, its information can be integrated into the new

ABC model. Ensuring consistency with the other ABC models must be a primary consideration otherwise data captured by the other ABC models is lost when merged with the new ABC model.

An important point at this stage is to ensure the consistency of the ABC model with other models in the company. Ensuring this consistency is important to ensure that the data captured by other models are not lost when merged with the new ABC model (Mohan & Patil, 2003:10).

3.7.8 Costing transactions

According to Rafiq and Garg (2002:10), the first immediate benefit of ABC is that it allows an organisation to cost transactions. The ABC system will usually present costing for any unique transaction profile at an aggregate level, i.e. it will present the total costs for doing these types of transactions. Most current ABC software systems have the unit costing functionality. But in general computing the cost of a particular unit transaction for a profile may require reliance on a reporting tool, for example, Microsoft Excel or an OLAP tool. Once this is done, comparison with the traditional cost accounting methods and other value-added analysis could be carried out. In addition, some ABC software tools can also integrate the revenue side, permitting full visibility on profitability. Another burgeoning trend is flowing ABC data into an executive dashboard, a high-level presentation tool for senior management, through which they can monitor key performance indicators (KPI's) and other critical metrics of their business. This is supported by Mohan and Patil (2003:10).

3.8 ACTIVITY- BASED COSTING SOFTWARE

Borden (1994:39) states that cost management software products are but tools which companies use in order to have more accurate information about their cost management objectives: target costing, customer profitability and so forth. According to Borden (1994:39), "… a company must first determine what it wants from its cost management system at a conceptual or design level. Only then should implementation issues be considered, one of which is the selection of software to help in cost management process."

According to a study undertaken by Baxendale (1999:5), four packages have been active on the market. The four software packages are the common ones and are supported by Albright and Smith (1995) and Gurowka (1997) to be representative of ABC software. The main ABC software packages available on the market are: Net Prophet, CMS-PC, QPR Cost Control, SAS and Oros ABC.

According La Londe and Ginter (2000:11), a model is built by entering all data and relationships into a software model to calculate costs of drivers, activities, processes, products, services and other factors such as idle capacity. Data may include activity attributes such as indicators for value added and non-value added processing time. Attribute analysis permits the organisation to examine how much money is spent on non-value added activities or cost of quality.

Harvey (2003:2) states that when ABC/M is combined with a PC-spreadsheet program or customer/product-line profitability software, an organisation can pinpoint unprofitable customers and product-lines, negotiate with customers

and suppliers using hard numbers rather than gut feelings, unbundled and correctly priced value-added services.

3.9 DECISION ANALYTICS

According to Rafiq and Garg (2002:10), ABC creates a unique opportunity for a variety of rich strategic analyses that are not usually accessible through traditional profit and loss (P&L) data. In essence, it provides a conceptual launch pad to explore the frontiers of decision analytics. A number of different options are available to the organisation. The options will either be of a strategic or more operational/tactical nature. Furthermore, some options will be available immediately and some will have a longer-term horizon. In the next sections the author will briefly describe three such options, which illustrate the virtues of ABC and the valuable information it can provide.

3.9.1 The S-curve

Customer segmentation analysis is one of the immediate benefits of ABC. This allows a business to rank each service or product by profitability to determine which product/customer segments are the most attractive. This kind of analysis is called the S-Curve in which products are ranked according to how ABC costing compares with traditional costing. Where products are overcosted, ABC reveals hidden profit. Conversely, where ABC costing is above traditional costing, hidden losses are revealed. For one bank where this analysis was carried out after ABC implementation, it was discovered that seven out of their top ten products (by volume traded) were overcosted by traditional accounting. Given that popular products are usually “marker” or “comp” products, i.e., those that the customer uses to compare prices across

competitors, overcosting these products and by implication, overpricing these products, can have significant implications on market share. Given the information, there is a valid reason to pursue a different strategy: that of reducing the price of these products to attract clients to the bank and to attempt to increase market share (obviously dependant upon the price elasticity of these products) (Rafiq & Garg, 2002:11).

3.9.2 Customer segmentation analysis

ABC data also permits more rigorous customer segmentation analysis. Clients can be segmented based on two criteria: average price realised and cost-to-serve. In ABC one of the important dimensions analysed can be the order channel, so exact and reliable data is available to determine the precise cost to serve for each customer segment. Through this kind of segmentation analysis, organisations can turn the demanding customers (high cost-to-serve but profitable customers), into highly profitable clients. This is achieved by effectively planning customer migration strategies to serve them through lower cost-to-serve channels, such as web-based solutions. In the futures business of a major investment bank, the cost per transaction was seven times higher for orders that were received through trading desks than for orders that were received through the electronic channel. To the degree that “demanding customers” can be carefully and thoughtfully migrated to the electronic order channel, bottom line profitability can be substantially boosted. With decision-makers having complete visibility on costs by product, customer and order channel, they can plan specific price and product packages tailored for particular customers by product and by order channel (Rafiq & Garg, 2002:11).

3.9.3 Insource versus outsource decisions

According to Rafiq and Garg (2002:12), another popular tactical use of ABC is in supporting complex insource versus outsource decisions. This is especially true for certain IT activities such as PC support, which might be considered for outsourcing. The true resource cost of performing these activities can be accurately costed through ABC. For financial institutions where IT accounts for a large allocation of the yearly budgets, this is a significant benefit. Rafiq and Garg (2002:12) have also found that financial institutions have increasingly been using ABC budgeting to effectively plan their budgets and their resource requirements.

3.10 CARE AND MAINTENANCE

According to Rafiq and Garg (2002:12), care and maintenance is an often over-looked part of ABC implementation. Once the model is up and running, it is often assumed that the model is self-sustaining. This is rarely the case, as in the first few months while some of the data feeds are automated, the ABC model still requires some manual intervention. This is a crucial time for the sustainability of the model. If most of the data feeds are not automated, then upkeep of the ABC model will become arduous. Therefore it is imperative to automate as many elements of the ABC model as possible, and as early as possible. It is also important to understand that the ABC model will only deliver indicative results in this early gestation period. The model needs to be run for at least six months and ideally a year to capture the impact of seasonality or other such variations. In six months the results of the ABC model will stabilise, providing accurate and robust data for analysis.

Post-implementation, care and maintenance functions need to be sustained. Continued refinement and testing of the model should occur – after all, a business is not static and so the ABC model should never remain static. As new activities are introduced and others erode, this should be reflected in the model. ABC produces rich results, but it also requires a resource commitment to make sure that is populated with data and is continuously updated. Rafiq and Garg (2002:12) have found that institutions will typically use two people on a 50% basis to maintain the model and an additional resource (could be part-time) to analyse the results from the model.

3.11 SUMMARY

This chapter discussed the rationale for implementing ABC, the steps for designing and building an organisation's activity-based cost model as well as the steps that need to be carried out in order to implement ABC. There is growing academic evidence that links ABC adoption with improved financial performance. In order for ABC to be successful, it needs the support of top management as well as the support of the managers of all the various departments. The first immediate benefit of ABC is that it allows an organisation to cost transactions more accurately than traditional costing methods. ABC creates a unique opportunity for a variety of rich strategic analyses that is not usually accessible through traditional profit and loss (P&L) data.

This chapter also discussed the fact that once the system is up and running, post-implementation, care and maintenance functions need to be sustained

and that the ABC model should never remain static. Chapter 4 will discuss the research methodology.

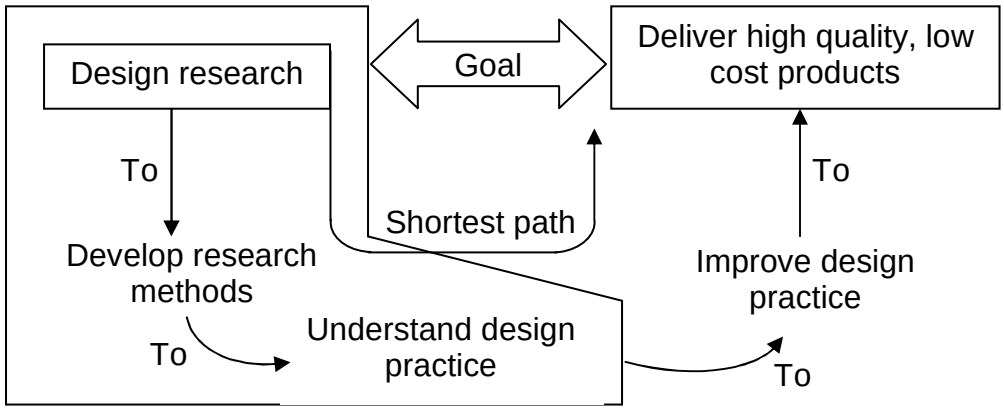
CHAPTER 4

RESEARCH METHODOLOGY AND PRESENTATION OF RESULTS

4.1 INTRODUCTION

The objective for much of the research to be carried out in the field of design theory and methodology is to develop a better understanding of the design process. This understanding can be used to develop new methods and services to improve design practice in industry and design education at academic institutions. The complexity of the design process offers numerous challenges in accomplishing these objectives. There are many directions possible for conducting research design, as is evident from the number of academic disciplines involved in it, such as engineering, anthropology, sociology, management and psychology, among others. As a result, research design is published in a large variety of literature sources (Stanford University, 2002). This can be depicted in Figure 11.

Figure 11: Research design



Source: Stanford University (2002).

The objective focus of this chapter is to establish an appropriate research strategy for a given research problem. The research strategies must be applicable to the nature of the problem. It will be assumed that the nature of the research problem, the objectives of the research and the methodology of the research will focus the research strategy towards triangulation, with the primary research methodology focused on quantitative research and the secondary research on qualitative research.

The research purpose can be classified into three basic purposes: exploratory, descriptive and explanatory. An explorative research is suitable when a problem is difficult to demarcate, and when the researcher has not got a clear appreciation about what model to use and which characteristics and relations are important (Olander & Rosengren, 1999:23). An exploratory research is usually conducted with the expectation that subsequent research will be required to provide such conclusive evidence. Descriptive research is often used when a problem is well structured and there is no intention to investigate cause effect relations (Olander & Rosengren, 1999:23). Zikmund and d'Amico (2001:25) state that "you know what you want to find, but do not know the answers." Different kinds of statistical selections and analysis are usually used during this kind of investigation (Olander & Rosengren, 1999:23). Olander and Rosengren (1999:23) state that the purpose of an explanatory research is to identify cause and effect relationships between variables. Olander and Rosengren (1999:23) also state that experiment is the most common method in explanatory researches.

The research purpose of this thesis is exploratory and descriptive owing to the sample size and the nature of the data. The main problem identified in Chapter 1 was how to develop a model to overcome the difficulties when implementing an ABC system.

In order to solve the problem, the following sub-problems were identified:

- What are the steps involved in ABC?
- What are the benefits of ABC versus traditional methods?
- What are the limitations of ABC?
- What do literature studies reveal regarding the practical use of ABC?
- What are the steps involved in designing a model for implementing ABC?

The empirical study is discussed under the following headings:

- Research design and approach;
- Research sampling;
- Data collection;
- Questionnaire design and structure;
- Data analysis; and
- Summary.

4.2 WHAT IS RESEARCH DESIGN?

4.2.1 The concept of research

Geocities.com (2003) states that research is a process through which we attempt to achieve systematically and with the support of data, the answer to

a question, the resolution of a problem, or a greater understanding of a phenomenon. This process, which is frequently called research methodology, has eight distinct characteristics:

- Research originates with a question or problem;
- Research requires a clear articulation of a goal;
- Research follows a specific plan or procedure;
- Research usually divides the principal problem into more manageable sub-problems;
- Research is guided by the specific research problem, question, or hypothesis;
- Research accepts certain critical assumptions;
- Research requires the collection and interpretation of data in attempting to resolve the problem that initiated the research; and
- Research is, by its nature, cyclical; or more exactly, helical.

The Oxford Concise Dictionary (1995:1169) defines research "as the systematic investigation into sources in order to establish facts and reach new conclusions or collate old facts by the scientific study of the subject or by a course of critical investigation." Finally, Leedy and Ormrod (2001:4) define research "as the systematic process of collecting and analysing information in order to increase understanding of the phenomenon under investigation."

The research design is the logical sequence that connects the empirical data to the study's initial research questions and, eventually, to its conclusions. The research design can be defined as the blueprint of the research,

connected to at least four problems: what questions to study, what data are relevant, what data to collect, and how to analyse the results (Yin, 1994:8).

4.2.2 The concept of design

Yin (1994:20) defines design "as the preparation of a working plan aimed at systematically assembling, organising and integrating data, in order to solve the research problem." Leedy and Ormrod (2001:91) state that research design is the complete strategy of attack on the central research problem. Leedy and Ormrod (2001:91) further state that it provides the overall structure for the procedures that the researcher follows, the data that the researcher collects, and the data analyses that the researcher conducts. The Oxford Concise Dictionary (1995:1169) states that design is a preliminary plan, concept or purpose.

From the above definitions, research design can be interpreted as the preparation of an action plan aimed at organising and integrating data in an overall framework in order to solve the research problem. Basic to design are four fundamental questions that must be resolved with respect to the data:

- Where is the data needed?
- Where is the data located?
- How will the data be secured?
- How will the data be interpreted?

The focus of research design is to maximise the validity and reliability of the research findings. According to Leedy and Ormrod (2001:107), the use of

human subjects in research raises the question of ethical standards and should not go without careful scrutiny.

4.3 RESEARCH APPROACH

The choice of methodology approach is based on the problem definition and on the type of data which has been collected during the research process. A distinction between inductive and deductive research can be made. The research approach is generally classified as either quantitative or qualitative (Holme & Solvang, 1997:20).

Quantitative research is usually associated with positivism while qualitative research with interpretativism. It is best to visualise the distinction between quantitative and qualitative research as a continuum. All research methods could be placed somewhere between the extremes of pure quantitative and pure qualitative research (Jackson, 1995:13). It is, however, plausible to indicate whether research projects have a more qualitative or more quantitative nature. This, in turn, would play an important role in decisions on the process to follow and measuring instruments to select (Van Biljon, 1999:37). A summary of the main differences between qualitative and quantitative research is given in Table 11:

Table 11: Differences between qualitative and quantitative research

Quantitative	Qualitative
Test hypothesis that researcher begins with. Hypotheses are stated explicitly and are formulated beforehand.	Capture and discover meaning once the researcher becomes immersed in data. Hypotheses are frequently undeclared or stated in the form of a research goal.
Concepts are in the form of distinct variables. Concepts have an ambiguous meaning.	Concepts are in the form of themes, motifs, generalisations and taxonomies. Concepts can be interpreted in a number of ways.
Measures are systematically created before data collection is standardised. The researcher remains largely aloof.	Measures are created in an ad hoc manner and are often specific to the individual or researcher. The researcher is involved in the events/phenomena.
Data is in the form of numbers from precise measurement.	Data is in the form of words from documents, observations and transcripts.
Theory is largely causal and is deductive.	Theory can be causal or non-causal and is often inductive.
Procedures are standard, and replication is assumed.	Research procedures are particular, and replication is very rare.
Analysis proceeds by using statistics, tables or charts and discussing how, what they show related to hypotheses.	Analysis proceeds by extracting themes or generalisations from evidence and organising data to present a coherent, consistent picture.

Source: Neuman (1994:317); Mouton and Marais (1992:159).

An important choice that researchers face is the research method to be used. Leedy and Ormrod (2001:148) believe that the answer to this question can be found in the nature of the data, the problem of the research, the location of the data, obtaining of data and the intention with the data. Leedy and Ormrod (2001:148) state that as the study proceeds, the qualitative

researcher gets to grips with the nature of the phenomenon and his/her questions become more specific.

Van Biljon (1999:37) states that if the data is verbal, the methodology is qualitative; if it is numerical, the methodology is quantitative. According to Yin (1994:23), both approaches have their strengths and weaknesses and neither one of the approaches can be held better than the other. The best research method to be used for a study depends on that study's research problem and the accompanying research questions. One typical characteristic of qualitative studies is that they are to a large extent founded on description, that is, on the involved person's own description, emotions and reactions.

The author has used a qualitative method when conducting the empirical study since it was the alternative that best suited the research questions.

4.4 QUANTITATIVE RESEARCH

Mouton and Marais (1992:159) define quantitative research as more highly formalised as well as more explicitly controlled, with a range that is more exactly defined, and which, in terms of the methods used, is relatively close to the physical sciences. This definition once again shows a preference for the positivist approach. The qualitative method emphasises understanding. This is achieved by implying a small degree of formalisation. In addition, it is characterised by the closeness to the source where the information is gathered. The main purpose of the qualitative method is to obtain a deeper understanding of the problem that is studied, and not to prove the

trustworthiness with statistical tools (Holme & Solvang, 1997:22). Quantitative research seeks to quantify observations about human behaviour through numbers. The emphasis is on precise measurement, the testing of hypotheses based on a sample of observations and a statistical analysis of the data. Relationships among variables are described mathematically and the subject matter is, as in the physical sciences, treated as an object (Van Biljon, 1999:40).

Variables play key roles in quantitative research. Variables take on two or more values. Attributes, on the other hand, are the values of categories of a variable and people sometimes confuse variables with attributes. A quantitative research project would usually test the most important causal links to be found in the research domain. This relationship between variables is usually expressed as a hypothesis and hypotheses are tested to answer the research question or find empirical support for a theory (Neuman, 1994:99).

4.5 QUALITATIVE RESEARCH

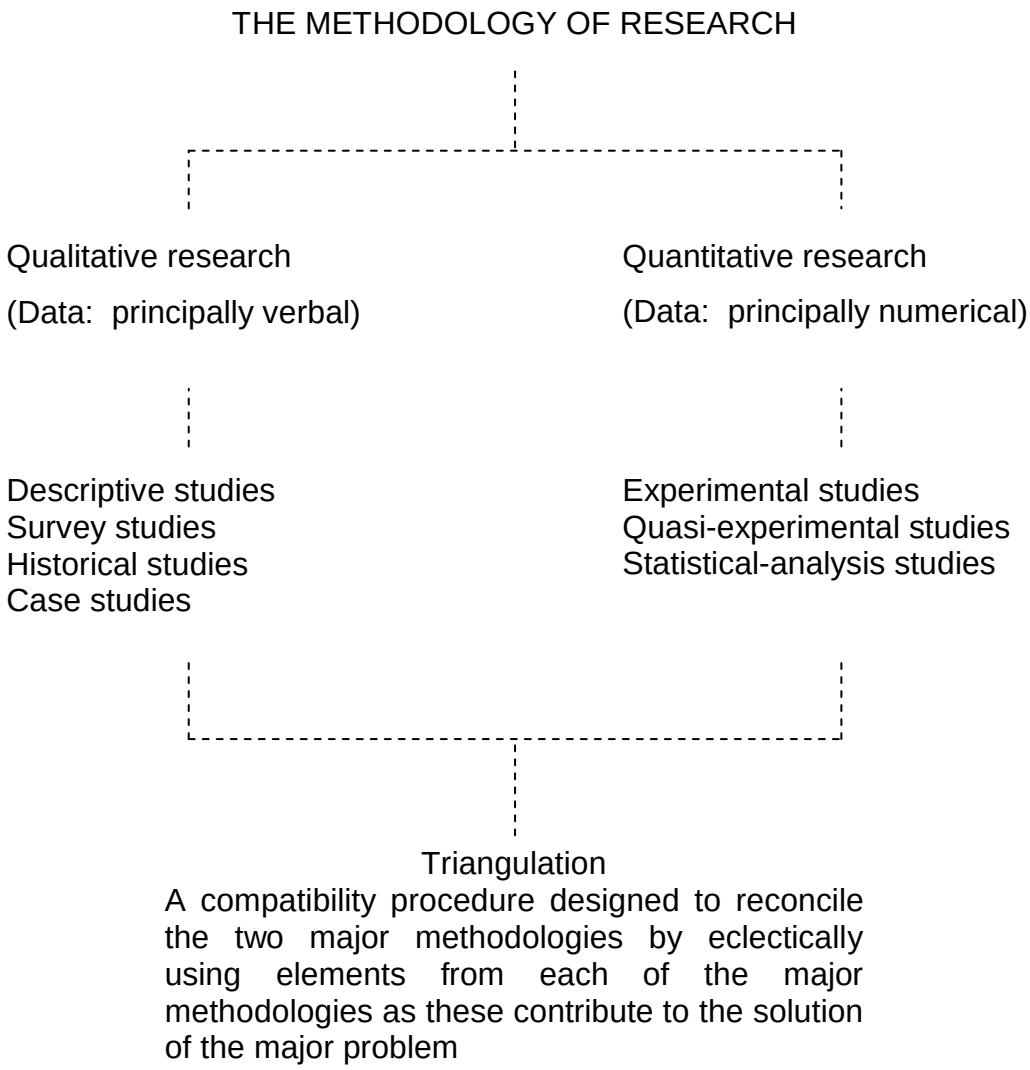
When it comes to quantitative research, the conclusions are based on quantifiable data. It is important that the method of working is more formalised and structured if one wants to reach a good and satisfying result. Statistical methods of measurement are of decisive importance in the analysis of the gathered quantitative information. If quantitative research is carried out, a statistical generalisation can be made (Holme & Solvang, 1997:23). Qualitative research relies on interpretative and critical approaches to social science. The aim of qualitative research is to study individuals and

phenomena in their natural settings in order to gain a better understanding of them. It is also evident that qualitative research does not follow a fixed set of procedures (Van Biljon, 1999:41). Mouton and Marais (1992:155) define qualitative research projects as those in which the procedures are not strictly formalised, while the scope is more likely to be under-defined, and a more philosophical mode of operation is adopted.

4.6 TRIANGULATION

Leedy (1997:143) describes the situation where it is possible to combine qualitative research methods with quantitative research methods in the same project. This process is called triangulation and many research projects could be enhanced considerably if a triangulation approach were taken. The interactions between quantitative and qualitative research are illustrated in Figure 12:

Figure 12: Interaction between quantitative and qualitative research



Source: Leedy (1997:145).

Eastorby-Smith, Thorpe and Lowe (1991) as quoted by Hussey and Hussey (1997:74), identify four types of triangulation:

- Data triangulation: this is where data is collected at different times or from different sources;
- Investigator triangulation: this is where different researchers independently collect data on the same phenomenon and then compare the results;

- Methodological triangulation: this is where both quantitative and qualitative methods of data collection are used; and
- Triangulation of theories: this is where theory is taken from one discipline (for example, marketing) and used to explain a phenomenon in another discipline (for example accounting).

Hussey and Hussey (1997:74) further state that unless one is part of a research team, it is unlikely that one would be able to consider triangulation as an option.

4.7 CHOOSING THE MOST APPROPRIATE RESEARCH METHOD

For the purposes of the author's dissertation both a qualitative and quantitative approach will be used, in order to describe the procedures undertaken to come up with answers to the problem posed at the beginning of this dissertation. Owing to the number of conclusions reached, the author had to rely on his own interpretations and understanding of the problem. To further enhance this research project, quantitative research is introduced in the form of interviews as well as questionnaires that were e-mailed to selected companies. The companies that were e-mailed were first contacted in order to obtain their permission. This methodological triangulation was used to ensure that the data from the questionnaire was tested in more than one way with the theory.

4.8 RESEARCH GOALS AND STRATEGIES

4.8.1 Research goals

The research goal provides a broad indication of what a researcher wishes to accomplish with research. The primary aim of this research project is to portray accurately the characteristics of a particular group, situation, interaction or object (Mouton & Marais, 1992:43). The outcome of a descriptive project is a detailed picture of the subject. According to Neuman (1994:19), the aims of descriptive projects may be to:

- Provide an accurate profile of a group;
- Describe a process, mechanism or relationship;
- Give a verbal or numerical picture;
- Find information to stimulate new explanations;
- Present basic background information or a context;
- Create a set of categories or classify types;
- Clarify a sequence, set of stages or steps; and
- Document information that contributes prior beliefs about a subject.

4.8.2 Research strategy

There are several different research strategies that can be used when undertaking research. Yin (1994:5) points out five different types of research strategies: case study, experiments, surveys, histories and the analysis of archival information. Each of these five strategies has its advantages and disadvantages, which depend upon three circumstances: the sort of research question, the degree of control over actual behavioural events and the focus on contemporary phenomena versus historical events. Yin (1994:6) defines a

case study as “an empirical enquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.” Since the boundaries of the author’s study are not clear, a case study is a suitable research strategy. Merriam (1998:56) states that this type of study is intensive, holistic descriptions and analyses of a single unit. The single most defining characteristic of case study research lies in delimiting the object of study. A delimitation of this study is that it focuses on implementing an ABC model aimed at manufacturing, service and telecommunication companies in the form of questionnaires e-mailed to a number of companies. Permission was obtained by telephone before e-mailing questionnaires to these companies.

Case studies rely on multiple sources of evidence and therefore have a wide approach to data collection. Since this specific data collection approach is incorporated into the research design, this technique becomes a comprehensive research strategy. Another strength of case studies is that this type of research strategy allows the researcher to retain a holistic view while examining real-life events. Furthermore, the researcher has the possibility of penetrating deeply into a complex problem and the result can be applied effectively owing to the real-life context of the study. According to Yin (1994:14), one major weakness of the case study strategy is the lack of rigidity of the research design. There is a possibility that the researcher uses vague data or biased views to influence the findings and conclusions. It demands a lot of the researcher to report all evidence fairly. There have also been concerns raised that case studies provide little basis for scientific

generalisation. The researcher's objective is to expand and generalise theories (analytic generalisation) and not to list frequencies (statistical generalisation). Another criticism of case studies is that they take too long to undertake and result in massive documentation. This can be avoided by applying a good structure for the study.

4.9 SUMMARY

This chapter states that the objective for much of the research to be carried out in the field of design theory and methodology is to develop a better understanding of the design process. This understanding can be used to develop new methods and services to improve design practice in industry and design education at academic institutions.

The research purpose can be classified into three basic purposes: exploratory, descriptive and explanatory. The chapter discusses research design, which can be broken down into eight distinct characteristics. It goes on to discuss the concept of research design. The choice of methodology approach is based on the problem definition, and on the type of data, which has been collected during the research process and can generally be classified as either quantitative or qualitative. The chapter also discusses how to choose the most appropriate method as well as the research goals and strategies.

Chapter 5 will discuss the questionnaire design as well as the presentation of the results.

CHAPTER 5

QUESTIONNAIRE DESIGN AND PRESENTATION OF RESULTS

5.1 INTRODUCTION

Chapter 5 discusses the questionnaire design as well as the results of the empirical study. This will be done in the form of an analysis of the results obtained from the questionnaire. The results will be presented both in tabular form and descriptively to describe how respondents answered the various questions.

5.2 QUESTIONNAIRE DESIGN AND STRUCTURE

Hussey and Hussey (1997:61) detail questionnaires as a list of structured questions with a view to eliciting reliable responses from a chosen sample with the aim of finding out what a selected group of participants do, think or feel.

The questionnaire was developed from the literature study in Chapters 2 and 3 to facilitate the collection of information. Questionnaires were e-mailed to twenty-five companies. The questionnaire (see Annexure A) was developed with the objective of finding out what strategies companies are adopting in order to develop an ABC model as well as whether they are using suitable software in order to have more accurate information on the costing of products.

The questionnaire was e-mailed to two senior lecturers, three MBA students as well as three companies in order to obtain their input as to the relevance

of the questions before e-mailing them to the selected companies. The questions address the issue of whether ABC is more accurate than traditional-based costing, how to identify the cost of the activities, establishing a cost pool for each activity, the benefits of ABC, the steps to be used in designing an ABC model and the types of software that are effective in implementing ABC.

The questions selected for the questionnaire are mainly multiple choice and Lickert rating scale-type questions. According to Allison, O'Sullivan, Owen, Rothwell and Saunders (1996:83), the best way to represent views and opinions is to use the Lickert rating scale-type questions.

According to Thomas (1996:121), the questions should not lead the respondents to a set answer. The questions should be kept simple and the wording kept basic to allow the respondents to understand the questions unambiguously. Thomas (1996:121) states that the questionnaire should not be too long and should be user-friendly.

5.3 GENERAL PROCEDURES

The methodology adopted in this research project was discussed earlier in this chapter. The body of data collected consisted of questionnaires in the form of e-mails and this collection of data was required to test the hypotheses.

The response to the e-mails was 72% and these yielded favourable outcomes. The questionnaires were unstructured to gain a better

understanding within those companies and what they felt were important issues relating to ABC. The design of the questionnaire was of such a nature that the questions were all designed with the respective hypotheses in mind.

5.4 RESULTS OF THE QUESTIONNAIRE

The questionnaire was aimed at gaining information on how to develop and implement an ABC model. The results are depicted in Table 12:

Table 12: Summary of results pertaining to activity-based costing

	Question	Yes	No	% Yes	% No
1	Is product costing more accurate with ABC as opposed to traditional costing methods?	18	0	100%	0%
2	Do you agree that ABC involves a two-step process as listed below?	16	2	88,88%	11,11%
3	Does your company make use of baselining (starting point) in order to determine activity inputs and outputs?	13	5	72,22%	27,78%
4	Do you feel that it is important to define the value added and non-value added activities as part of ABC?	15	3	83,33%	16,67%
5	Do you agree that the importance in understanding the cost behaviour in any organisation is identifying the cost drivers upon which various types of costs depend?	18	0	100%	0%
6	Do you make use of cost drivers to reflect the extent to which cost objects consume activities?	18	0	100%	0%
7	Do you agree that the objective that designers of an ABC system should set for themselves is to provide the most benefit possible at the lowest overall cost?	17	1	94,44%	5,56%
8	Do you agree that a positive relationship exists between improved financial performance and ABC adoption?	18	0	100%	0%
9	Do you agree that in order for ABC to be successful, it must have the support of top management and all departments?	18	0	100%	0%
10	Do you make use of ABC software?	18	0	100%	0%

5.5 ANALYSIS OF THE RESULTS

The analysis of the questionnaires yielded the following results: One hundred percent of the respondents indicated that product costing is more accurate with ABC as opposed to traditional costing methods. This is supported by the literature studies (ABC Technologies, 1996:1). Eighty-eight percent of the respondents stated that ABC involves a two-step process. Those that did not agree stated that ABC involves a multi-stage process and that they cannot be clearly defined. Seventy-two percent of the respondents made use of baselining (starting point) in order to determine activity inputs and outputs. Eighty-three percent of the respondents felt that it is important to define the value added and non-value added activities as part of ABC. One hundred percent of the respondents agreed that the importance in understanding the cost behaviour in any organisation is identifying the cost drivers upon which various types of costs depend. One hundred percent of the respondents made use of cost drivers to reflect the extent to which cost objects consume activities. Ninety-four percent of the respondents agreed that the objective that designers of an ABC system should set for themselves is to provide the most benefit possible at the lowest overall cost. One hundred percent of the respondents stated that a positive relationship exists between improved financial performance and ABC adoption. One hundred percent of the respondents stated that in order for ABC to be successful, it must have the support of top management and all departments. One hundred percent of the respondents made use of ABC software.

5.6 SUMMARY

This chapter presented the results of the empirical study. The results were presented in both descriptive terms and tabular form. Chapter 6 will follow on from this and will provide a summary, recommendations and a conclusion. This chapter will link all the concepts discussed in this research and provide an answer to the main problem and sub-problems that were posed in Chapter 1.

CHAPTER 6

FINAL SUMMARY, CONCLUSIONS AND RECOMMENDATIONS OF THE RESEARCH

6.1 INTRODUCTION

Chapter 6 presents the final summary, conclusions and recommendations of the research. The final summary discusses similarities and differences between the literature study (Chapters 2 and 3) and the empirical study (Chapter 5), whilst at the same time conclusions are drawn based on these similarities and differences. Chapter 6 is presented under the following headings:

- Background and objectives of the study.
- Is product costing more accurate than traditional with ABC as opposed to traditional costing methods?
- Identifying the cost of the activities and establishing a cost pool for each activity.
- Developing a model to overcome the difficulties when implementing an ABC system.
- Steps involved in ABC.
- Benefits of ABC.

6.2 BACKGROUND AND OBJECTIVES OF THE STUDY

Product costing is the accumulation of cost information by units of production so that management can value ending inventories in process, finished goods, and cost of goods sold.

In traditional product costing analysis the product cost falls into three major categories: direct labour cost, direct material and manufacturing overhead. Manufacturing overhead is determined by an overhead rate which equals total manufacturing overhead divided by direct labour hours or machine hours. This costing method has been broadly acknowledged in both basic cost accounting texts and industrial settings. The traditional method assumes that the manufacturing overhead is a linear function of one or several common variables, such as product volume, direct labour hours and/or machine hours. For some certain types of industries, for example a labour-intensive company where the majority of cost is direct cost, this assumption may be true. However, modern automation intensive industries usually have a relatively high percentage of indirect cost, that is research and development expenses, engineering support costs and high capital costs, as the major part of the product cost.

ABC can trace the cost from resources to activities that are consumed by product manufacturing processes as well as from activities to products. ABC investigates the transactions that trigger cost instead of concentrating solely on measures of physical volume or a certain amount of labour hours. Compared to the traditional costing systems, ABC can not only answer how much product cost is but also tell executives the factors triggering costs and the way to manage cost. ABC helps managers make better decisions about product design, pricing, marketing and mix, and encourage continual improvement.

Unlike the traditional method, instead of using the single pre-determined overhead rate to absorb the indirect cost to products, ABC uses actual occurred cost to determine the product cost. By tracing the absorption process of indirect cost, ABC provides more information to management and helps it find better ways to manage cost. However, the cost drivers used in ABC are constants but the cost driver rates are continually changing. ABC still uses predetermined cost drivers so it has the same fundamental problem as the traditional methods for estimating.

ABC makes a lot of sense for companies with multiple products or services who are suffering from inaccurate costing information and need to know which products are really winners and which are losers. For these companies the effort required to successfully implement ABC is worth the time and resources. ABC can identify high overhead costs per unit and find ways to reduce the costs, avoid decreases in head counts due to inaccurate allocation of costs, and measure profitability with higher accuracy than traditional costing that uses direct-labour hours as the only cost driver.

6.3 IS PRODUCT COSTING MORE ACCURATE THAN TRADITIONAL WITH ACTIVITY-BASED COSTING AS OPPOSED TO TRADITIONAL COSTING METHODS?

With regard to the empirical study conducted, all the respondents categorically stated that ABC is more accurate and complete as it encompasses the entire value chain as opposed to traditional costing methods such as standard costing, which excludes taking the product through the value chain. Traditional overhead costs are allocated to products

and services by volume, therefore penalising high volume products and subsidising low margin/high cost products. ABC cost allocation is driven by volume and other relevant cost drivers, for example setups, number of orders, number of batches, process time etcetera. Identifying and understanding the cost drivers leads to better management decisions and controls.

6.4 IDENTIFYING THE COST OF THE ACTIVITIES AND ESTABLISHING A COST POOL FOR EACH ACTIVITY

According to Hilton (1997:36), an important step in understanding the cost behaviour in any organisation is identifying the cost drivers upon which various types of costs depend. A cost driver is a characteristic of an event or activity that causes costs to be incurred by that event or activity. In most organisations different types of costs respond to widely differing cost drivers

The results of the empirical study emphasised that a business needs to identify cost drivers for each activity, assign the resources to the activities and then to assign the activities to the cost objects.

6.5 DEVELOPING A MODEL TO OVERCOME THE DIFFICULTIES WHEN IMPLEMENTING AN ACTIVITY-BASED COSTING SYSTEM

If an ABC system is chosen to provide the activity and cost information, the management needs to be aware of the impact listed as the following:

- ABC is a complicated system that drives extra resources. There is certainly a cost associated with designing and implementing a new cost system that has

different architecture and different data requirements than a traditional cost accounting system. There should be an assessment of the cost for ABC system itself to justify the request of the system.

- ABC is not designed to trigger automatic decisions but rather to provide more accurate information so that the managers can focus on how to increase profits. Management needs to understand how to interpret and use the results from ABC.
- The overall impact of the changes to product costs should be discussed based on a comparison of the traditional versus the ABC system's reported product cost results. The cost information must be further investigated and confirmed before any changes are made. This cost result would be significantly different to the result from the traditional system. Using historical scenarios and comparisons to verify the ABC results are highly preferred.
- ABC is a management system and should not replace the existing accounting system for any formal corporate financial operation.

The empirical study indicated that the following steps should be followed in designing an ABC system:

- Identify and analyse activities performed;
- Trace the usage of organisational resources to the activities;
- Define the outputs produced; and
- Link the activity costs to the outputs.

6.6 STEPS INVOLVED IN ACTIVITY-BASED COSTING

The results of the empirical study indicated that the following steps should be taken with regard to ABC:

- Define ABC project – The first step is to have a meeting with the ABC team members, to clarify the design purpose and to define the basic structure of the ABC system. The range of the system as well as who the users are may be identified.
- Hold ABC seminars – The seminar is to introduce the background to team members, to discuss the characteristics of their facility that made it a candidate for an activity-based system. Further seminar sessions will include the discussion of how to identify the resources, activities and the cost drivers and how to collect data as well.
- Identify resources, activities and cost drivers – This will be through interviews to identify the resource categories and the cost of these resources, also to identify the major activities and determine the cost of these activities. Identify cost drivers and determine the quantities of these cost drivers associated with each product.
- Progress meetings – The design team keeps the management informed about progress made throughout the entire design and data collection phase. The team should hold several monthly meetings to report their findings and to discuss problems encountered. These meetings will allow management to develop some ownership of the system's design and to ensure that the design was appropriate.

- Executive seminars – A series of executive seminars should be held for management to explain the mechanics and benefits of ABC in detail. These seminars help build commitment to the ABC system, prepare management for the results of the project and suggest the types of actions they should consider once the results are available.

6.7 BENEFITS OF ACTIVITY-BASED COSTING

The benefits of ABC that were established in the empirical study were as follows:

- ABC assisted with the planning budgeting, and scenario planning as cost allocations were more accurate;
- A cost can be ascribed to all departmental activities. The departments can be evaluated on their cost contribution to the sale of the product;
- Understanding the cost make-up completely;
- Having a clear understanding of the activities;
- Logical user-friendly information for better decision-making;
- Product and client profitability analysis; and
- The cost information provided to managers due to the drill-down capabilities of the model allows managers to improve the cost effectiveness of the operations.

6.8 CONCLUSIONS

ABC has helped enterprises in answering the market need of better quality products at competitive prices. By ascertaining the product profitability and customer profitability, this method has contributed effectively to the top

management's decision-making process. With ABC, enterprises were able to improve their efficiency and reduce the cost without sacrificing the value for the customer. This has also enabled enterprises to model the impact of cost reduction and subsequently confirm the savings achieved.

ABC is a practical tool that can be used by companies of all sizes not only to better determine the cost of their products, but also to better understand why they cost what they do. With this knowledge, the organisation can acquire a more profitable mix of products, identify those activities that are prime candidates for improvement, better use their limited capital funds and generally make better business decisions. Without accurate and relevant cost information, managers are flying blind when making decisions. With ABC they can gain the vision necessary to direct them toward a more prosperous future.

In competitive environments, managers require better information, not only about their products and services cost, but also about the cost of the different activities needed to create these products or services. Traditional accounting systems do not provide this information. The activity-based management approach allows everyone in the organisation to understand where costs are being incurred, why they are being incurred and how these activities contribute to a higher value added to customers. Additionally, ABC seeks to identify activities that can be eliminated or improved. It can also be added that, if all company employees follow the activity-based approach, communications improve and changes are easier to make.

6.9 RECOMMENDATIONS FOR FURTHER RESEARCH

Further research would include the following items:

- Analysis of the ABC results; and
- Optimisation of the resource and activity assignment.

The analysis of the ABC result is very important to evaluate cost performance of the existing organisation. Also, the additional optimisation technique such as simplex linear programming or dynamic programming would benefit the model in delivering an optimised resource-activity assignment to achieve the cost performance goal such as the minimum total unit product cost consumption for a group of products.

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ANNEXURE A

QUESTIONNAIRE

Contact information

Company Name: _____

Physical Address: _____

_____

Website Address: _____

E-Mail: _____

Telephone: _____

Fax: _____

Contact Person: _____

Designation: _____

ACTIVITY BASED COSTING

1 Is product costing more accurate with activity-based costing as opposed to traditional costing methods?

Yes/No

1.1 If you answered “yes” to 1 above, could you kindly elaborate?

_____

2 How do you identify the cost of the activities and establishing a cost pool for each activity?

_____

3 What do you see as the benefits of activity-based costing?

_____

4 Do you agree that ABC involves a two-step process as listed below?

(a) Firstly overheads are pooled in accordance with the activities, which cause them.

(b) Secondly, a link known as a cost driver is found between each activity cost pool and product output.

Yes/No

4.1 If you answered “no” to 4 above please describe the process that you take.

_____

5 Does your company make use of baselining (starting point) in order to determine activity inputs and outputs?

Yes/No

6 Do you feel that it is important to define the value added and non-value added activities as part of ABC?

Yes/No

6.1 If you answered “yes” to 6 above, please describe why you feel that this is important.

_____

7 Do you agree that the importance in understanding the cost behaviour in any organisation is identifying the cost drivers upon which various types of costs depend?

Yes/No

7.1 If you answered “no” to 7 above, please explain briefly why you disagree.

_____

8 Do you make use of cost drivers to reflect the extent to which cost objects consume activities?

Yes/No

8.1 If you answered “yes” to no 8 above, indicate which categories of cost drivers you make use of:

- ☐ Transaction drivers
- ☐ Duration drivers
- ☐ Intensity drivers
- ☐ Other (please specify) _____

9 Do you agree that the objective that designers of an ABC system should set for themselves is to provide the most benefit possible at the lowest overall cost?

Yes/No

9.1 If you answered “yes” to no 9 above, please indicate which steps should be taken.

- ☐ Aggregate the different activities
- ☐ Report the cost of activities
- ☐ Identify activity centres
- ☐ Select first-stage cost drivers
- ☐ Select second-stage cost drivers
- ☐ Other (please specify) _____

10 Please indicate which of the following you make use of when determining activity costs.

- ☐ Analyse activities
- ☐ Gather costs
- ☐ Trace costs to activities
- ☐ Establish output measures
- ☐ Analyse costs
- ☐ Other (please specify) _____

11 Please indicate whether you believe that ABC can be used for the following:

☐ As a tool to aid strategic decision-making

☐ Allowing resources to be more efficiently allocated and to enable cost-reduction

☐ As an allocation mechanism

☐ Other (please specify) _____

12 Please indicate whether the following steps should be used in designing an activity-based costing model:

☐ Identify and analyse activities performed

☐ Trace the usage of organisational resources to the activities

☐ Define the outputs produced

☐ Link the activity costs to the outputs

☐ Other (please specify) _____

13 Do you agree that a positive relationship exists between improved financial performance and ABC adoption?

Yes/No

13.1 Please rate your response in the blocks below

1 Strongly agree	2 Agree	3 Do not know	4 Disagree	5 Strongly disagree

14 Do you agree that in order for ABC to be successful, it must have the support of top management and all departments?

Yes/No

15 What in your opinion are the biggest obstacles in implementing ABC?

_____

16 Indicate in the blocks below the steps that were taken by you in implementing ABC.

- ☐ Identifying the information requirements of the users through interviews
- ☐ Extracting cost information from the General Ledger
- ☐ Implementing a time tracking system
- ☐ Costing each activity
- ☐ Obtaining volumetric data
- ☐ Building an ABC model
- ☐ Ensuring consistency with other ABC models
- ☐ Ensuring that ABC is able to cost unit transactions
- ☐ Other (please specify) _____

17 Please indicate in terms of importance in the blocks below whether a company must first determine what it wants from its cost management system at the conceptual or design level before implementing an ABC system.

1 Very important	2 Important	3 Do not know	4 Not important

18 Do you make use of ABC software?

Yes/No

18.1 If you indicated yes to 18 above, please advise which ABC software package you are making use of.

_____

18.2 If you are not using ABC software, please advise how you designed your in-house software.

_____