

# Embedding an activity-driven operational accounting framework in a fertiliser company

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## SUMMARY

Activity-based Costing is a management tool which both covers the shortcomings of traditional costing methods and provides better cost information. There is a lot of competition in the economic environment where only the “fittest will survive”. The overall picture of ABC will bring operational processes to financial figures more visibly and accurately. Operational processes have changed dramatically over the past centuries, therefore we need to change our old way of doing things. Processes get more automated, thus there are higher percentages of variable and indirect costs.

When costs are visible, ACME Fertilizer can compete with confidence because they will know when a transaction is not financially beneficial any more. The actual cost of the final product or output is of critical importance. Activities which are not adding value to the process must be identified and eliminated or else costs will be inflated unnecessarily. Competitors will get a higher market share and sales because they might be able to enter the market at a lower price. The end user is extremely price-sensitive, and will accept the lower monetary value offer if the quality is equivalent.

It is of critical importance that companies understand and be aware of the true costs of their products. ABC has the ability to assist companies to strive for cost-competitive excellence.

In this mini-dissertation, a comparison between ABC and the traditional costing method in a fertilizer company attempts to investigate the distortion of cost. The same scenario is used for the two different costing methodologies: ABC versus the traditional method. The results are discussed and a conclusion with recommendations is made. By analysing the results, the non-value adding processes can be eliminated and management can shift their focus to the relevant activities. This will assist ACME Fertilizer’s management towards better decision-making and better competitiveness.

ACME manufactures and blends different mixes of fertilizer. The manufacturing of a product consists of various processes and activities from where the raw material enters the factory premises to the manufacturing, bagging and distribution of the final product. The cost of the raw material can be affected by fluctuating commodity prices, exchange rates and other unforeseen circumstances, for example the recent instances of Somali Piracy and so forth. Overheads and indirect costs get allocated based on the activities required to manufacture the final product. Products will not absorb costs which do not have a direct impact on the manufacturing of the final product or intermediates. The first step of the implementation of an ABC system is to identify the output or the product of which costing needs to be done. The

process and activities must be identified as well as the costs applicable to these activities. Costs then get allocated to the cost pools based on the activity driver per cost pool. The final cost can be calculated and assigned, per cost driver, to the final product or output.

The main objective of this study was to determine the feasibility of implementing an ABC system within ACME Fertilizer. The results proved that with the traditional costing method, all the costs are not visible and may be distorted. Thus, the cost of a product will be understated - in other words all the actual costs occurred were higher than the budgeted costs and will not be recovered through the cost of sales. Instead it will take a bite out of the annual profit! On the other hand, should the cost of a final product be overstated, more costs are to be recovered and this becomes a snowball effect. Companies have to either contribute its margin to remain competitive or increase the price of the product and the risk of lost sales and market share increases.

ABC is a useful tool to use to control and have visibility of the costs, improved decision-making abilities and the possibility of closely shaven profits to ensure that the necessary volumes get manufactured. The right product, at the right quantity, at the right price!

## OPSOMMING

Aktiwiteitsgebaseerde Kosteberekening (ABC) is 'n bestuursmetode gemik daarop om die tekortkominge van tradisionele kostemetodes aan te spreek. Die mark is baie kompetender en maatskappye moet altyd daardie een stap voor hul kompetisie wees. ABC sal die operasionele prosesse koppel aan finansiële syfers, en dus sal die kostes van finale produkte meer sigbaar en akkuraat wees. Operasionele prosesse het dramaties verander in die afgelope jare, daarom moet die ou manier van dinge doen ook verander om aan te pas by die nuwe era. Prosesse word geoutomatiseer en minder hande-arbeid is nodig - dus is veranderlike en indirekte kostes hoër.

Wanneer kostes duidelik uiteengesit is, kan ACME Kunsmis met vertroue meeding, want hulle sal weet wanneer 'n transaksie nie finansiëel voordelig is nie. Die werklike koste van die finale produk is van kardinale belang. Aktiwiteite wat nie waarde toevoeg tot die proses nie, moet geïdentifiseer en geëlimineer word sodat hulpbronskoste nie onnodig aangegaan sal word nie. Die eindgebruiker is baie prys-sensitief, en sal die laagste prys verkies indien die kwaliteit dieselfde is. Mededingers sal neig na meer verkope en 'n hoër marktaandeel omdat hulle in staat is om die mark teen 'n laer prys te betree.

Dit is van kritieke belang dat maatskappye die kostes in detail moet verstaan en weet hoekom elke koste aangegaan is. ABC help die maatskappy om te streef na optimale kostemededinging en –besluitneming.

In hierdie skripsie word 'n vergelyking tussen ABC en die tradisionele kosteberekeningsmetode gedoen om te bewys dat die kostetoedeling met die tradisionele kosteberekeningsmetode nie akkuraat is nie. Dieselfde scenario word gebruik, maar deur middel van die twee verskillende kosteberekeningsmetodologieë; ABC teenoor die tradisionele metode. Die resultate word bespreek word en 'n slot met aanbevelings word gemaak. Deur die analise van die resultate kan die aktiwiteite wat nie waarde toevoeg nie, geëlimineer word en bestuur kan fokus op probleemareas. Dit sal ACME Kunsmis se bestuur help met beter besluitneming en meer kompetender mededinging.

ACME vervaardig en meng verskillende kunsmismengsels. Die vervaardiging van 'n produk bestaan uit verskillende prosesse en aktiwiteite. Die koste van die roumateriaal kan beïnvloed word deur wisselende kommoditeitspryse, wisselkoerse en ander onvoorsiene omstandighede. Bokoste en indirekte koste word geallokeer gebaseer op die aktiwiteite wat nodig is om die finale produk te vervaardig. Produkte sal nie kostes absorbeer wat glad nie 'n impak het op die vervaardiging van die finale produk nie. Die eerste stap van die

implementering van 'n ABC-stelsel is om die finale produk te identifiseer, en dan die prosesse. Koste word dan geallokeer na die aktiwiteit, en dan geallokeer na kostepoele gebaseer op die aktiwiteitsgebruik per kostepoel. Die finale koste van 'n produk kan nou akkuraat geallokeer word deur kostedrywers.

Die belangrikste doel van hierdie studie is om die lewensvatbaarheid van 'n ABC stelsel in ACME kunsmis te bepaal. Die resultate is 'n duidelike bewys dat alle kostes nie altyd in berekening gebring word nie, en dat die syfers nie akkuraat is nie. Dit kan lei tot 'n onderverhaling van kostes, m.a.w die begrote koste van 'n produk is minder as sy werklike koste. Dit beteken minder wins! Aan die ander kant, indien die kostes oorverhaal word, sal die maatskappy die prys van produkte moet verhoog, en dit kan lei tot 'n verlaging in markaandeel.

ABC is 'n handige stelsel wat 'n mens in staat stel om beheer en sigbaarheid oor die kostes te kan hê om beter besluite te neem, te weet wanneer winste minimaal is en ook wat die optimale produksiehoeveelhede is.

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# CHAPTER 1: INTRODUCTION

## 1.1. BACKGROUND

Companies in today's global economy are under pressure to optimize and reduce costs, determine product costs more accurately and improve overall customer profitability (Fei & Isa, 2010). Companies that achieved success in the past are now doing everything they can to maintain their growth and sustainability by adopting new management tools and techniques to be able to deliver products or services faster, better and cheaper without compromising quality (Chen & Jones, 2007). A high-demand product can potentially show good profits and provide a low cost of sale. However, if the product's cost of sales is overstated, the product won't be as profitable as it can be (Wang, Goa & Lin, 2010). Management focus should therefore shift to business processes and value chains of products that are more advantageous to manufacture and those that do not add value should be eliminated (Fei & Isa, 2010; Walters & Lancaster, 2000). This principle creates the need for a system which can focus on the value chain and business performance, which will lead to better cost control as well as an understanding of which activities and mechanisms drive the cost of manufacturing the product (Furniss & Spencer, 2005; Fei & Isa, 2010; Poggenpoel, 2004).

A managerial/operational accounting system should generate solid support, factual information, allocate costs to the right product and provide accurate reports to assist managers to make better decisions, thus providing relevant information for planning, control and performance management purposes (Garrison, Noreen & Brewer, 2011; Cokins, 2001a). Decision-making relies on incremental analysis (cost behaviour analysis) which analyses revenues and costs that increase (or decrease) if a decision is made (Drury, 2008; Jiambalvo, 2004).

In order to succeed, companies need to focus more on making their products and customers more profitable and to eliminate those products that are not adding value. One of the major challenges that most manufacturing organisations face, is the "disconnect" between what actually happens in the manufacturing environment and the methodology which the finance department follows when determining the product costs. In many cases, financial data is based on operational assumptions and often the easiest and most convenient option is selected to determine the costs of manufacturing products or delivery of services. Thus, accountants often assume, for simplicity reasons, that all products require equivalent resource inputs (labour and overheads) to manufacture.

Accountants may not always be aware of all the inputs during the manufacturing and administration processes which will lead to products carrying unnecessary costs (Tardivo & Di Montezemolo, 2009). It is important to determine the cost of running the factory and costs associated with each job function or activity within the manufacturing process. When broad averages are used for the allocation of costs of resources utilized by products in an unsustainable way, it is called cost smoothing or peanut-butter costing (Horngren, Datar & Foster, 2003). This will have the result that for some products the labour and overhead cost factors are overstated, while for others it might be understated (Wang *et al.*, 2010). Costing of products is not always based on the operational facts, but is done on the financial information that is available and then allocated based on the bill of materials which will lead to distorted results. If costs get allocated to a product based on the actual manufacturing activities, that product will reflect a much more accurate and reliable cost (Vercio & Shoemaker, 2007).

To increase the accuracy of the information, an activity-driven operational accounting framework will reduce the chance of allocating unnecessary costs to a particular product and the true cost of resource consumption can be allocated to the products utilizing the resource (Chen & Jones, 2007; Horngren *et al.*, 2003; Poggenpoel, 2004). This will bring operational information into the accounting framework and provide adequate information, necessary to improve the quality of decisions affecting operational and/or environmental processes (Bennett, Rikhardson & Schaltegger, 2003; Burrit, Hahn & Schaltegger, 2002; Garrison *et al.*, 2011; Tardivo & Di Montezemolo, 2009).

This leaves the question of what effect the activity-driven costing methodology will have on profitability and price of certain products.

## **1.2. FIELD OF RESEARCH**

ACME Fertilizer is a South African-based listed company which grew out of a family business distributing agricultural limestone (calcium carbonate). Currently its operations extend into Africa, but the main operation is in South Africa. After some recent product expansions and new facilities the company has seen substantial growth and it is expected that such growth will continue in the foreseeable future.

It is forecast by the International Fertilizer Industry Association (IFA) that the world fertilizer demand will increase by 4.8% from 2010 to 2011 which brings the total demand to 170.4 million metric tons (Prud'homme & Heffer, 2011). The International Grains Council (IGC) estimated that the global maize demand will reach 825 million metric tons in 2010/2011 and wheat may reach 650 million tons (IGC, 2011). The demand for fertilizer is growing daily due

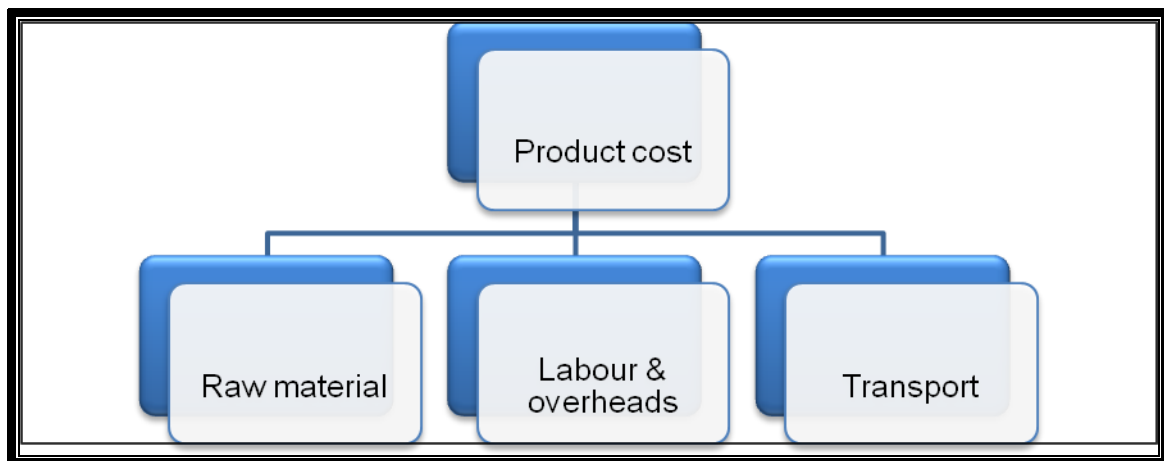
to various factors, some of which include the price of crops, price of fertilizer and other input costs, pollution fallout, soil type, the fast growing global population, etc. Fertilizer helps to restore the nutrient balance of the soil and to speed up the growth process of crops in order to have good harvests at the end of the season. ACME Fertilizer currently follows a basic costing methodology in the form of a standard-/hybrid costing framework.

There are four factors which are included in the cost of sales of the products they sell:

- Raw material costs;
- Fixed and variable costs;
- Labour and overheads; and
- Transportation costs.

ACME costs the main raw material based on the market value and the rest of the raw materials costs are based on historical information. The labour and overhead rate is based on a broad average calculation made annually by dividing the budgeted overhead costs by the forecast production tons. To achieve a competitive advantage, a crucial strategy to follow is the concept of product differentiation in which costing plays a vital role.

**Figure 1.1: Building blocks of product cost – ACME conventional costing method**



Source: Own research

ACME Fertilizers is currently faced with several challenges in respect of its costing methodologies, including the following (Ferrara, 2007):

- Forecast costs that are often overstated and forecast tons of produced fertilizer, which are understated with the resultant incorrect recovery rates per ton.

- Cost allocation information that is based on assumptions, e.g. resource availability and that all fertilizers use the same resources and time to manufacture, which may result in questioning the reliability of price fluctuations.
- The same labour and overhead rate is used to allocate costs to the products, without considering the relevant and actual effort to manufacture the various products and the fact that input costs and resources are less than others.
- The value, or cost, of a product needs to be set at a “balanced price”. If a product’s cost is set too high, the company will lose market share and if the cost is underestimated, profits will be negatively influenced. Because of the increase in costs associated with the manufacturing of fertilizer it is necessary to make provision for those increases over the forward cover, as well as for imported products. Therefore it is important to provide a more accurate costing method to increase the profitability and to reduce waste (Tatikonda & Tatikonda, 2001).

In order to determine the feasibility of an activity-driven operational accounting system within ACME Fertilizer, the following must be done:

- Identify a range of products to be included in the study;
- Determine the costs of these products, based on their operational activity requirements; and
- Compare the costs based on the activities they consume, against the current costs as per standard costing method.

This will determine what the effect will be of the different costing frameworks on the profitability per product.

### **1.3. PROBLEM STATEMENT AND HYPOTHESIS**

As highlighted above, a key challenge for many manufacturing companies is the lack of a proficient and robust cost accounting system that is able to provide managerial information about the company’s operations and to control its overhead costs efficiently. Such a system combined with reliable information feed can be considered as a good starting point for getting a competitive advantage, which is essential especially when the competition is strong and powerful.

The **primary research problem** to be considered is whether an activity-driven accounting framework in the ACME Fertilizers will provide better and more relevant management information.

The consideration of the following aspects will contribute to addressing the above problem:

- The impact that the activity-driven operational accounting framework will have on decision-making and financial structure;
- Current performance of operational activities;
- The utilization of activities to produce individual jobs or products;
- Accurate costs, through covering all direct and indirect costs associated with the manufacturing of products;
- Management of fluctuating cost driver mechanisms;
- Ensuring that risks are minimized and calculations are correct and realistic;
- Eliminating irrelevant, non-value adding costs without substituting the quality of products; and
- Effective resource utilization and control.

Blumberg, Cooper and Schindler (2008) defined hypotheses as the proposition for an empirical testing that must be uncertain and of an academic nature. A hypothesis is described by Crowther and Lanchester (2009) as uncertain proposed assumptions which are subject to justification through subsequent investigations. The hypothesis of this study is that the allocation of direct and indirect costs, based on consumption of activities and resources, will provide a much more accurate costing and cost recovery. The working hypothesis of this study is therefore that by allocating not only the direct costs, but also indirect costs based on consumption of activities, the method will be more advantageous and the cost hierarchy of the various products will be visible. This will eliminate the over- or under-estimation of indirect costs of a product.

#### **1.4. RESEARCH OBJECTIVES**

According to an independent research firm, Gartner (quoted by Furnis & Spencer, 2005) Activity-based Costing is an important decision support tool which enables a company to deal with the challenges regarding product, customer or channel profitability, as well as the cost of doing business.

Considering all the above, the primary objective of this research project is therefore to determine the feasibility of an activity-driven operational accounting framework within a manufacturing organisation and therefore defined as follows:

- To determine, compare and analyse the product costs, including the labour and overheads based on the current costing method and comparing the results to a

situation where costs get allocated based on an activity-driven operational accounting framework with resource and activity utilization as basis.

In addition to the above primary objective, this study will also lead to identifying the following secondary objectives:

- Ensure the lowest possible cost per ton of fertilizer and thus establish a higher margin, but a high profit at the end as well; and
- More effective and efficient utilization of available resources thus irrelevant costs will be eliminated and processes can be amended.

Other objectives for ACME Fertilizer which also contribute to this study are:

- Recovering full absorption costs on mainstream operations;
- Setting standard procedures for costing purposes;
- Maintaining the competitive position; and
- Embarking on best practices.

The application of Activity-based costing with special reference to planning, control, decision-making and more accurate and reliable costing will be evaluated within the company.

## **1.5. METHOD OF INVESTIGATION AND RESEARCH**

To achieve the above objectives, the proposed research method will be a case study and will be concluded by means of a literature as well as an empirical study.

### **1.5.1. Research methodology**

Blumberg *et al.* (2008) defined business research as a "...systematic inquiry whose objective is to provide the information that will allow managerial problems to be solved." Research methodology is defined as the category of research approach used in a research study and relates to the data collection (Crowther & Lanchester, 2009). Research is done for this study to be able to provide information and assistance in cost management and decision-making. Blumberg *et al.* (2008:195) defined research design as an activity- and time-based plan and it is based on research questions. It guides the selection of sources and types of information and as a framework in specifying the relationships among the study's variables. The design gives direction to and sets procedures for the research activities.

### 1.5.2. Research studies and design

There are four different types of research studies namely reporting, descriptive, explanatory and predictive.

- Reporting research is an uncomplicated level of research where an account or summary of data is given (Blumberg *et al.*, 2008). This research method is employed for this research project on the current situation in the ACME case study.
- A descriptive study will answer the “who”, “what”, “when”, “where” and (sometimes) “how” questions. By creating a group of problems or people, the subject will get some meaning and definition (Blumberg *et al.*, 2008).
- An explanatory study will provide reasons for the results of the descriptive study (Blumberg *et al.*, 2008).
- Predictive research will ensure that should you be able to provide an explanation for the event after it has occurred. It is preferred to give a prediction of when and in what situation a similar event might occur (Blumberg *et al.*, 2008).

According to Blumberg *et al.* (2008) the criteria of research include a good desirable decision-oriented research.

### 1.5.3. Research method

Quantitative studies rely on quantitative information like numbers and figures, and are more objective and scientific (Blumberg *et al.*, 2008; Crowther & Lanchester, 2009). Qualitative determination is more driven towards qualitative information like words, sentences and narratives (Blumberg *et al.*, 2008) and is more applicable to phenomena which are difficult to quantify (Crowther & Lanchester, 2009). For this study, both qualitative and quantitative studies have been done. Chapters 1 to 3 are based mainly on quantitative studies, and in Chapter 4, there is a mixture of qualitative and quantitative studies. With the empirical case study, qualitative studies have been used.

Case study research is a crucial and widely used method of research. It follows replication logic, in other words, the results of case studies are not generalized to populations (sampling logic) but to theoretical propositions (Blumberg *et al.*, 2008). It emphasizes the possible implementation of concept in its real life context (Blumberg *et al.*, 2008). Case studies rely on multiple sources for evidence (Blumberg *et al.*, 2008) and include interviews, documents and/or archives and observation. In the case of ACME Fertilizer, a case study was done to prove the hypothesis of this study.

Questionnaires are very commonly used and are a valuable way of data-gathering (Crowther & Lanchester, 2009). Self-administered surveys and questionnaires are used to gather information. Using a survey is the approach to collect data from a large number of respondents to identify a specific trend (Crowther & Lanchester, 2009). The surveys/questionnaires can be delivered per hand, e-mail, courier or post, whichever is the preferred method. For the purpose of this study, a questionnaire (see Appendix 1, p 77) of 20 questions was either delivered by hand or via e-mail. Participants completed the questionnaire without assistance from the interviewer, and this could be done on their own, either in their offices or at home.

Valuable information can be gathered through looking and noting (Crowther & Lanchester, 2009) as the event occurs (Blumberg *et al.*, 2008). Observation can generate data based on what is actually happening and what is not according to what people claim they are doing or how processes are supposed to be working (Crowther & Lanchester, 2009). Non-behavioural observation will include process (activity) analysis and includes time/motion studies of manufacturing processes and the traffic flow in a distribution system (Blumberg *et al.*, 2008). Behavioural observation includes body movements, motor expressions, etc. This is not included in this study (Blumberg *et al.*, 2008). For this study, an observation at ACME's main factory in Sasolburg was done in order to note the processes and procedures when manufacturing fertilizer.

#### **1.5.4. Literature study**

A literature study has been conducted through gathering theoretical information by means of a review of the relevant text books, relevant articles from academic journals, subject-specific magazines and case studies. The foundation of the case study will be based on basic information and theory of Activity-based Costing and the implementation thereof.

#### **1.5.5. Empirical study**

An empirical study will be carried out to measure the results of the current traditional costing method versus an activity-driven operational accounting framework method within the company. Firstly, interviews were held with the stakeholders who include finance, supply chain, planning and operational management teams, factory managers and accountants. All had a possible influence on the cost of a product, whether it was raw material procurement, handling of the stock (raw materials, intermediates and/or final products) or the manufacturing process.

Secondly, an exploratory survey was also conducted by a third party, managers, cost and management accountants, etc. of related industries. The sample was chosen randomly and the objective was to find out more about their costing methodologies. The questionnaire is attached (see Appendix 1, p 77). Direct competitors could not be approached directly because of current competition commission investigations. Their financial statements of 2008 were published and made publicly available, and some information on their costing methodologies could be deduced from there.

Thirdly, ACME fertilizer's management reports and other internal reports for the financial year 2008 were also analysed to provide a clear perspective as to what their current situation is and how an activity-driven operational accounting framework would affect profit margins on certain products. Labour, overheads and other cost drivers were taken into account based on the financial information from 2008. Information was also gathered through daily activity observation within respective departments and factories, and the correct application of relevant cost management techniques in the workplace.

## **1.6. TERMINOLOGY**

ABC terminology is very work-centric, not like the traditional costing terminology which is more transaction-centric. Definitions of commonly used terminologies relating to Activity-based Costing include the following:

- **Activities:** An activity is a unit of work performed in a process. An activity consumes the resources available as well as the applicable costs such as setting up the machine and processing invoices (Christie, 2008; Stout & Bedenis, 2007; Tatikonda & Tatikonda, 2001).
- **Activity-based Costing:** This is where activities get monitored and costing is done by means of resource consumption, and the costing of the final product gets done. Resources are assigned to activities and activities to cost objects (based on resource consumption estimates) (CIMA Terminologies, 2010; Fabozzi, Drake & Polimeni, 2007; Tardivo & Di Montezemolo, 2009).
- **Activity-based Management:** Actions that increase effectiveness, reduce costs and/or to improve resource utilisation (CIMA Terminology, 2005; Christie, 2008; Tardivo & Di Montezemolo, 2009).
- **Activity Driver:** CIMA Terminology (2005) defines an activity driver as an activity caused by a transaction, for example receipt of a sales order sets in train the order processing activity (Christie, 2008; Tatikonda & Tatikonda, 2001).

- **Bill of Material:** This is a detailed specification, for a final product or output, of the materials, other projected costs and scrap factors required (CIMA Terminologies, 2010; Herzner, 2009).
- **Costs:** Expenditures can be classified into two different costs, viz. product costs and period costs. Product costs can then be classified as direct (traceable) and indirect (shared) costs. Indirect costs can be allocated to product by a chosen basis, such as machine hours (Drury, 2008; Horngren *et al.*, 2003; Tatikonda & Tatikonda, 2001).
- **Cost Centres:** Costs traceable to the central unit of tasks in a company (CIMA Terminology, 2005; Drury, 2008; Garrison *et al.*, 2011).
- **Cost Driver:** Any factor than causes a change in the cost of an activity (CIMA Terminology, 2005; Tardivo & Di Montezemolo, 2009) and is the source of the activity cost (Fabozzi *et al.*, 2007).
- **Cost Object:** The final result or output which all the above costs get linked to (Stout & Bedenis, 2007). All 'work' and processes are done because of the cost object and can be a customer or a product (Tardivo & Di Montezemolo, 2009). This will be the identifiable products or services.
- **Relevant Cost:** Incremental costs (or relevant cost) are the additional costs incurred as a result of selecting one decision alternative over another (Jiambalvo, 2004). Relevant costs are those costs that will be considered in making a decision and will be affected by that decision. Relevant costs are those costs which will be influenced by future decisions and are valued at their market value (Drury, 2008).
- **Resources:** Expenses (in the general ledger of a company) incurred by the company to help in delivering the final product (Tatikonda & Tatikonda, 2001). Resources are devoted to the performance of activities, and are the source of costs (Stout & Bedenis, 2007). These expenses include salaries, utilities, depreciation, raw material costs, etc.
- **Sunk Cost:** This is a cost which has already occurred and a future decision cannot influence this cost (CIMA Terminology, 2005). This cost is the opposite of relevant cost (Drury, 2008). Sunk cost is a cost which you cannot do anything about any more.
- **Time-Driven ABC (TDABC):** An approach to ABC by calculating the time required for each unit of activity. The method is easier to implement and maintain. It avoids the use of costly interviews with employees to determine the percentage of time spent on different areas of work and unutilized capacity can be visible (CIMA Terminology, 2005; Max, 2007; McGowen, 2009).

## 1.7. CHAPTER OVERVIEW

To provide structure for the research project, the following chapter layout was chosen:

### Chapter 1: Introduction

This chapter consists of a background to this study, the rationale and motivation, problem statement, hypothesis, research objectives and aims, method of investigation and the chapter overview.

### Chapter 2: Activity-based Costing focused theory

Theoretical research related to Activity-based Costing (ABC) has been the aim of this chapter. 'Activity-based Costing' and other related terms are defined, as well as the applicable advantages, disadvantages and fundamentals. Implementation of the activity-driven framework is addressed, as well as the implications and supporting systems thereof. A comparison between ABC and the traditional methodology is also included in this chapter.

### Chapter 3: Fertilizer business synopsis

This chapter covers the summary of the fertilizer industry in general and the specifics of ACME's business. It also covers topics such as sales reporting, the manufacturing process, current costing methodology and factors which can influence the costs of different products within ACME's business model and operations.

### Chapter 4: Empirical research at different business units

The purpose of this study is to compare the current standard costing method ACME fertilizer follows, to the possibility of implementing an activity driven operational accounting framework. A scenario is given where the two methodologies are brought into perspective by means of a case study. One scenario, two methodologies, and the outcome thereof are analysed and recommendations made accordingly.

### Chapter 5: Findings and recommendations

Following the investigation into the method currently in use by ACME fertilizer and the embedding of an activity-driven operational accounting framework, recommendations are made to ACME fertilizer. The best practices are identified and recommended to ACME fertilizer for further consideration.

The next chapter provides a précis of the theory of ABC and includes definitions, applicable advantages, disadvantages and fundamentals. Implementation of the activity-driven framework is addressed, as well as the implications and supporting systems thereof.

# CHAPTER 2: PRINCIPLES OF ACTIVITY-BASED COSTING

## 2.1. INTRODUCTION

The purpose of this chapter is to summarise the theoretical research relating to ABC. ABC is defined and the applicable advantages, disadvantages, key components and fundamentals are discussed. Implementation of an activity-driven framework is addressed, as well as a comparison between traditional methods of costing vs. the ABC method.

One of the main reasons why companies fail is because somewhere in the past, bad decisions have been made. The solution is not to cut costs only, but to retain a good cash flow and liquidity (Dwyer, 2009). As the costs increase, their cash flow and profit margins are decreasing. This is seen more often in the business world than ever. The price of goods sold is not inclining as fast as the input costs, thus we are facing a recession where only the 'fittest' companies will survive. "Fittest" companies are not necessarily big companies, but rather the great ones (Collins, 2009). High interest rates, increased fuel prices and other costs are the reason for the steep price increases, and if we do not take remedial action, these high costs and poor economic circumstances will strangle more companies globally.

In any company it is very important to control and manage costs (Narong, 2009). ABC is a management tool which should provide managers with strategies for pursuing possible growth (Stout & Bedenis, 2007) and cost management. By making use of ABC, the management of ACME Fertilizer might get a better understanding of the costs of the product, simplified products and processes, financial management, eliminating waste and idle times, cost reduction, lead time reduction, better resource and overhead allocation, improved quality, added value, better customer satisfaction to name but a few as it is the order of the day (Narong, 2009). Costly and non-value adding activities could be identified, and managers could focus on these activities to reduce or eliminate the costs (Stratton, Desroches, Lawson & Hatch, 2009). These are all critical issues when the focus is on improved profitability and better decision-making. The ABC methodology supports continued improvement, a balanced scorecard and performance measurement. In this chapter, ABC is discussed under the following headings:

- Background;
- Key components of Activity-based Costing;
- Fundamentals of Activity-based Costing;
- Advantages of Activity-based Costing;
- Disadvantages of Activity-based Costing;

- Implementation of the Activity-based Costing approach (Introduction, Conditions and Steps); and
- Other ABC-based methodologies.

## **2.2. ACTIVITY-BASED COSTING**

### **2.2.1. Background**

During the late 1980s a new method of costing was developed by academic researchers, Professors Robert Kaplan and Robin Cooper (Kennett *et al.*, 2007), to overcome some problems that the traditional method had. The traditional method allocated overheads to products based on only one volume-sensitive driver, which distorted cost estimates (Christie, 2008; Kennett *et al.*, 2007; Roztocki & Scultz, 2003).

ABC has proved positive results for companies who succeeded in the implementation of the process. In a recent study done by Stratton *et al.* (2009) 70% of the respondents who already implemented ABC had noted the benefits and they now have accurate costs of activities. The implementation process is described in detail later in this chapter.

ABC is not limited to manufacturing costs only but includes non-manufacturing and other overhead costs such as selling, marketing, distribution and administrative costs that can be traced to the product through activities (Garrison *et al.*, 2011; Christie, 2008). Products get charged for the cost of capacity it actually uses, and idle time is not taken into consideration (Kaplan & Anderson, 2007). Identifying and allocating costs based on an activity rate assist in making decisions not only about product costs, but also distribution and customer related decisions (Cokins, 2001b; Friedl, Küpper & Pedell, 2005; Stratton *et al.*, 2009).

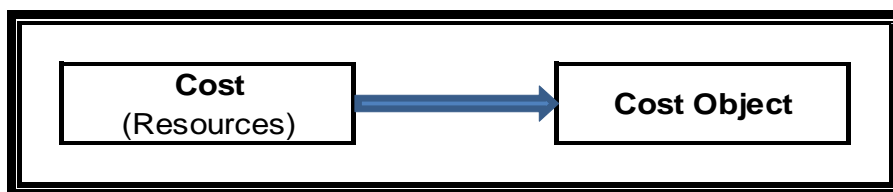
### **2.2.2. Key components of Activity-based Costing**

It is important to understand the meaning of the often used terms in ABC methodology. Turney (2005) defined ABC as a technique to measure the cost and performance of activities and cost objects (see figure 2.2). Costs are assigned to activities based on resource consumption, and to cost objects based on the usage of these activities (Garrison *et al.*, 2011) (see figure. 2.2). CIMA Terminology (2005) states that ABC is where the costing of activities is done and monitored by means of resource consumption in order to cost the final product accurately. Resources are allocated to the various activities, and these activities will be allocated to cost objects based on consumption estimates. Activity-based Costing is a costing method which can trace cost to activities which take place based on resource consumption and/or capacity usage, and then furthermore to the product which

caused the activity (Kennett *et al.*, 2007; Stratton *et al.*, 2009; Tardivo & Di Montezemolo, 2009; Turney, 2005). Its ability to identify cost cutback opportunities may be very helpful in today's economic environment of cost saving attitude amongst companies. If the expected benefits are more than the expected cost, ABC must be definitely considered (Kennett *et al.*, 2007).

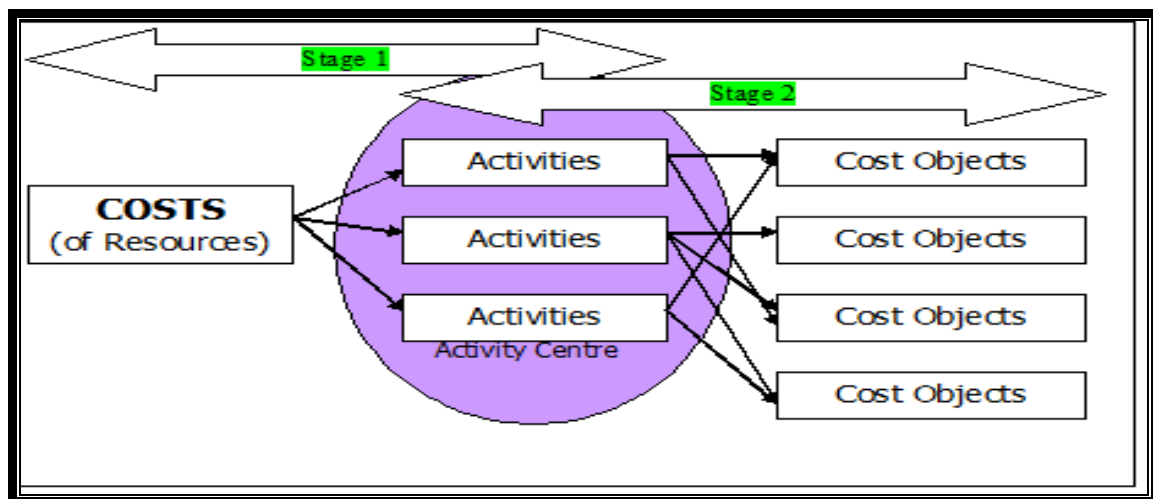
Cost objects will have a certain percentage of usage of each activity. Various costs from the general ledger will be allocated to a specific activity and based on the percentage consumed per cost object will be allocated to the final products costing.

**Figure 2.1: Costing basic structure of an Activity-based Costing system**



Source: Cokins 2001a:60.

**Figure 2.2: Costing basic structure of an Activity-based Costing system**



Source: (Modified) Turney, 2005.

### 2.2.3. Fundamentals of Activity-based Costing

The fundamentals of using the ABC methodology are to estimate the costs where the project is sub-divided into activities or work units. The activities must be performed where the productivity can be measured in units. The cost of performing that activity is estimated by summing all relevant costs to that activity such as labour, materials, equipment,

subcontracting costs etc. and accumulate in the cost pool (Christie, 2008; Garrison *et al.*, 2011; Kennett *et al.*, 2007; Stratton *et al.*, 2009). The total cost of the final product/service will be the sum of all the activity costs based on the consumption of the activities (Kennett *et al.*, 2007). This will contribute to giving much more accurate estimates of the actual cost of products, and is an important step towards increasing profits.

The motivation behind ABC is to be in control of the costs and overheads in an operation. It is highly recommended when indirect costs of a product make up a high proportion of the total cost. It is advisable to analyse ABC as a possibility when the above-mentioned criteria are applicable. Should the financial benefits of applying an ABC system to ACME Fertilizer be greater than the financial cost of the implementation thereof, it will most definitely be advantageous to implement ABC (Kennett *et al.*, 2007). Companies with little or no product differentiation and which have labour-intensive operations will not gain much from ABC (Tatikonda, 2003), but if the company has significant overheads, ABC will warrant serious consideration (Kennett *et al.*, 2007; Stratton *et al.*, 2009). Because of different production methods and technology that play a big role in today's production environment, a much higher proportion of overhead costs will be allocated to indirect cost. For example, labour in the traditional method consisted of a huge proportion of the total product cost (Garrison *et al.*, 2011). In the modern business environment most production processes get automated, which leads to lower physical labour costs, but a higher indirect overhead cost. Because of this situation, the indirect costs need to be allocated to the product to recover all costs otherwise the costs may be distorted. ABC will resolve this problem that traditional accounting methods face in this changing world.

#### **2.2.4. Advantages**

The first important issue why ABC will be advantageous is measurement. The way a company is measured will determine the results. You cannot improve what you cannot measure. Whether it is profit, market share, or materials consumed, the end result will be dependent on what drives the company. Some of the most common measurements are customer and product profitability and cost management (Kaplan & Anderson, 2007). To achieve higher profits your first step will be to optimise cost rather than just cutting costs of products without forfeiting the quality (Tatikonda, 2003). Traditional costing methods might not be the most reliable source of the true costs. The objective of this study is to investigate the possibility of implementing an ABC system, and the effect it will have on the costing of a product and the profitability of ACME Fertilizer.

If ABC is implemented correctly and all the necessary data captured with special care, it can hold significant advantages for ACME Fertilizer. Here are a few of the advantages:

- ABC gives a more visible and accurate calculation of the true costs of a product, which can help in better allocating resources and decision-making especially in today's globally competitive market (Christie, 2008:70; Garrison *et al.*, 2011; Needy, Nachtmann, Roztock, Warner & Bidanda, 2003; Stratton *et al.*, 2009). This means that there will be a better understanding of overheads allocated to a product, and substance as to why it's been allocated (Stratton *et al.*, 2009).
- With ABC the total activity costs and work processes can be directly assigned to the cost object (Christie, 2008; Stratton *et al.*, 2009).
- Productive resource utilization is a common inadequacy in the operational side of business, but with ABC scarce resources can be maximized and distributed throughout the manufacturing process as well as other operational improvements opportunities can be identified and executed (Stratton *et al.*, 2009; Stout & Bendenis, 2007).
- ABC provides better cost control and management, more accurate decision-making, performing budgeting, planning and performance evaluation (Stratton *et al.*, 2009). Thus, it creates better public and customer relations, because selling prices are based on more reliable costing (Christie, 2008).
- Performance measures are crucial in any company and the ABC model can identify most (and least) profitable customers, products and resources (Christie, 2008; Furniss & Spencer, 2005; Stratton *et al.*, 2009).
- The main reasons for poor financial performance can be pointed out (Furniss & Spencer, 2005) and it will be evident on which areas to focus on or to improve.
- Non-value adding, redundant and under-utilised resources can easily be identified and eliminated which means only the necessary costs will be allocated to the outputs (Tatikonda & Taticonda, 2001).

### **2.2.5. Disadvantages**

Because of the volatility in commodity prices that we face today, it's important that ACME manage their cost with care. ACME Fertilizer faces huge risks buying high volumes of raw material stock at a certain price, which can fall drastically within a few days, depending on the market supply and demand of that product. If the cost of the final product is overstated by not having an accurate costing system or knowledge of the costs, this might lead to unfavourable situations (Vercio & Shoemaker, 2007). These situations can be either unrealized sales because of a too high selling price or on the other hand they might sell the products at a loss only to get it out of stock and avoiding further losses.

ABC can be beneficial and should not be a “nice to have” system. It should be used to its fullest potential. If a commitment towards ABC is present, ABC will ensure that costs are allocated accurately and that the true costs of products/services can be visible. Thus, accurate margins at year end, which means no nasty surprises which can lead to a downward spiral in a company.

Therefore it is evident that an accurate, proper costing methodology is crucial in any competitive market, and that a feasibility study of the different options must be done in order to be able to choose the best possible one where the financial benefits outweighs the cost involved.

Some of the disadvantages reported with ABC are that the implementation and the maintenance thereof are time-consuming and too costly, especially the expensive employee surveys that are required and the cost of additional staff needed (Christie, 2008:70; Kaplan & Anderson, 2007). If employees are not informed about ABC, they will feel confused, thus they will not be eager to support and maintain the ABC system (Tatikonda, 2003). To process the raw data, gathered through several channels, can take up to 30 days to prepare a useful report, which will be outdated when management needs the information (Kaplan & Anderson, 2007; Stratton *et al.*, 2009). Management needs information that is timely and relevant (Garrison *et al.*, 2011). There will always be a delay in delivering the final results. Inaccurate input and results may occur if information is not 100% correct (Garrison *et al.*, 2011). The accuracy of the results is based on the correctness information given by this model (Christie, 2008). The model is dependent on the feed of information by employees whom can make human errors and is not always correct. There can be problems integrating the current legacy system with ABC. ABC can block accounting systems, thus misleading cost reports can be given to management, which will lead to poor decision-making and will destroy the integrity of the ABC system (Tatikonda, 2003). Manual collection of inputs must be done with care; otherwise the result will be false.

ABC perceives activities and resources to be linear, absolute and certain (Geri & Ronen, 2005), and internal limitations or constraints are not considered. Overheads are difficult to assign to the activities, and are thus applied arbitrarily (Garrison *et al.*, 2011). The identification of cost drivers is difficult, and sometimes has little or no relevance to the activity (Adkins, 2008; Christie, 2008; Geri & Ronen, 2005). Many companies left ABC unconsidered because it did not recognize the complexity of their operations (Stratton *et al.*, 2009). An ABC system should be altered according to the company's needs and goals.

When following an ABC methodology, an unprofitable product on the income statement can be eliminated although the recovery of the fixed operating costs thereof will remain

unavoidable (Baxendale & Raju, 2004). Additional documentation and record-keeping might be required (Christie, 2008) to support the ABC model. This will lead to unnecessary storage and labour cost and time wasted.

Historically it was financially not viable to consider ABC because it had the reputation that it was very costly and time-consuming to implement and maintain (Stratton *et al.*, 2009). However, before a company rejects ABC they should first be sure that ABC is not the best system for their needs and that the cost of implementing and maintaining ABC cannot justify the benefits of ABC (Kennett *et al.*, 2007). If a company is not fully committed to ABC, and isn't willing to spend the necessary resources (operational and human resources), cost and time ABC will not be as successful. ABC can be misleading and too wide. A lot of effort will go into maintaining the information and system, with regular updates of operational changes. The ABC system can't be run alone and should be run parallel with a proper ERP system to ensure best results.

## **2.3. THE IMPLEMENTATION OF ACTIVITY-BASED COSTING**

### **2.3.1. Introduction**

There are a few strategic implications of the current costing system that needs to be addressed which will determine the outcome of the implementation of ABC. Firstly, ABC focuses on medium to long-term planning and decision-making and must provide managers with relevant and accurate product cost information. This is important when new products and markets are considered as well as other management decisions (Tatikonda, 2003). ACME Fertilizer must compete with global companies who might have lower labour costs, manufacturing overheads and stronger currencies (Lowder, 2006). Imported raw materials are volatile especially with the rand/dollar fluctuations that South Africa is facing these days.

Thus, the supply chain in companies can have a lack in continuity and therefore it is crucial that there is focus on its value chain (Kannegiesser, Gunther, Van Beek, Grunow & Habla, 2009; Walters & Lancaster, 2000). Companies can't afford to make the wrong decisions that have an impact on product mix, price quotes, inaccurate costing of products, etc. (Cokins, 2001b; Stratton *et al.*, 2009). Throughput evaluation addresses the production throughput (Lowder, 2006). Bottlenecks or constraints must be eliminated because they slow down the production throughput and have huge costs associated with plant down times.

The one certain factor in any business is change. Therefore the cost-accounting system must be accurate, relevant, flexible and comprehensive. No ownership in a department confuses the employees, thus not supporting the system. After implementation employees

will lose interest, the maintenance thereof becomes hard work and will be extended to employees at a lower level (Tatikonda, 2003). This can also lead to unsuccessful implementations (Stratton *et al.*, 2009).

Secondly, because ABC is focused on medium to long-term results and decisions, some decisions may affect the company's reaction at a global level and operational throughput which will have a huge impact on ACME Fertilizer's financial performance. To help achieve success, ownership should be transparent and employees should know their responsibility and where they fit it in making ABC work efficiently. The ABC model and the accounting system should be maintained and changed regularly (Garrison *et al.*, 2011).

The implementation of ABC will improve visibility of the costs to managers and employees. Continuous improvement is the attribute of analysing of costs and cost structures (Needy *et al.*, 2003), to reduce or eliminate non-value added activities and to achieve overall efficiency, without affecting the quality of products. A company can have a cost system which is integrated with its current system where the ABC information is used outside the accounting function for decision-making and performance measurements (Baxendale & Raju, 2004; Searchy & Roberts, 2007). ABC should therefore be seen as a superb supplement to, rather than a replacement of, a company's current system (Adkins, 2008; Garrison *et al.*, 2011). External reporting requires that production costs must be allocated to the cost object for income and asset reporting purposes. On the other hand, other costs from the internal value chain get allocated to the product for operational cost control, strategic decision-making and performance measurement (Kannegiesser *et al.*, 2007; Stratton *et al.*, 2009; Walters & Lancaster, 2000).

Should operational improvements be implemented, and ABC data can be maintained and managed regularly, benefits can realize and ACME Fertilizer can strive towards continuous improvement and more accurate cost control.

### **2.3.2. Conditions prior to implementation**

To be successful in the implementation process, it is necessary to determine whether the company complies with several conditions before the process can start. The most critical issues include informational, technical, design, behavioural, financial, competitiveness, and managerial issues.

- Informational issues: It is crucial that there should be management commitment present from the implementing company and all levels of management must be fully informed about the advantages ABC will provide to the company and how this

method will work for them, i.e. assist in decision-making processes, cost control, etc. (Christie, 2008; Needy *et al.*, 2003; Tatikonda & Tatikonda, 2001). The current costing system must be assessed, a process plan of all shortcomings must be conducted and a detailed report of what is needed in order to successfully implement the new costing system (Needy *et al.*, 2003). Potential data sources that can assist in data gathering must be identified. A customer profile must be developed (Needy *et al.*, 2003) in order to determine the ratio of your clientele which make up a significant percentage of your total sales, e.g. 80% of ACME Fertilizer sales are made up by only 20% of all its customers.

- Technical issues: All employees should get efficient training to operate the system and to understand and actually use the information provided by an ABC system (Christie, 2008; Tatikonda, 2003). The implementing company must be willing to appoint an expert with the necessary qualifications and experience in this field to manage this system (Christie, 2008; Tatikonda, 2003). Rather spend sufficient money in the development phase than incurring higher costs later to fix what wasn't done properly earlier.
- Design issues: To give proper direction, the practical requirements, objectives and specifications of an ideal proposed costing system must be identified and/or developed (Needy *et al.*, 2003). A cost accumulation model must be developed to assist in the prototype of the system on software like MS Excel (Needy *et al.*, 2003). Compare product costs on the old/current system with the new prototyped costing system (Needy *et al.*, 2003). Because the design is a very important process the implementing company must be willing to spend the necessary money on the implementation and maintenance. The activity-driven operating system should not replace the ERP system, but rather run parallel with it.
- Behavioural issues: Users of the ABC system must understand that the implementation might take time before providing results, but will be worth the wait (Christie, 2008:70; Tatikonda, 2003). They should stay committed and not lose interest. Sufficient training must be provided to the users until they are comfortable. Management must inform and force the users to manage and use the data, otherwise they might lose interest, and the project will fail (Christie, 2008:70; Tatikonda, 2003). By employing a committed team who will only be responsible to manage ABC will ensure better commitment and success.
- Financial Issues: A financial feasibility study must be done to determine whether the benefits will outweigh the costs of implementing the ABC systems (Kennett *et al.*, 2007). The non-volume overheads must be significant (Christie, 2008:70; Tatikonda, 2003). Distorted costs are given by the current costing system (Christie, 2008:70;

Tatikonda, 2003) and the ABC system should improve cost control and the management thereof. A fixed-to-variable ratio needs to be calculated (Needy *et al.*, 2003) in order to determine whether the current circumstances will comply with ABC. Furthermore a thorough analysis of the financial statements must be conducted (Needy *et al.*, 2003). This will be very helpful when setting goals and measuring the value of the change, as well show on which areas you should focus. Very importantly, the implementing company must be financially capable to pull off such a project and to support it afterwards (Christie, 2008:70; Kaplan & Norton, 2008; Tatikonda, 2003). If the company is not in such a strong financial position all research cost and time will be wasted, because of the high input cost of implementing ABC.

- **Competitiveness Issues:** Determine whether ABC is already implemented by competitors (Christie, 2008:70; Tatikonda, 2003), or whether they are considering it. Do this research at other companies' similar industries and sizes who might share this information more easily than competitors. Ask how they experience the new ABC systems and what recommendations they have.
- **Managerial Issues:** Top Management must be committed to and willing to support the implementation process (Christie, 2008:70; Garrison *et al.*, 2011; Tatikonda, 2003). Their buy-in is very important to the success of the implementation and maintenance of an activity-driven costing system.

If ACME Fertilizer is complying with the above-mentioned conditions and have the financial ability and senior management's commitment on the project, they can consider implementing an ABC system. Sufficient research, training and expertise must be considered. ABC should be used as a supplement to the current ERP system. Activities get classified at four levels. Unit-level activities are activities which are performed every time a unit is manufactured, and assume that inputs are consumed in direct proportion of units manufactured (Garrison *et al.*, 2011). Batch-level activities are activities which are performed every time a batch is manufactured and assume that inputs are consumed in direct proportion to batches manufactured, without the size of the batch having an effect on it (Garrison *et al.*, 2011; Vercio & Shoemaker, 2007). Product-level activities are activities which are performed as needed to support the production of each type of product and assume that inputs are consumed to allow production of a product. Facility-level activities are necessary to maintain the facility's functionality. These costs are randomly allocated, if at all. These costs include head office costs, salaries of directors, etc. (Tatikonda & Tatikonda, 2001).

### 2.2.3. Steps for implementation

After a thorough analysis and feasibility studies have been done, and it has been decided to implement ABC, there is a basic set of steps that needs to be followed. When designing an ABC model, the following steps are required to assign the activity costs to cost objects:

- Identify the object for which costing has to be done, or the output. These are the desired end results or product. Cost objects are the sum of all individual unit costs (Garrison *et al.*, 2011; Krumwiede & Roth 1997; Tatikonda & Tatikonda, 2001).
- Identify the process involved and the major activities as well as the costs associated with each activity (Unit, batch, product, facility and customer level activities) (Christie, 2008:68; Garrison *et al.*, 2011; Krumwiede & Roth 1997; Vercio & Shoemaker, 2007).
- Determine the cost pools as well as the primary and secondary cost driver per activity pool. Indirect and direct resource costs get allocated to cost pools (Garrison *et al.*, 2011; Krumwiede & Roth, 1997; Tatikonda & Tatikonda, 2001).
- Calculate the cost per unit of cost driver applicable per each activity and assign these rates to the cost object (output) (Garrison *et al.*, 2011; Krumwiede & Roth, 1997).
- Analyse the result to determine what the most costly aspect is in this process, which activities can be eliminated or added (unutilized capacity) and advise on what will be the most cost-effective solution. Managers must be able to make operating and strategic decisions based on the information given (Christie, 2008:68; Garrison *et al.*, 2011; Tatikonda & Tatikonda, 2001).The implementation process will be discussed in detail in Chapter 4 by means of an empirical case study on ACME Fertilizer.

The proposal that ABC implementation is basic and uncomplicated is the message that gets sent out in many articles and journals, but to implement a system that in reality works and deliver the expected benefits is very convoluted (Searcy & Roberts, 2007).

Tatikonda (2003) stated that a costing system need not necessarily be complex. The data needed for ABC can be sourced from interviews at the operation, and data which is already available. Though this data is not precise, this is sufficient for managerial decision-making. One must be careful not to go in to much detail, but only necessary and relevant data must be used, maintained and always kept up to date.

The organizational structure and financial status of the company will have an effect on the duration of ABC implementation process. Internal factors which have an effect on ABC's ability to influence the decision-making process in a company include the corporate culture, available information systems and current financial performance (Stout & Bedenis, 2007).

There are two phases in which overheads get allocated to the cost objects (or outputs) with ABC (Cooper, 1990) (See figure 2.2). The first stage requires tracing all costs that resources consume and allocate these costs to the activity cost pools (Baxendale & Raju, 2004). In the second stage, all overhead costs from activity cost pools get allocated to the cost object (output). In traditional costing methods, the costs get directly allocated to the cost object (see figure 2.4) (Vercio & Shoemaker, 2007).

- Resource - First, the meaning of a *resource* needs to be understood. It is the beginning point of all costs to produce the final product. The expenses can be gathered through the general ledger and include raw material costs, salaries, storage fees, research and development costs, etc. (Stout & Bedenis, 2007; Tatikonda & Tatikonda, 2001). The costs traceable to the activities are therefore sum of the resources consumed to perform any processes to add value to the cost object or output (Gonzalez & Morini, 2006). To get the amount of resources consumed, an analysis of the data from the general ledger can trace the costs back to the activities. These costs can then be classified through a level hierarchy according to the level of direct costs, indirect costs and general and admin expenses incurred.
- Activities - An activity is a unit of work performed by people and machines (Christie, 2008:68). Activities can be organized by creating a master list called the “Activity Dictionary” (Stout & Bedenis, 2007; Tatikonda & Tatikonda, 2001). Once one has that information, the outputs which used the resources and activities can be determined.

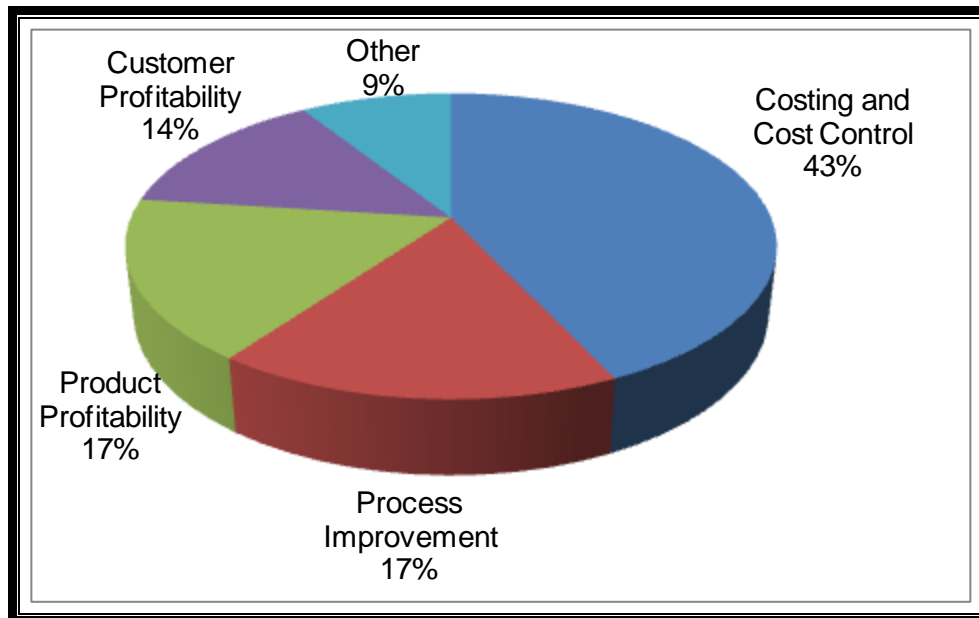
### **2.3. CASE STUDIES – ACTIVITY-BASED COSTING IMPLEMENTATION**

Needy *et al.* (2003) concluded a study on the implementation of an ABC system on small manufacturing companies and identified 3 out of 30 potentially good candidate companies for the implementing of and benefiting by ABC. Company names remain anonymous. They found that 22% of service companies and 19% of manufacturing companies interviewed had already implemented ABC. Those companies which implemented ABC was overall bigger companies and had a diverse product mix (Roztoki & Schultz, 2003). Their accountants were also more familiar with ABC than those of smaller companies. Needy *et al.* (2003) predict that should smaller companies become more familiar with ABC that they will definitely consider implementing it (Roztoki & Schultz, 2003). Results of a recently published study, “Activity-based Costing: How Activity-based Management is used in the Organisation” (Better Management, 2005) proved that Activity-based management is contributing to the improvement of performance management results. This survey was done in July 2005 and included 528 participants across all industries worldwide. The results showed that 89% of the participating companies has already implemented or is considering implementation of

ABC systems. Sixty percent of the participant companies stated that their output from the ABM systems supports performance management initiatives in their companies.

The primary usage of the ABC model is given in figure 2.3.

**Figure 2.3: Activity-based Costing's primary use**



Source: Bettermanagement, 2005

Another survey of 49 U.S. cities with 100 000 + populations was done by Ho and Kidwell during 2005 / 2006 (Kennett *et al.*, 2007). The results proved that users of ABC can confirm that the benefits of ABC outweigh the disadvantages, but the feelings were mixed as to whether the benefits were indeed greater than the costs incurred in implementing and maintaining the system. Although non-users agreed that the information provided by ABC can have a considerable effect on business decisions, they believed that it would not be financially feasible to consider ABC (Kennett *et al.*, 2007).

In the study by Roztoki and Shultz (2003) service firms and manufacturing firms with multiple diverse products or services and overheads can benefit by the use of Activity-based Costing. Larger firms might already have the accountants and managers available who are familiar with Activity-based Costing than those working for smaller businesses.

By looking at these results it's clear that ABC might be a useful management tool which will assist in product decisions and profitability, operational improvements and performance measures. ABC is attractive to highly competitive firms with significant overhead cost

(Stratton *et al.*, 2009:34) which need to be managed closely and who will be able to reduce the non-value added costs in order to be more profitable.

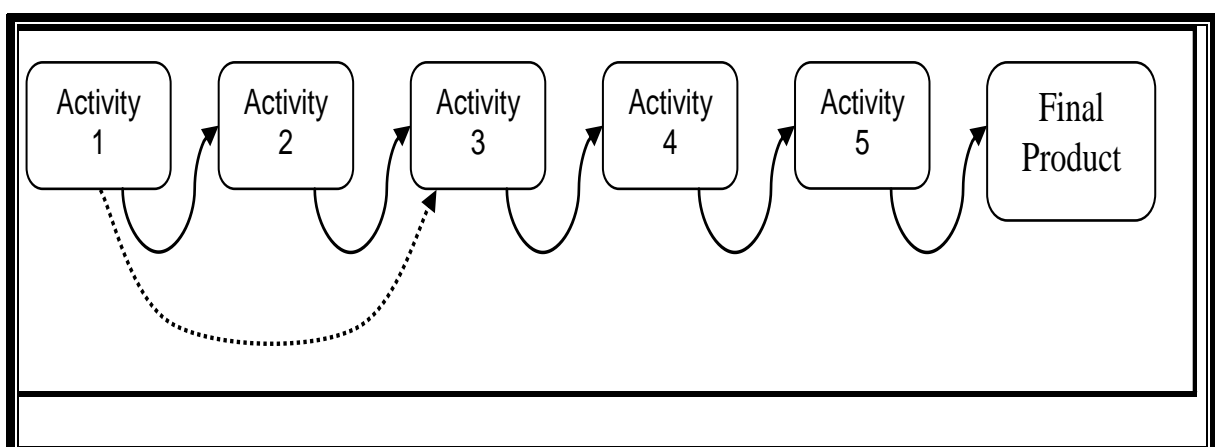
## 2.4. OTHER ACTIVITY-BASED COSTING METHODOLOGIES

### 2.4.1. Traditional costing methods vs. Activity-based Costing

Traditional costing can be used in organizations with limited competition, and where indirect costs only consist of a small percentage of the total cost (Garrison *et al.*, 2011; Narong, 2009). The products are mainly standardised with a low diversity. The ABC method is suitable for companies with intense competition where a higher percentage of total cost of a product consists of indirect overheads or costs (Garrison *et al.*, 2011; Narong, 2009). The products have a high diversity.

If a company has many manufacturing processes and products or services, with different cost drivers, it should consider the possibility of implementing ABC. Traditional methods allocate overheads to departments whereas ABC allocates these overheads to different activities. ABC has many cost centres, and costs get allocated from the cost centre to the product. Traditional method allocates the costs directly to one cost driver or the product (Christie, 2008:70; Kennett *et al.*, 2007; Roztocki & Schultz, 2003). Different cost drivers are used in an ABC approach where only labour and machine hours are taken into account with the traditional approach. ABC can be considered as more accurate, because the cost drivers are linked to the activity. In traditional costing there are absolutely no link between the cost drivers and the activity (see figure 2.4).

**Figure 2.4: Activity-based Costing is more process-driven and in line with the cost structure**

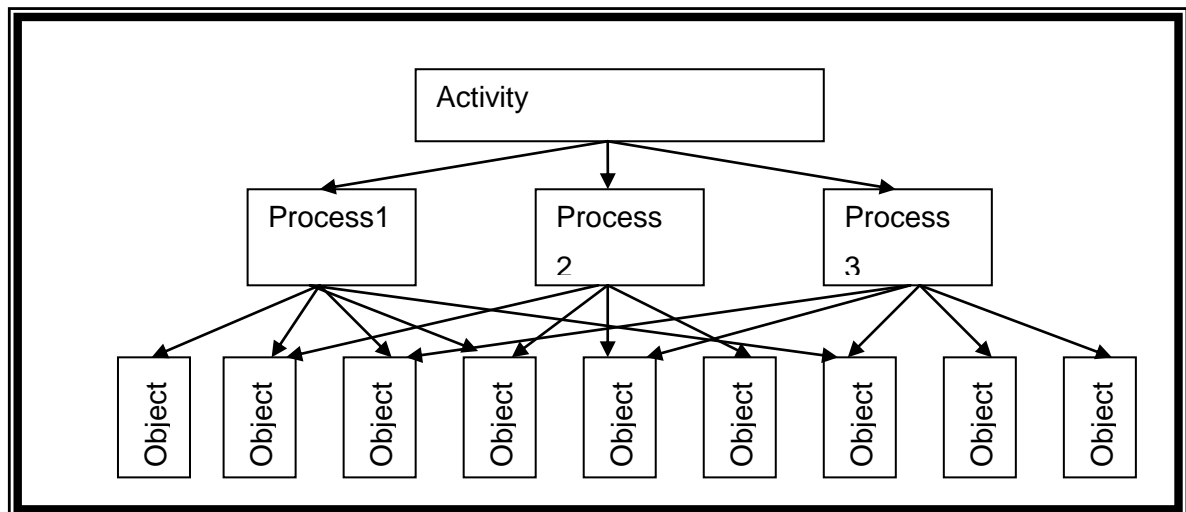


Source: Own Research

Overheads get allocated to the activities per cost centre. The final product will attain its costs by means of the utilization of these activities.

Should an activity not be utilized, the cost of the final product will exclude any cost allocation from that activity (Garrison *et al.*, 2011) (see dotted line, figure 2.4).

**Figure 2.5: Traditional costing systems' more vertical cost structure**



Source: Own Research

With the traditional costing methods, all overheads are allocated to different processes, plant or departments. These costs will be absorbed by the different products manufactured whether they are applicable to that product or not.

### **2.5.2. Activity-based Costing and accounting systems**

The introduction of ABC into a company is not only to improve operational and strategic views and processes, but must also be seen as an information innovation process. Better information-improving decision-making should start with IT innovation. IT innovation is seen in developing systems like raw material planning systems, human resource management systems, etc (Kaplan & Norton, 2008). This all will contribute to the successful implementation of ABC. If decided to implement ABC in a company, a proper ERP and software system is crucial. IT systems are intended to make that “dream come true”, but also a company’s “worst nightmare”. Today, companies are so dependent on its IT system that they are forced to invest in proper IT systems and cannot afford to be conservative on this issue (Kaplan & Norton, 2008). It is important to keep in mind the size of the company, resources consumed and the output (Tatikonda, 2003). Examples of service providers which

may be considered will be software support from like Acorn, SAS, SAP, Syspro IMPACT Encore and Deltek.

Before a company wants to implement ABC they must comply with some important issues which will make the consumption of ABC system easier and more successful. Should the company's operating system (ERP) be able to include internal as well as external data, it will be very helpful especially for setting a benchmark. An example of getting a valuable benchmark for an implementing company is to have external market prices available on the system. To maintain pricing strategies and product mix, the company will need financial- as well as non-financial information on the system. This will improve relationships with suppliers, customers and employees. By pulling the external and internal data as well financial and non-financial information together, management and other shareholders can get a much better idea of the position of the company.

The data to be used by the ABC system must always be up to date. The older the data, the less accurate information is available for decision-making. Even if the data is accurate, it's the decision-makers' responsibility to use this data, and to benefit from all the effort put into the accuracy of the data (Garrison *et al.*, 2011). ACME Fertilizer's system must be able to build custom reports quickly and easily, and be able to drill down to the bottom level of the data. The system should be user-friendly and easy to use by all employees (Furniss & Spencer, 2005; Searchy & Roberts, 2007). This will ensure their commitment which is essential in the success of ABC implementation.

### **2.5.3. Activity-based Management**

Activity-based Management (ABM) defines the management decisions which use ABC information by means of activities or business processes to satisfy customers, and to maximize profits.

CIMA Terminology (2005:3) defines ABM as actions based on activity-driver analysis that increases efficiency, lowers costs and/or to improves asset utilisation. ABM is the cost determination of activities within a company's value chain, and includes indirect costs which are not relative to the output volumes (Tardivo & Di Montezemolo, 2009; Walters & Lancaster, 2000). The results will be different from the traditional method.

It includes decisions of pricing, product-mix, cost reduction, process improvement, planning and management of activities (Garrison *et al.*, 2011). Activities and processes consume the cost traceable to products, thus AMB must be pro-active in reducing costs by encouraging managers to manage the activities and processes, rather than only the costs (Christie,

2008;68). In other words, where ABC identifies product or customer profitability and true costs, ABM identifies opportunities to eliminate non-value adding activities and improve product profitability.

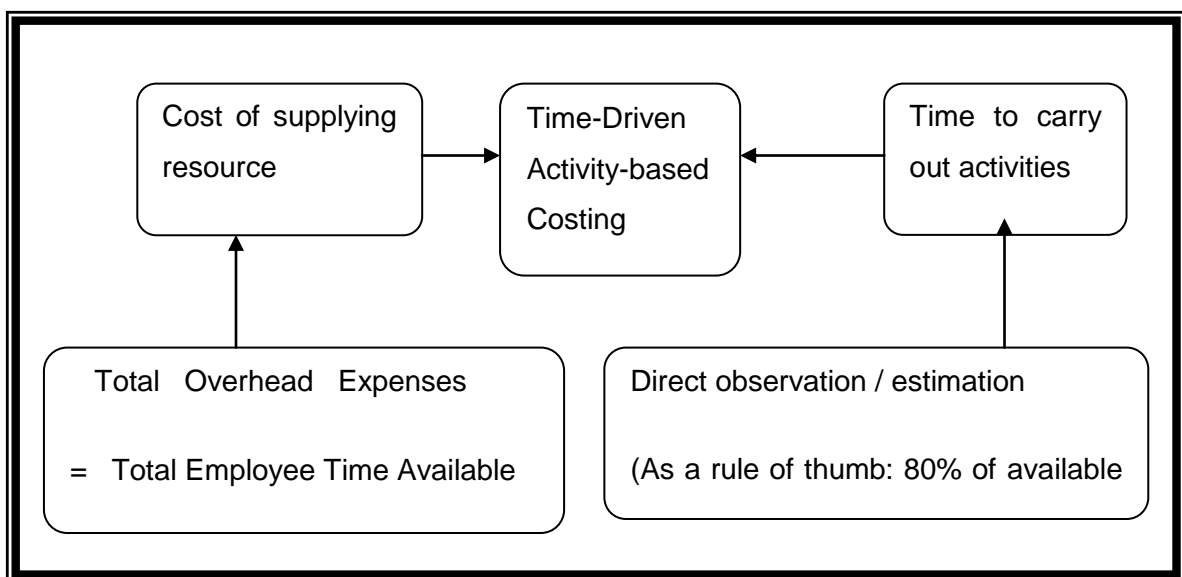
#### 2.5.4. Time-driven Activity-based Costing defined

According to Atchity work is infinite; time is finite - therefore, you must manage your time, not your work (Stout & Bedenis, 2007). When a company is implementing ABC, the available time on hand must be managed carefully. This can be done by the monitoring of access, flow and level of information (Stout & Bedenis, 2007).

CIMA Terminology (2005:3) defines time-driven ABC as an approach to ABC, but is based on the time required to perform each unit activity. Costly interviews with operating managers to determine the percentage of work spent per area is being ignored with this method. It is reckoned that the installation and maintenance of a time-driven ABC is less complicated and unutilized capacity and resources can be identified.

Time-driven ABC has a concept of 'available capacity'. It takes the unused or idle capacity into account which is important to cost products in line with the activity consumption. This can be a supplement to the ABC approach, but not a complete replacement. Time-driven ABC has 2 parameters. The cost of supplying the resource capacity, and the time spent per product per resource (Kaplan & Anderson, 2003).

**Figure 2.6: Time-driven Activity-based Costing parameters**



Source: (Adapted) Kaplan and Anderson, 2007

Managers can have a better sense of the total time needed to perform an action and the actual time employees have available. This will lead to better capacity management. No more expensive employee surveys are necessary. Implementation time and cost will be significantly reduced (Kaplan & Anderson, 2007; Kennett *et al.*, 2007). Kennet *et al.* (2007) state that this is not only a more cost-effective method but also a more accurate way of costing as well as giving management better cost information. Kaplan and Anderson (2007) went further with the statement they made above, and imply that the results will only be accurate if the data can be processed timely, even within a few days after the month end. Kaplan believes that it was the inability of companies to maintain relevance in the data which made them abandon ABC (quoted by Gilbert, 2007).

Charles Schwab, a leading provider of investment services, implemented Time-driven ABC data sourced directly from their enterprise resource planning (ERP) system and results were delivered within a few days after month end. The system's results could verify the profit outcome on 50 million transactions conducted by 3 million (+) customers within the specific month (Kaplan & Anderson, 2007). Kaplan and Anderson (2003) stated in their article "Time-Driven Activity-based Costing" in the November issue of the Harvard Business Review that as a rule of thumb, the assumption can be made that the total full capacity will only be 80% used. This method makes provision for idle times, tea breaks and lunch times. With Time-driven ABC the idle or unused time of the resource should also be accounted for (Kennett *et al.*, 2007), which is not the case with ABC.

The accuracy of information available for decision-making depends on the accuracy of the data being used (Kaplan & Anderson, 2007). If any assumptions are made, the final result might not be as accurate.

### **2.6.1. Time-driven Activity-based Costing vs. conventional Activity-based Costing**

Time-driven ABC is 'married' to Activity-based Costing. This new approach intends to eliminate the difficulties experienced with the implementation of the conventional Activity-based Costing method (Kaplan & Anderson, 2003; Kaplan & Anderson, 2007; Max, 2007; McGowan, 2009). It is a simpler way to cost products, without high data storage, processing and reporting costs as associated with the conventional ABC method (Kaplan & Anderson, 2007). The conventional ABC model requires much effort and time in updating and maintaining the model, as well as costly surveys and interviews with employees (Kaplan & Anderson, 2004; Kaplan & Anderson, 2007; Kennett *et al.*, 2007, Max, 2007; McGowan, 2009).

The conventional ABC method might work well when roles remain relatively torpid over time and where services are relatively consistent (Kennett *et al.*, 2007), but the data remains subjective and theoretically incorrect for the reason that no provision was made for idle capacity (Kaplan & Anderson, 2007). Processes and resource spending are heterogeneous, new activities are added, the diversity and complexity of orders, channels and customers increase (Garrison *et al.*, 2011; Kaplan & Anderson, 2004). These are some of the key issues that require specific focus when implementing ABC to ensure easier management and sustainability. Robert S. Kaplan, father of Activity-based Costing and Steven R. Anderson introduced the simpler, cheaper and far more powerful Time-driven ABC method which makes provision for volatility within an organization and the industry. The ABC method is a “push” model of costing. You determine the total expenditure of resources and by allocating these costs as a proportion consumed by activities, the final costs consumed by the cost object can be determined (Adkins, 2008). Time-driven ABC on the other hand is a “pull” model of costing. You have 2 parameters, unit of time to perform an activity, and cost per unit of time (Adkins, 2008; Kennett *et al.*, 2007). With ABC they failed to recognize the critical role that capacity plays when estimating the cost driver rates. With the Time-Driven approach, existing process documentation and resources are used to determine the effort which goes into each stage of the process (Kennett *et al.*, 2007; Max, 2007; McGowan, 2009).

### **2.6.2. Advantages of Time-driven Activity-based Costing**

An accurate Time-driven ABC model can be built quickly and easily. Changes in processes can effortlessly be updated (Kaplan & Anderson, 2007; Kennett *et al.*, 2007) as frequently as necessary. The model can be validated through direct observation of unit time estimations, and costs. Time-driven ABC integrates well with high volumes of data (Kaplan & Anderson, 2007), and still delivering fast processing times, and “live” reporting. Time equations can identify variation in activities without increasing the difficulty of the model. Cost and capacity utilization of processes, product and customer profitability and unused or non-value added resources can be identified, on which management can take action (Kaplan & Anderson, 2003; Kaplan & Anderson, 2007). Costs are highly transparent and management can see the true cost consumption model/“Bottom-up” model (Kennett *et al.*, 2007). Time-driven ABC simplifies the conventional ABC approach by eliminating timely and costly processes, e.g. interviews and regular maintenance that are prone to error (Kaplan & Anderson, 2007; Max, 2007; McGowan, 2009).

It needs only two parameters for the allocation of costs, cost of resources and activity consumption of these resources. This makes the approach far simpler, but more accurate

(Kennett *et al.*, 2007). Two benefits from the ability to compute the cost of non-value adding activities is that excess capacity can be managed and measured and unit cost variances exclude the impact of volume against fixed cost (Kennett *et al.*, 2007). The total direct and indirect costs can be allocated to the different resources used to manufacture a certain product to give a total cost per unit per resource (Kennett *et al.*, 2007).

Updates can be performed easily to reflect changes in costs and processes. High volumes of data can be sourced from the ERP system, which makes it more relevant and accurate than ABC (Max, 2007; McGowan, 2009). Direct observation of time resources is used and this can be validated by the model by means of process documentation and unused capacity can be identified. This model allows more heterogeneity in activities, orders and customer behaviour without the need to go and recalculate activity, product and customer costs (Kaplan & Anderson, 2003; Kennett *et al.*, 2007).

### **2.6.3. Disadvantages of Time-driven Activity-based Costing**

It's difficult and costly to extend the Time-driven ABC model to all applications of a company. Time-driven ABC will not be suitable if there is little differentiation or complexity in work effort, if costs are mainly fixed and if the outputs are homogeneous (Kennett *et al.*, 2007).

When the hours can't be projected and vary from project to project, Time-driven ABC might also not be the answer, and a more formal time-tracking system may be required (Kennett *et al.*, 2007). The problem of updating or scaling the data still remains, and costly interviews still need to take place to have accurate and relevant information (Kaplan & Anderson, 2003). The accuracy of information depends fully on the information given above.

### **2.6.4. Implementation of Time-driven Activity-based Costing**

The resource expense can be traced to the activity by time logs, interviews, direct observation of time spent per activity, in other words, process documentation and an ERP system. Because Time-driven ABC is driven by process performance times instead of time allocations, the regularity of model updates is greatly reduced. Data can be imported from the general ledger, production schedule and customer order file, or ERP if available (Kaplan & Anderson, 2007, Max, 2007; McGowan, 2009).

The first step to implement the Time-driven ABC model is to identify resources and the activities that they perform (Kaplan & Anderson, 2007; Max, 2007; McGowan, 2009). To assign the expenses of activities, rates of the cost drivers need to be calculated. This model works well in a typical single facility or plant, especially if the company has a high investment

in plant and equipment. Accurate times of resource consumption are critical as activity, process and manufacturing costs make up a huge percentage of the total cost of a product.

### **2.6.5. Influence of Time-driven Activity-based Costing**

Previously, consultants forced their customers to choose to see either the Strategic information from an ABC model, or operational information, but not both. According to Kennett *et al.* (2007) time-driven ABC shows that both approaches, strategic and operational, should be incorporated. Because of the “bottom-up” approach, information gathered from the operational level (“Bottom-up” or Upside-Down model) should be used in strategic cost analysis. ABC is embarking on the identification of the work which was performed to get the final product (Euske & Vercio, 2007:50).

## **2.7. SUMMARY**

The purpose of this chapter was to précis the theory of Activity-based Costing, including the definition, advantages, disadvantages, key components, fundamentals and implementation of the activity-driven framework will be addressed, as well as the implications and supporting systems thereof. Activity-based Costing was developed to refine the traditional standard costing with limited cost drivers and to assign a much truer and more realistic value to goods and services, especially those with a high percentage of variable costs. The aim was that a product should only carry the costs of the resources utilized, and not absorb the total running cost based on volumes manufactured. With ABC, costs of the resources captured in the general ledger get allocated to activities, and proportionally get allocate further down to the cost object based on the utilization of the activity. Activity-based management is the management of the activities in order to be more efficient, less costly and ultimate utilization which will satisfy the customer. The main driver beyond ABC is the measurement of products and/or services and assists in decision-making processes for management. This can build or break a company. The information provided by ABC is only as reliable as the source it comes from.

Unprofitable products, bottlenecks or non-value adding resources can easily be identified, and eliminated or changed so that they can become profitable. This will come at a high price (financially) and maintenance is crucial in the success of ABC. ABC is only beneficial if the financial benefit outweighs the financial cost involved in implementation and maintenance thereof. Time-driven ABC is a ‘push’ method of costing and is based on the costs of resources and allocated according to the time it takes to complete that activity. This method is much easier and less costly to implement and maintain than ABC.

The next chapter will provide an overview of the fertilizer business and ACME Fertilizer's key operations and processes will be discussed based on Porter's Value Chain. The production process of ACME Fertilizer will be mapped out and described accordingly. ACME's current costing methodology will be compared to the various costing methodologies followed by its rival companies to gain a view of what the industry is doing. The results of a pilot study of questionnaires sent to 14 similar companies will be analysed and discussed.

# **CHAPTER 3: ACME BUSINESS OPERATION -FERTILIZER BUSINESS OVERVIEW**

## **3.1. INTRODUCTION**

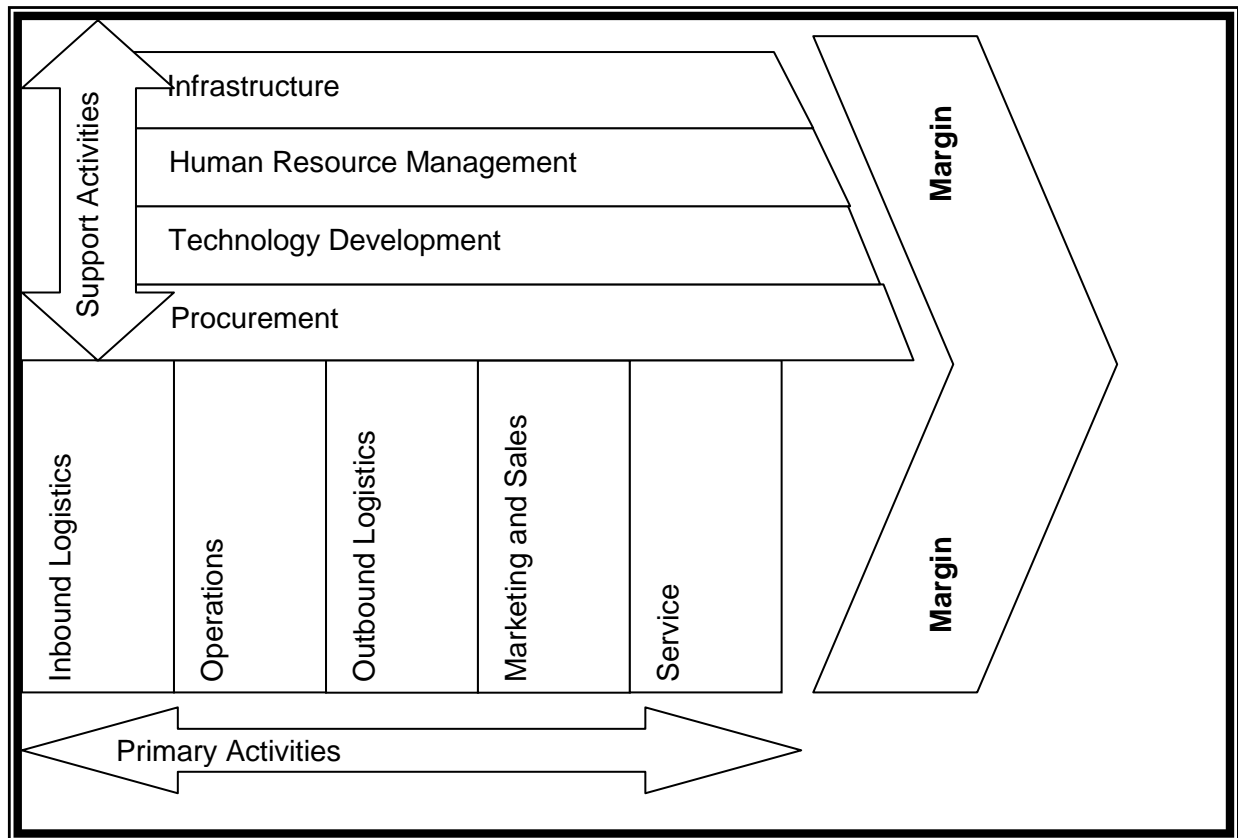
This chapter serves to provide an overview of the fertilizer business, and then especially of ACME Fertilizer's key operations. ACME Fertilizer trades in the agricultural industry and primarily manufactures various kinds of fertilizers which are vital to the growth and production of different kinds of crops. Raw materials are imported and then blended into different types of fertilizer in accordance with the specifications and requirements of chemical engineers, farmers and agronomists.

A bill of material (BOM) is formulated to serve as the basis of ingredients or recipe for a specific product. BOMs are formulated according to the total standard Nitrogen, Phosphorus and Potassium (NPK) values of the raw materials of the final product. The factories can amend or substitute products in the BOM, providing that the final analysis reflects the same NPK values as per original BOM.

## **3.2. PORTER'S VALUE CHAIN**

Professor Michael Porter introduced the *Value Chain* model during 1985 in his book 'The Competitive Advantage' (Porter, 1985). The value chain is a process during which products will gain value as they go through different activities which run at optimal levels (Fei & Isa, 2010; Porter, 1985).

**Figure 3.1: Porter's Value Chain**



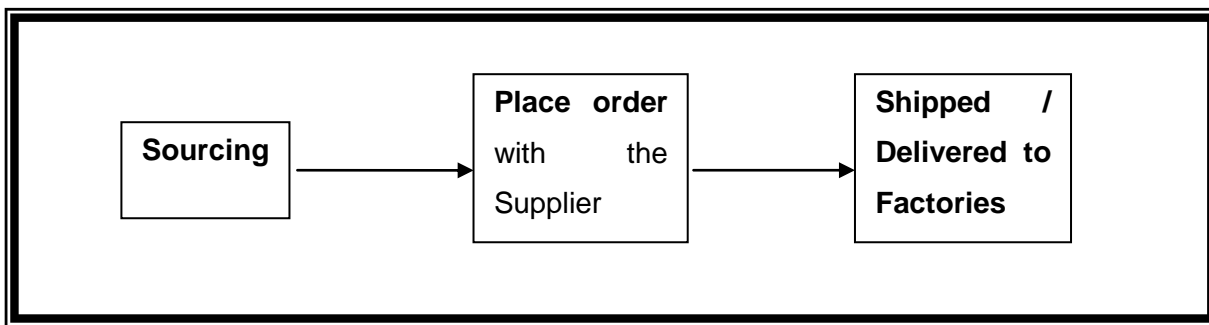
Source: Porter, 1985

Activity-based Costing management will assist Porter's value chain model in improving customer satisfaction, market efficiencies and competitive advantage, thus better profit margins (Tardivo & Di Montezemolo, 2009; Wang *et al.*, 2010; Zhang, 2010). There are primary and secondary activities within Porter's Value Chain (see figure 3.1). The primary activities will be discussed below:

### **3.2.1. Inbound logistics**

The transport of raw materials to the factory must be done efficiently which will reduce costs. Inbound logistics include the quality control, receiving, raw materials, and control and supply chain functions inside a business. Raw materials get sourced based on the forecast demands as to where it will be delivered to the factory (see figure 3.2).

**Figure 3.2: Raw material ordering process**



Source: Own Research

The forecast and planning model will keep track of the raw materials to be obtained, and by when. If a raw material is needed, an order will be placed by the procurement department on the supplier. The raw material will then be shipped/delivered to the factory.

### **3.2.2. Operations**

Because the fertilizer industry is very seasonal, outsourced services and contract workers will assist in keeping costs low.

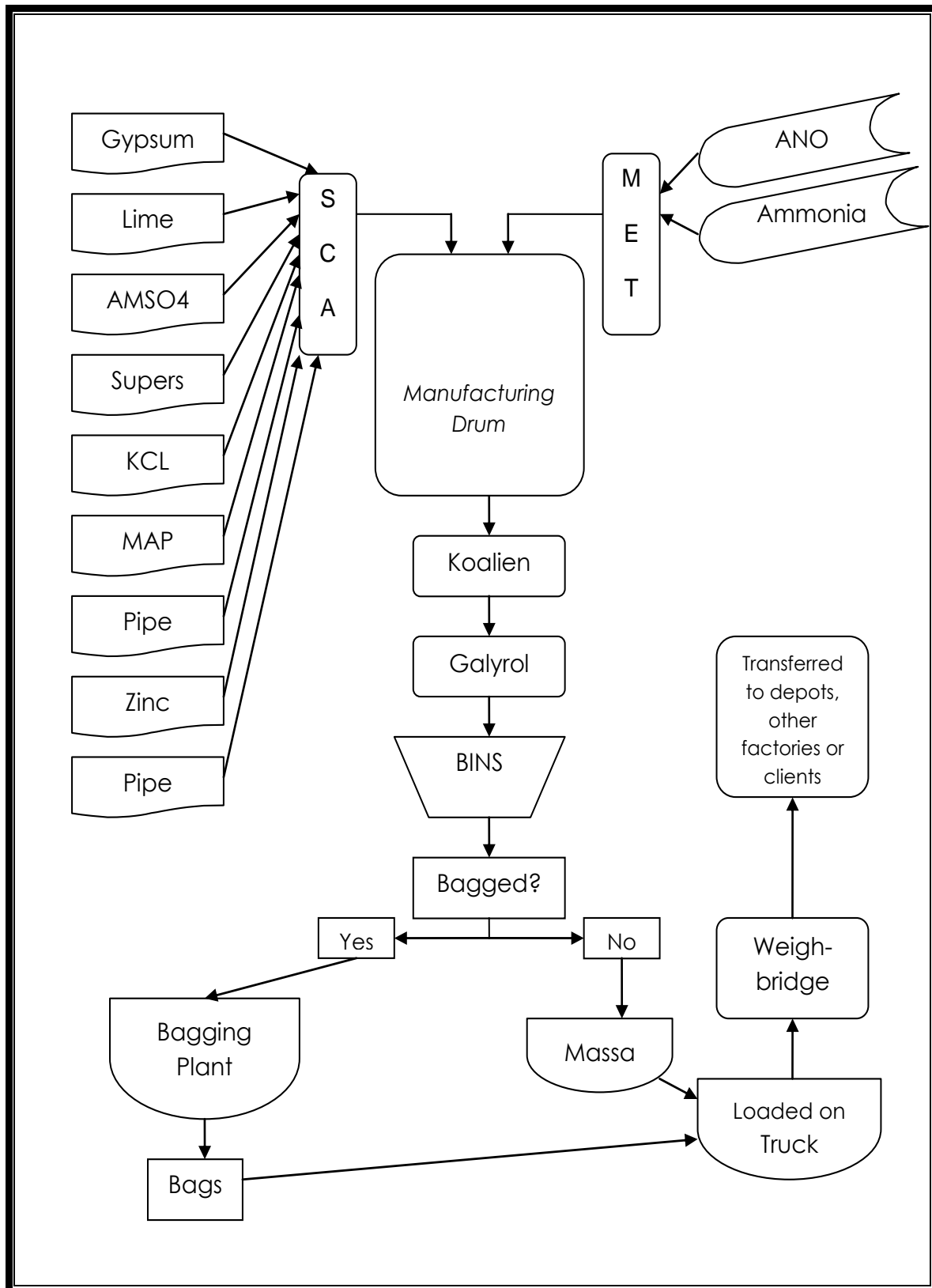
Production processes (see figure 3.3): In respect of the production processes, the business units and their accountants must see that for every type of product they manufacture, there is a BOM in the system. The BOM gets approved by chemical engineers at the factory, who make sure that the NPK values are up to the required standards. The BOM and its routing (labour and overheads rate) are loaded onto the system from where the standard cost of the final product gets calculated. The typical cost of the product is made up of:

- Raw material price;
- The labour and overheads, and
- The transport cost to the different factories.

The BOM can be amended providing the NPK value remains unchanged. In other words, input products can be substituted as and when required, depending on the cost and availability of raw materials. By making use of cheaper substitute raw materials and efficient processes a usage variance (UV) will be calculated per plant. A usage variance is the difference between the amount of material which was actually used to make a final product and the amount of material that was budgeted to make the final product (as per BOM). Annually, each plant gets measured on these Usage Variance's (UV) profit and loss results.

When all the raw materials have been blended into the final product (bagged or bulk), a sample is taken to the laboratory for the chemical engineer to analyse and confirm that the NPK values are true and correct. For every load of fertilizer which gets dispatched out of the plant, a sample is kept for a set period of time, in accordance to fertilizer industry laws and regulations.

Figure 3.3: Production process



Source: Own Research

The flow of the production process as per figure 3.3 is as follows:

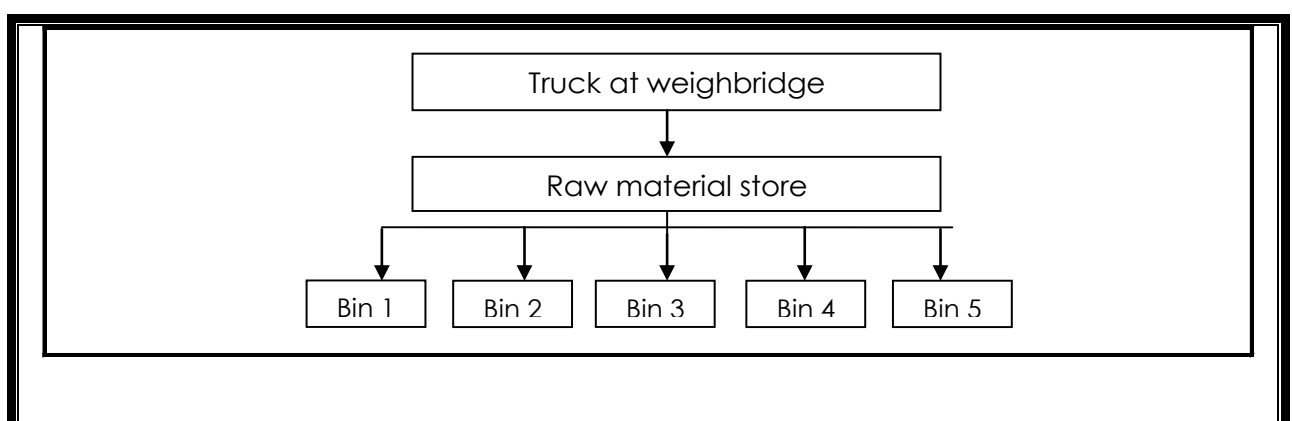
- In accordance with the production schedule, required dry raw materials needed for production are taken from the raw material store with front-end loaders. The raw materials are dumped onto conveyer belts, and taken to the right granulation plant.
- Built-in scales in the conveyer belts are programmed to allow a specific quantity of raw material through, as per the production schedule. This will ensure that the correct measurement of raw materials is added to the manufacturing drum.
- Any raw materials in the form of liquid or gas are pumped through pipelines from the tanks or bullets to the granulation plant.
- Once all the raw materials have been added into the manufacturing drum, the drum rotates and heats up until it reaches the required mixing temperature and an exact round granular product is formed.
- The product leaves the drum by means of conveyer belts, to the next process.
- Koalien, a glue-like substance, gets sprayed onto the semi-final product and this then goes through a dry.
- Galoryl powdery substance which serves as a protection layer.

### 3.2.3. Outbound logistics

Operations and outbound logistics include the manufacturing, packaging, dispatching and delivery of the final product.

Raw material handling: Upon arrival of the truck at the factory (see figure 3.4), the weighbridge weighs the full load upon entry and the empty truck upon exit. This confirms the total tons delivered to the factory as per delivery note.

**Figure 3.4: Raw material handling process – dry products**

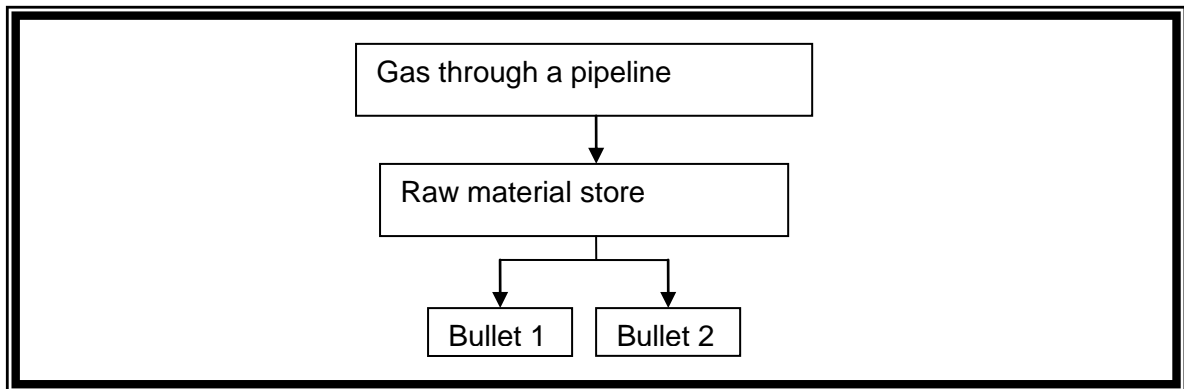


Source: Own Research

Figure 3.4 illustrates the process from where the hauler stops at the weighbridge until it offloads into the allocated bin. The raw materials will be offloaded at the raw material store

into the allocated bin, which the schedulers will determine prior to the delivery (see figure 3.4). At the weighbridge the bin number where product should be offloaded, will be given to the truck driver. It is imperative that the product gets offloaded into the right bin to eliminate confusion of the different raw materials and to avoid chemical reactions.

**Figure 3.5: Raw material handling process – gas**



Source: Own Research

Figure 3.5 illustrates the raw material handling of ammonia gas. The ammonia gas will be sent to the different bullets or cartridge via a pipeline (see figure. 3.5) from the supplier whose premises are located next to the factory. The process of raw material handling is known as “shunting”.

#### **3.2.4. Marketing and sales**

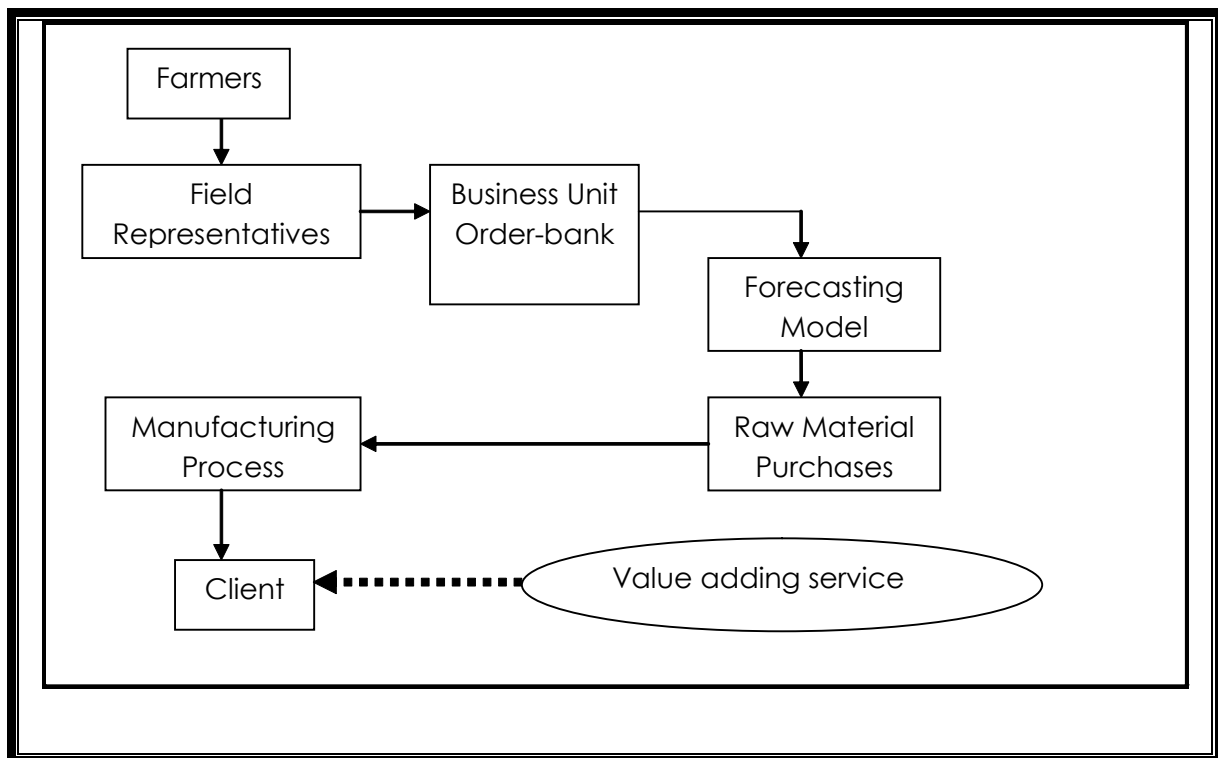
ACME Strategy should include that one thing that the other competitors do not have. This will put ACME one step ahead of its competitors.

Product sales orders: ACME Fertilizer’s field representatives are responsible for the sales and marketing of these products to farmers. The flow of sales ordering processes is given in figure 3.6.

Sales are recorded in an order bank on the internal mainframe and the sales orders are then approved by the respective business units. These sales orders will be included in the Forecasting Model. In this model, the supply chain department will determine which raw materials will be needed to manufacture the products on order and if not in stock, source the required raw materials. If all raw materials are available at the factory level, the production process can commence. This process will be discussed in greater detail later in this chapter. The final product can then be delivered to the farmer and the invoicing process takes place.

The farmer will receive value adding service by the support of the agronomist's technical knowledge even after the sale has been closed.

**Figure 3.6: Sales order process**



Source: Own Research

### 3.2.5. Service

Intended to provide training so that the employees are comfortable and can perform optimally.

### 3.2.6. Secondary/support activities of the value chain

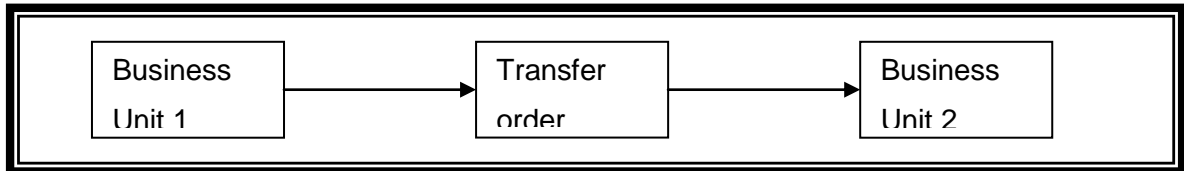
- **Procurement:** ACME must keep up a good relationship with suppliers in order to receive timely deliverables.
- **Technological development:** The systems should be updated and available in order to ensure optimal usage.
- **Human Resources Management:** ACME must recruit the correct people for a job.
- **Firm Infrastructure:** ACME has six different factories which are located nationally.

The support activities, for example administrative and finance infrastructure, human resources, technology development and procurement will contribute toward the value-adding opportunities within the primary objectives. ACME Fertilizer's primary activities will follow.

### 3.2.7. Inter-company transfer orders

If a business unit requires raw materials or final products from another business unit (or factory), a transfer order will be placed (see figure 3.7).

**Figure 3.7: Inter-company transfer process**



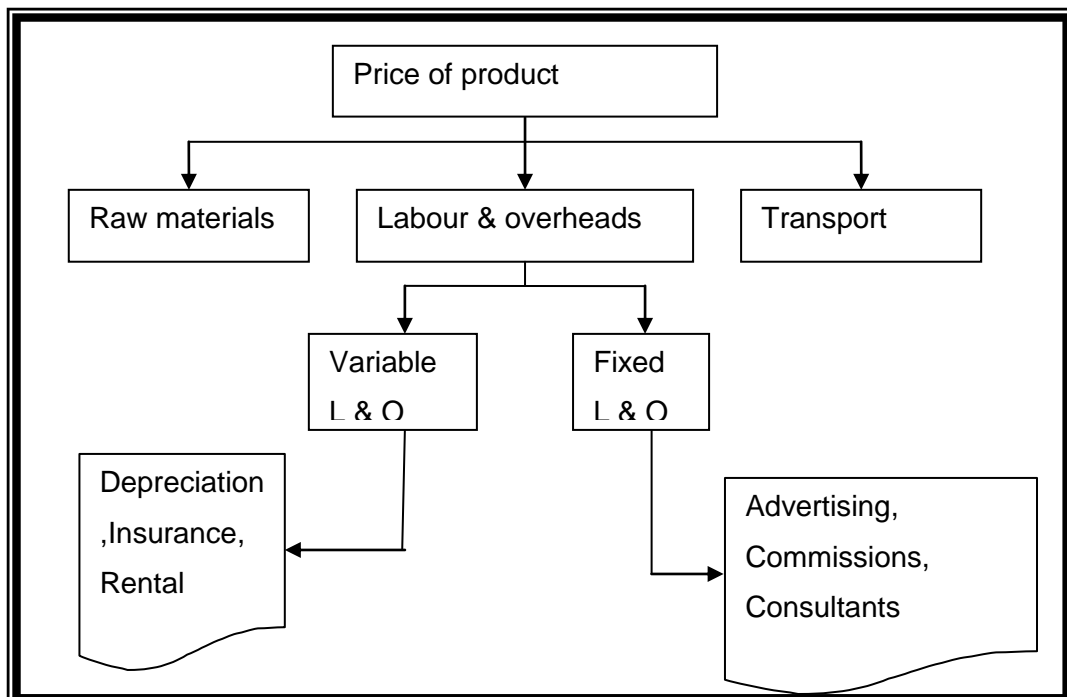
Source: Own Research

The required product gets delivered from the dispatching warehouse to the applicable receiving warehouse.

### 3.3. CURRENT COSTING MODEL

ACME Fertilizer follows a conventional standard costing method as costing principle (see figure 3.8).

**Figure 3.8: Structure of the current costing of a manufactured product**



Source: Own Research

The total cost of a product consists of raw material price, labour cost, overheads (fixed and variable overheads) and a transport component, as illustrated in figure 3.8. The cost of the main raw materials used in manufacturing is based on the weighted average costs, while the other raw materials costs get updated based on historical financial information. The current costing system at ACME Fertilizer assumes that all processes are the same and only tracks against budget compliance.

Costs are allocated on a single volume basis. The model assumes that all processes per work centre consume the same activities, in the same proportions, when in fact some products are more expensive to manufacture than others, although its manufacturing processes are done in the same plant.

ACME Fertilizer's senior management has little knowledge of product costing. Costing of products is done on the assumption that it costs the same to manufacture all products.

The purpose of this study is to evaluate the current costing strategy and to compare it with the possibility of implementing an Activity-based Costing model.

### **3.4. METHODOLOGIES OF RIVAL SIMILAR COMPANIES**

SASOL, FOSKOR and AEL, rival companies of ACME Fertilizer costing methodologies were researched by analysing their published annual financial statements and it was evident that the overall costing strategies are very similar to ACME Fertilizer's (SASOL, 2008; FOSKOR, 2009, AEL, 2008). Due to a current case being investigated by the competition commission, it was not allowed to approach the direct competition for confidential information.

- SASOL: Chemicals Storefront, one of SASOL's business markets, provide polymers, solvents, ammonia, nitro and other fertilizer products. Their costs include all other costs in obtaining, manufacturing (pro rata overheads based on actual production) as well as the transportation of all raw materials at that specific point where it currently sits at.
- FOSKOR: Foskor specializes in one element of a fertilizer, and mainly manufactures products high in phosphates. Their manufacturing process is basic, and labour and overhead cost on all products is the similar. They don't include transport in their cost of sales, because they sell all their products ex works, and their customers need to arrange transport.
- AEL: They produce mostly Nitrogen products which are used as an explosive and the raw materials get valued through the LIFO method and the final products value is based on the weighted average cost.

A comparison between the costing methodologies of ACME Fertilizer’s rivals is summarized below:

**Table 3.1: Costing methods of competitors**

Company	Cost Object	Costing Methodology
ACME Fertilizer	Raw Materials	LIFO / Weighted Average
ACME Fertilizer	W-I-P & Finished Goods	LIFO / Weighted Average
SASOL	Raw Materials, WIP and Finished Goods	FIFO
FOSKOR	Raw Materials	Weighted Average
FOSKOR	W-I-P & Finished Goods	Standard Costing / Actual
AEL	Raw Materials	FIFO

Source: Own Research

### **3.5. PILOT STUDY**

A study was done by sending a questionnaire to fourteen (14) different companies in similar industries, of which there was a response ratio of 71.43%. Ten (10) responded before the deadline given. The questionnaires were hand-delivered, and the sample was chosen conveniently. The questionnaire (see Appendix 1, p 77) contained 20 questions in total and was categorized under the headings: “General”; “Manufacturing”; “Accounting Systems” and “Other”. Their feedback was analysed, and a recommendation was made.

The questionnaire was sent to different companies dealing with similar processes. They were guaranteed anonymity. The primary objective of this research method was to determine whether there are any similar companies using ABC, and whether they were aware of ABC. ACME Fertilizer’s direct competitors could not be included in the survey because of the current investigation being done by the Competition Commission.

#### **3.5.1. General**

It was found that 70% of the companies who participated were within the FMCG industry and were familiar with Activity-based Costing. 50% of the respondents felt that their top management could be convinced to consider ABC. Not one of the 10 conveniently sampled companies has implemented ABC, and 30% was certain that their Senior Management would consider implementation. Half of the participant companies confirmed that they are aware of non-value adding activities in their manufacturing processes. They were all exchange-rate sensitive.

### **3.5.2. Manufacturing**

BOMs are used in 60% of the companies. Most of the companies change their cost of sales quarterly (40%) and/or per purchase (40%). ACME Fertilizer's strategy about not having different labour and overhead rates for different products was also followed by 60% of the companies, although all of the participating companies' management were concerned about managing these costs. Only 20% of the participating companies could say that they were in control and their current processes work very well.

### **3.5.3. Accounting system**

All the companies represented by respondents said that their company had a chart of accounts. 90% of these companies have sub-accounts set up in their ledger and only 50% of the companies' accounting systems had a project cost general ledger where all the expenditures can be recorded per project.

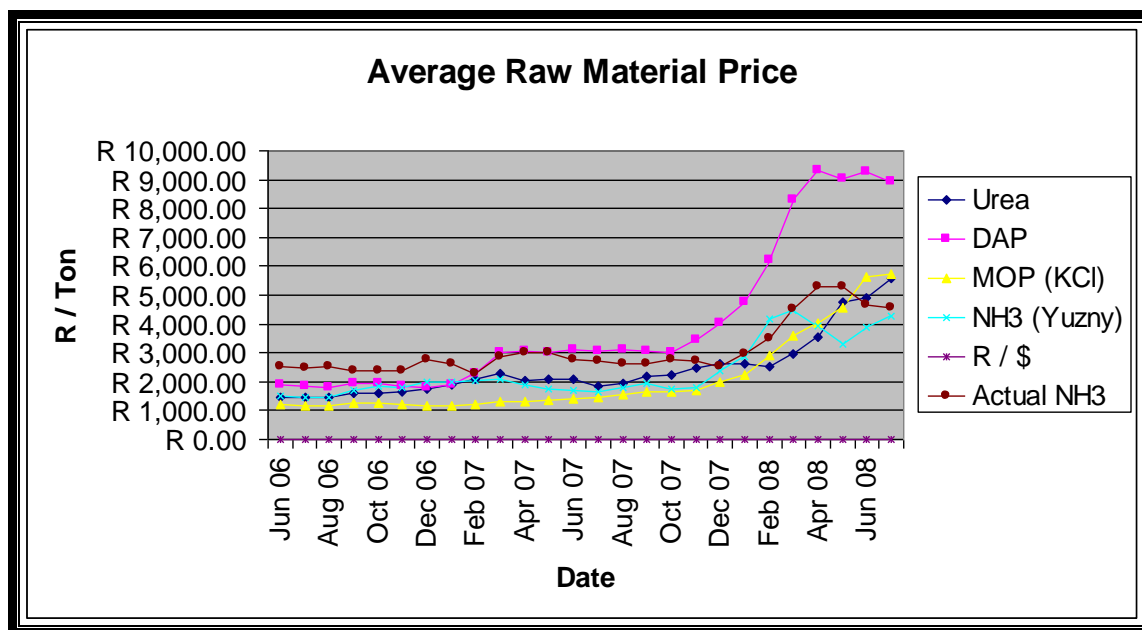
The recommendation regarding this study is that ACME Fertilizer's general costing strategy was in line with similar successful companies, but they need to consider a new way of thinking to get a competitive advantage in the market. ABC is a very good starting point in achieving their competitive advantage. If ABC can be implemented and managed in ACME Fertilizer, it may have huge advantages to follow. To prove this, a case study will be conducted in chapter 4.

## **3.6. FACTORS WHICH CAN INFLUENCE COSTS OF DIFFERENT PRODUCTS**

In today's global economy, especially with commodity prices, supply and demand, there can be major fluctuations in the price of raw materials. The risk of vessel piracy increases the insurance costs on vessels, which directly influence the cost of raw materials (see figure 3.9). The volatile market needs some security to manage economic risks, for example, hedging of funds, contracts and exchange rates, insurance premiums, economies of scale and minimising the stock by following a J-I-T stock management system.

Examples of the main raw materials used in manufacturing with drastic price increases over the past few months include DAP, MAP, ammonium sulphate, potassium sulphate, rock phosphate, etc.

**Figure 3.9: Average raw material costs**



Source: FMB STATS via e-mail on 18 July 2008.

### 3.7. SUMMARY

The purpose of this chapter is to provide an overview of the fertilizer business and ACME Fertilizer's key operations and processes are discussed based on Porter's value chain. The production process of ACME Fertilizer is mapped out and described accordingly. ACME's current costing methodology is compared to the various costing methodologies followed by its rival companies to get a view of what the industry is doing. The results of a pilot study of questionnaires sent to 14 similar companies will be analysed and discussed.

ACME Fertilizer needs to broaden its ways of thinking and doing things. With reference to Michael Porter's value chain ACME Fertilizer's primary activities can be identified under the inbound logistics (raw material purchasing and procurement), operation, outbound logistics (raw material handling and production processes), sales and marketing (product sales orders and inter-company transfer orders) and servicing (extra value-added service of assisting farmers for the whole farming season, and not only selling the fertilizer) (Walters & Lancaster, 2000). By cutting the unnecessary or non-value adding activities and costs, they can gain a competitive advantage in this extremely volatile and competitive industry. Proper planning is of crucial importance to contribute to successful stock and cost management. Every expense incurred should be adding value to the processes and products. If ACME Fertilizer can manage to do that, they will be a step ahead of their competitors.

With the pilot study (see Appendix 1, p 77), 14 companies were conveniently sampled and questionnaires were completed by an employee of 10 of the 14 companies. It was evident that most of the companies know what ABC is, or have heard about it before, but none has implemented it yet. Half of the respondents knew that there was space for improvement by eliminating the non-value adding activities. The general feeling which was gained through this pilot study is that companies are very interested in ABC, but because it is outside their paradigm, they are too scared to consider. The effect of the possibility of implementing costing system driven by activities will be done by means of a case study in Chapter 4.

The next chapter will include the empirical study, with one scenario, but from two different perspectives. The cost of the final products will be calculated following the traditional Standard Costing method and then by following ABC steps. The results will be analysed and recommendations will be made based on the results of the two different methodologies.

# **CHAPTER 4: EMPIRICAL CASE STUDY BASED ON ACTIVITY-BASED COSTING VS. THE CURRENT STANDARD COSTING METHOD**

## **4.1. INTRODUCTION**

The main purpose of this chapter is to look at one scenario, but from two different perspectives. Firstly, the cost of the different products is calculated, where the results based on the current standard method which ACME Fertilizer follow and secondly the proposed ABC method will be compared to the aforementioned results. After the results have been analysed, recommendations will be made.

## **4.2. EMPIRICAL CASE STUDY**

There are a few good reasons why ACME Fertilizer should look at the option of implementing ABC. The production process can be mapped out and alternative options can be identified. Product cost can reflect the true cost of the process of manufacturing. It will reflect the maximum cost (overhead) per product. By eliminating the non-value adding activities or resources, money can be saved and the remaining resources will be allocated more accurately to maximize optimal utilization. ABC reflects a more accurate way of costing a product, which means that full cost recovery may be achieved and the visibility of the cost traced to each product. Unprofitable products can be discontinued while focussing on those that are profitable. ABC should therefore help ACME management in making better business and financial decisions.

For the purpose of this study, the assumption is made that ACME Fertilizer manufactures 6 different fertilizers; product 1, product 2, product 3, product 4, product 5 and product 6. Raw materials are imported or sourced from local suppliers, based on the forecast given by the planning and forecasting model managed by the Planning - and Procurement department within ACME Fertilizer. Another assumption is that the budgeted demand in tons is correct and true, and that the overheads will remain unchanged for both scenarios. Rounding errors may occur in the calculations.

### **4.2.1. Product demand**

According to the planning and forecasting model, the demand in tons for the 6 different products is given in table 4.1.

**Table 4.1: Demand for fertilizer for FY2010**

<b>Products</b>	<b>Demand (Tons)</b>	<b>Selling Price per ton</b>	<b>Estimated Turnover (ZAR)</b>
<b>Product 1</b>	180,000	R 3,630.00	R 653,400,000.00
<b>Product 2</b>	130,000	R 3,250.00	R 422,500,000.00
<b>Product 3</b>	240,000	R 1,900.00	R 456,000,000.00
<b>Product 4</b>	220,000	R 5,500.00	R 1,210,000,000.00
<b>Product 5</b>	70,000	R 2,100.00	R 147,000,000.00
<b>Product 6</b>	105,000	R 2,600.00	R 273,000,000.00
<b>Total</b>	<b>945,000</b>		<b>R 3,012,500,000.00</b>

Source: Own Research

#### **4.2.2. Raw materials**

ACME Fertilizer mainly uses nine (9) types of raw materials for the production of the six (6) products. The acronym for the products will be used during the study. The full names of the products are given below:

- AMSO4 Ammonium sulphate
- KCl Potassium chloride
- MAP Mono-potassium phosphate
- N Gas Nitrogen Gas
- P205 Phosphoric Acid
- Urea Ureum prills or gran

#### **4.2.3. Bill of materials**

The Bill of Materials (BOM's) or recipes of the six (6) products is summarized in table 4.2 below. These percentages represent the % of each raw material (as mentioned above) in a ton of fertilizer. The Bill of Material provides the 'recipe' for the final product and the raw material cost of the final product is calculated accordingly.

**Table 4.2: Costed bill of materials of products – 1, 2, 3, 4, 5 & 6.**

Exchange Rate	Bill of Materials										Raw Mat Cost per product
	AMSO4	KCL	MAP	N GAS	P205	UREUM	WATER	KAOLIEN	GALORYL		
R 7.80	A	B	C	D	E	H	J	F	G		
USD (\$)	\$ 235.00	\$ 385.00	\$ 250.00			\$ 320.00					
ZAR ('R)	R 1,833.00	R 3,003.00	R 1,950.00	R 4,200.00	R 7,500.00	R 2,496.00	R -	R 6,000.00	R 3,200.00		
Bill of Material per product (BOM)											
Product 1	0%	25%	30%	5%	10%	20%	0%	5%	5%		
Product 2	5%	15%	15%	0%	5%	50%	0%	5%	5%		
Product 3	10%	0%	15%	35%	10%	30%	0%	0%	0%		
Product 4	5%	0%	0%	75%	0%	20%	0%	0%	0%		
Product 5	0%	0%	5%	70%	10%	0%	15%	0%	0%		
Product 6	0%	45%	0%	0%	0%	55%	0%	0%	0%		
Costed Bill of Material per product (BOM)											(ZAR)
Product 1	R -	R 750.75	R 585.00	R 210.00	R 750.00	R 499.20	R -	R 300.00	R 160.00	R 3,254.95	
Product 2	R 91.65	R 450.45	R 292.50	R -	R 375.00	R 1,248.00	R -	R 300.00	R 160.00	R 2,917.60	
Product 3	R 183.30	R -	R 292.50	R 1,470.00	R 750.00	R 748.80	R -	R -	R -	R 3,444.60	
Product 4	R 91.65	R -	R -	R 3,150.00	R -	R 499.20	R -	R -	R -	R 3,740.85	
Product 5	R -	R -	R 97.50	R 2,940.00	R 750.00	R -	R -	R -	R -	R 3,787.50	
Product 6	R -	R 1,351.35	R -	R -	R -	R 1,372.80	R -	R -	R -	R 2,724.15	

Source: Own Research

#### **4.2.4. Raw material cost estimation**

The estimated averages prices below are determined based on the current market and are only assumptions. The imported raw material Free on Board (FOB) price estimations, thus a US Dollar price, are given:

- AMSO4 is estimated to reach an average price of \$235 per ton.
- KCL is estimated to reach an average price of \$385 per ton.
- MAP is estimated to cost \$250 per ton.
- Urea is estimated to reach an average price of \$320 per ton.

Locally sourced product prices:

- P2O5 should reach a market price of R 7500 a ton as this is a volatile market.
- N Gas is sourced locally at an estimated average price of R4200 would be used in this study.
- Kaolin's price on average will be in the region of R6000 a ton and should remain constant throughout the year.
- Galoryl is a very expensive product and will cost R3200 per ton.

Water is sourced locally and part of the general services of the municipality which is charged via a monthly levy, therefore for the purpose of this exercise, it is assumed that ACME Fertilizer does not get charged for water (e.g. no cost per unit of consumption). For the purposes of this study, it is assumed that the average exchange rate will be R7.80/USD (\$) and is used throughout the exercise, thus no foreign exchange gains or losses will be accounted for.

#### **4.2.5. Labour costs**

For this study, the assumption has been made that all plant workers are equally skilled and earn the same average rate. The minimum labour rate of R70 per hour for FY 2010 is used in the study.

The production times based on the budgeted demand for products 1, 2, 3, 4, 5 and 6 for the FY2010 are summarized below in table 4.3.

**Table 4.3: Total production hours**

Product	Demand (Tons) A	Production time C	Total time (Hours) C
Product 1	180,000	45 min / ton	135,000
Product 2	130,000	45 min / ton	97,500
Product 3	240,000	30 min / ton	120,000
Product 4	220,000	30 min / ton	110,000
Product 5	70,000	15 min / ton	17,500
Product 6	105,000	10 min / ton	17,500
<b>Total</b>	<b>945,000</b>		<b>497,500</b>

Source: Own Research

To calculate the labour cost per ton (see table 4.4) the total hours (demanded tons) multiplied by the production time (see table 4.3) is multiplied (x) by the standard labour rate of R70 per hour (see table 4.4).

**Table 4.4: Labour cost per ton**

Product	Demand (Tons)	Total time (Hours)	Labor rate	Total ZAR *	Labor Cost per ton **
Product 1	180,000	135,000	R 70 / hour	R 9,450,000.00*	R 52.50
Product 2	130,000	97,500	R 70 / hour	R 6,825,000.00	R 52.50
Product 3	240,000	120,000	R 70 / hour	R 8,400,000.00	R 35.00
Product 4	220,000	110,000	R 70 / hour	R 7,700,000.00	R 35.00
Product 5	70,000	17,500	R 70 / hour	R 1,225,000.00	R 17.50
Product 6	105,000	17,500	R 70 / hour	R 1,225,000.00	R 11.67
<b>Total</b>	<b>945,000</b>	<b>497,500</b>		<b>R 34,825,000.00</b>	

Source: Own Research

\* See calculation below

$$\begin{aligned}
 * \text{ Total Labour Cost ZAR} &= \text{Total Time (hours)} \times \text{R70 / hour} \\
 &= 135\,000 \times \text{R70} \\
 &= \text{R } 9\,450\,000
 \end{aligned}$$

$$\begin{aligned}
 ** \text{ Labour Cost per ton} &= \text{Total ZAR} / \text{Demand (Tons)} \\
 &= \text{R } 9\,450\,000 / 180\,000 \\
 &= \text{R52.50 per ton}
 \end{aligned}$$

#### 4.2.6. Overheads (factory)

Although ACME Fertilizer is not allocating the overhead costs per activity, a proposed activity dictionary is developed (see table 4.5) and overheads allocated accordingly (see table 4.6).

**Table 4.5: Suggestion for ACME Fertilizer’s possible activity dictionary**

Activity	Resource	Cost Hierarchy
Creating a customer order	Customer Services	Unit level
Ordering Raw Materials	Procurement	Unit level
Receipting an load	Scheduling	Unit level
Handling materials	Warehouse	Batch level
Blending of products	Manufacturing	Batch level
Manufacturing	Manufacturing	Batch level
Bagging	Manufacturing	Batch level
Sorting products	Manufacturing	Batch level
Transport of Final product	Logistics	Batch level

Source: Own Research

The budgeted overheads for the factory were set at R12.59 million for the FY2010. These overhead costs are broken down into different activities and resources. This will give an indication of the overhead costs applicable to the different activities.

**Table 4.6: Allocation of overheads to activities**

Activity	Resource	Overheads (ZAR)	
Creating a customer order	Customer Services	R	49,000.00
Ordering Raw Materials	Procurement	R	34,000.00
Receipting an load	Scheduling	R	54,000.00
Handling materials	Warehouse	R	223,000.00
Machine set-ups	Manufacturing	R	1,189,000.00
Blending of products	Manufacturing	R	2,085,000.00
Manufacturing	Manufacturing	R	3,934,000.00
Bagging	Manufacturing	R	3,512,000.00
Sorting products	Manufacturing	R	435,000.00
Transport of Final product	Logistics	R	1,075,000.00
<b>Total</b>		<b>R</b>	<b>12,590,000.00</b>

Source: Own Research

The overheads allocated to the different activities then need to be allocated to the 6 different products, based on the consumption of these activities or resources. The consumption of the activities is noted by direct observation at ACME Fertilizer's factory.

Based on activity consumption, in table 4.7, the total number of consumption units can be summed. This is necessary when a rate per activity needs to be calculated. The allocation of the overhead costs in table 4.6, divided by the relevant total amount of activities (see table 4.9) will give you an overhead rate per activity. This is showing the rate which an activity cost in order to cover the overhead costs, with the assumption that the budgeted overhead costs and activity consumption is correct and true.

**Table 4.7: Activity utilization per product (units)**

Activity	Product 1	Product 2	Product 3	Product 4	Product 5	Product 6	Total
<b>Demand</b>	180 000 tons	130 000 tons	240 000 tons	220 000 tons	70 000 tons	105 000 tons	945 000 tons
Creating a customer order	4,000	3,000	8,000	17,500	2,500	5,000	40,000
Ordering Raw Materials	100	120	80	250	110	60	720
Receipting an load	5,300	3,850	7,060	6,500	2,080	3,100	27,890
Handling materials	180,000	130,000	240,000	220,000	70,000	105,000	945,000
Machine set-ups	56	12	18	75	5	2	168
Blending of products	-	-	120	100	75	95	390
Manufacturing	200	175	-	-	-	-	375
Bagging	165,000	115,000	230,000	220,000	-	85,000	815,000
Sorting products	165,000	115,000	230,000	220,000	40,000	85,000	855,000
Transport of Final product	130,000	105,000	210,000	210,000	10,000	80,000	745,000
<b>Total</b>	<b>649,656</b>	<b>472,157</b>	<b>925,278</b>	<b>894,425</b>	<b>124,770</b>	<b>363,257</b>	<b>3,429,543</b>

Source: Own Research

Overhead Cost per activity

Overhead rate per activity = -----

Units of activity

**Table 4.8: Rate per activity**

Activity	Total	Overheads (ZAR)	Rate per activity
Creating a customer order	40,000	R 49,000.00	R 1.23
Ordering Raw Materials	720	R 34,000.00	R 47.22
Receipting an load	27,890	R 54,000.00	R 1.94
Handling materials	945,000	R 223,000.00	R 0.24
Machine set-ups	168	R 1,189,000.00	R 7,077.38
Blending of products	390	R 2,085,000.00	R 5,346.15
Manufacturing	375	R 3,934,000.00	R 10,490.67
Bagging	815,000	R 3,512,000.00	R 4.31
Sorting products	855,000	R 435,000.00	R 0.51
Transport of Final product	745,000	R 1,075,000.00	R 1.44
<b>Total</b>	<b>3,429,543</b>	<b>R 12,590,000.00</b>	

Source: Own Research

To calculate the cost per activity per product (see table 4.9), the rate per activity (see table 4.8) is multiplied by the total units of resources that the product would consume of that activity (demand).

**Table 4.9.1: Cost per activity, per product 1**

Activity	Product 1		
	Rate	Demand	Value
Creating a customer order	R 1.23	4,000	R 4,900.00
Ordering Raw Materials	R 47.22	100	R 4,722.22
Receipting an load	R 1.94	5,300	R 10,261.74
Handling materials	R 0.24	180,000	R 42,476.19
Machine set-ups	R 7,077.38	56	R 396,333.33
Blending of products	R 5,346.15	-	R -
Manufacturing	R 10,490.67	200	R 2,098,133.33
Bagging	R 4.31	165,000	R 711,018.40
Sorting products	R 0.51	165,000	R 83,947.37
Transport of Final product	R 1.44	130,000	R 187,583.89
<b>Total</b>			<b>R 3,539,376.49</b>

Source: Own Research

**Table 4.9.2: Cost per activity, per product 2**

<b>Product 2</b>			
<b>Activity</b>	<b>Rate</b>	<b>Demand</b>	<b>Value</b>
Creating a customer order	R 1.23	3,000	R 3,675.00
Ordering Raw Materials	R 47.22	120	R 5,666.67
Receipting an load	R 1.94	3,850	R 7,454.28
Handling materials	R 0.24	130,000	R 30,677.25
Machine set-ups	R 7,077.38	12	R 84,928.57
Blending of products	R 5,346.15	-	R -
Manufacturing	R 10,490.67	175	R 1,835,866.67
Bagging	R 4.31	115,000	R 495,558.28
Sorting products	R 0.51	115,000	R 58,508.77
Transport of Final product	R 1.44	105,000	R 151,510.07
<b>Total</b>			<b>R 2,673,845.56</b>

Source: Own Research

**Table 4.9.3: Cost per activity, per product 3**

<b>Product 3</b>			
<b>Activity</b>	<b>Rate</b>	<b>Demand</b>	<b>Value</b>
Creating a customer order	R 1.23	8,000	R 9,800.00
Ordering Raw Materials	R 47.22	80	R 3,777.78
Receipting an load	R 1.94	7,060	R 13,669.42
Handling materials	R 0.24	240,000	R 56,634.92
Machine set-ups	R 7,077.38	18	R 127,392.86
Blending of products	R 5,346.15	120	R 641,538.46
Manufacturing	R 10,490.67	-	R -
Bagging	R 4.31	230,000	R 991,116.56
Sorting products	R 0.51	230,000	R 117,017.54
Transport of Final product	R 1.44	210,000	R 303,020.13
<b>Total</b>			<b>R 2,263,967.68</b>

Source: Own Research

**Table 4.9.4: Cost per activity, per product 4**

Product 4				
Activity	Rate	Demand		Value
Creating a customer order	R 1.23	17,500	R	21,437.50
Ordering Raw Materials	R 47.22	250	R	11,805.56
Receipting an load	R 1.94	6,500	R	12,585.16
Handling materials	R 0.24	220,000	R	51,915.34
Machine set-ups	R 7,077.38	75	R	530,803.57
Blending of products	R 5,346.15	100	R	534,615.38
Manufacturing	R 10,490.67	-	R	-
Bagging	R 4.31	220,000	R	948,024.54
Sorting products	R 0.51	220,000	R	111,929.82
Transport of Final product	R 1.44	210,000	R	303,020.13
<b>Total</b>			<b>R</b>	<b>2,526,137.01</b>

Source: Own Research

**Table 4.9.5: Cost per activity, per product 5**

Product 5				
Activity	Rate	Demand		Value
Creating a customer order	R 1.23	2,500	R	3,062.50
Ordering Raw Materials	R 47.22	110	R	5,194.44
Receipting an load	R 1.94	2,080	R	4,027.25
Handling materials	R 0.24	70,000	R	16,518.52
Machine set-ups	R 7,077.38	5	R	35,386.90
Blending of products	R 5,346.15	75	R	400,961.54
Manufacturing	R 10,490.67	-	R	-
Bagging	R 4.31	-	R	-
Sorting products	R 0.51	40,000	R	20,350.88
Transport of Final product	R 1.44	10,000	R	14,429.53
<b>Total</b>			<b>R</b>	<b>499,931.56</b>

Source: Own Research

**Table 4.9.6: Cost per activity, per product 6**

<b>Product 6</b>			
<b>Activity</b>	<b>Rate</b>	<b>Demand</b>	<b>Value</b>
Creating a customer order	R 1.23	5,000	R 6,125.00
Ordering Raw Materials	R 47.22	60	R 2,833.33
Receiving an load	R 1.94	3,100	R 6,002.15
Handling materials	R 0.24	105,000	R 24,777.78
Machine set-ups	R 7,077.38	2	R 14,154.76
Blending of products	R 5,346.15	95	R 507,884.62
Manufacturing	R 10,490.67	-	R -
Bagging	R 4.31	85,000	R 366,282.21
Sorting products	R 0.51	85,000	R 43,245.61
Transport of Final product	R 1.44	80,000	R 115,436.24
<b>Total</b>			<b>R 1,086,741.70</b>

Source: Own Research

To calculate the total overhead cost per ton, all the activity costs, per product, must be summed. This is the total activity cost per product, per the demanded tons (see table 4.3). The total activity costs divided by the demanded tons will calculate the activity cost per ton of each product (see table 4.10).

**Table 4.10: Cost per activity summary**

	<b>Demand (Tons)</b>	<b>Total Activity Costs</b>	<b>Activity Cost per Ton</b>
<b>Product 1</b>	180,000.00	R 3,539,376.49	R 19.66
<b>Product 2</b>	130,000.00	R 2,673,845.56	R 20.57
<b>Product 3</b>	240,000.00	R 2,263,967.68	R 9.43
<b>Product 4</b>	220,000.00	R 2,526,137.01	R 11.48
<b>Product 5</b>	70,000.00	R 499,931.56	R 7.14
<b>Product 6</b>	105,000.00	R 1,086,741.70	R 10.35
<b>Total</b>	<b>945,000.00</b>	<b>R 12,590,000.00</b>	

Source: Own Research

#### 4.2.7. Total cost per product

The total cost of the product is calculated by adding the raw material cost, as per bill of material requirements (see table 4.2), labour cost (see table 4.4), and overhead cost (see table 4.11) together.

The results of this case study, based on Activity-based Costing method, are summarized in the table below (see table 4.11.)

**Table 4.11: Cost of sales per product (Activity-based Costing method)**

<b>Cost</b>	<b>Raw Material Cost</b>	<b>Labour</b>	<b>Activity Cost / Overheads</b>	<b>Total Cost of Sales</b>
<b>Product 1</b>	R 3,254.95	R 52.50	R 19.66	<b>R 3,327.11</b>
<b>Product 2</b>	R 2,917.60	R 52.50	R 20.57	<b>R 2,990.67</b>
<b>Product 3</b>	R 3,444.60	R 35.00	R 9.43	<b>R 3,489.03</b>
<b>Product 4</b>	R 3,740.85	R 35.00	R 11.48	<b>R 3,787.33</b>
<b>Product 5</b>	R 3,787.50	R 17.50	R 7.14	<b>R 3,812.14</b>
<b>Product 6</b>	R 2,724.15	R 11.67	R 10.35	<b>R 2,746.17</b>

Source: Own Research

### 4.3. CURRENT SITUATION

ACME Fertilizer is currently following a Standard Costing methodology. The raw material allocation is summarized in the bill of materials per product. The raw materials in product costing will remain relatively constant with the different methodologies, ABC or the traditional standard costing. The major cost element which plays a significant role is the allocation of the labour and overhead costs.

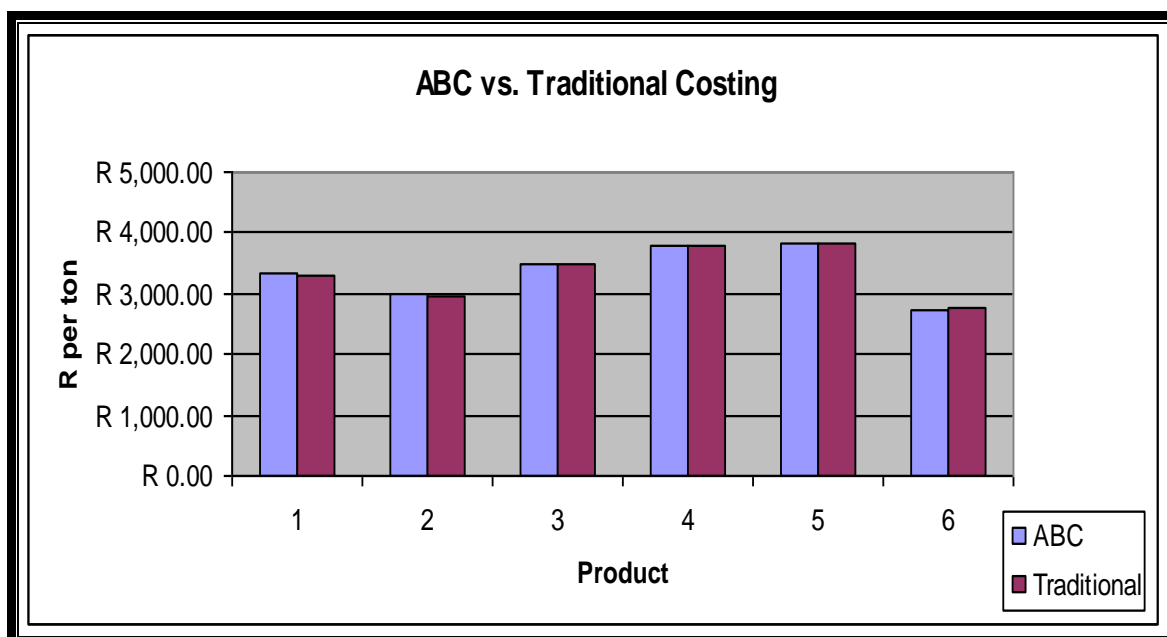
The labour and overheads are determined once a year based on budgeted expenses and tonnage. Thus, under or over-recovery of labour and overheads occurs yearly. It currently assumes that all products use the same effort to manufacture. To prove these statements, the usage of an activity driven framework within ACME Fertilizer will be assessed and the results discussed.

The costing of the 6 products will now be done according to the current traditional standard costing method that ACME Fertilizer follows. The scenario and figures in the above remain the same. Labour and overheads within ACME Fertilizer are calculated as follows:

$$\begin{aligned}
 \text{Labour Cost} &= \text{Total Labour Cost/Demand (tons)} \\
 &= \text{R } 34\,825\,000 / 945\,000 \text{ t} \\
 &= \text{R } 36.85 \text{ per ton} \\
 \text{Overhead Cost} &= \text{Total Overheads/Demand (tons)} \\
 &= \text{R } 12\,590\,000 / 945\,000 \text{ t} \\
 &= \text{R } 12.32 \text{ per ton}
 \end{aligned}$$

The raw material prices won't change, because the BOM will remain constant and unchanged. The cost of sales differences are provided in table 4.11 and figure 4.1.

**Figure 4.1: Activity-based Costing vs. traditional costing**



Source: Own Research

As a result of the empirical study, it is evident by looking at table 4.11 and figure 4.1 that there is a small difference between the cost of sales of the products when calculating it based on ABC and the traditional way of doing the costing, however, a small difference can become a huge financial factor if high volumes of products get sold.

**Table 4.12.1: Cost of sales differences - product 1**

ABC vs. Traditional	Product 1		
	ABC	Traditional	Difference
<b>Raw Material Cost</b>	R 3,254.95	R 3,254.95	R -
<b>Labour</b>	R 52.50	R 36.85	R 15.65
<b>Activity Cost / Overheads</b>	R 19.66	R 12.32	R 7.34
<b>Total Cost of Sales</b>	<b>R 3,327.11</b>	<b>R 3,304.12</b>	<b>R 22.99</b>

Source: Own Research

**Table 4.12.2: Cost of Sales differences – product 2**

ABC vs. Traditional	Product 2		
	ABC	Traditional	Difference
<b>Raw Material Cost</b>	R 2,917.60	R 2,917.60	R -
<b>Labour</b>	R 52.50	R 36.85	R 15.65
<b>Activity Cost / Overheads</b>	R 20.57	R 12.32	R 8.25
<b>Total Cost of Sales</b>	<b>R 2,990.67</b>	<b>R 2,966.77</b>	<b>R 23.90</b>

Source: Own Research

With Product 1 and 2, the cost of sales based on ABC was just over R20 more than when costing was done according to the traditional method (see table 4.12.1 and table 4.12.2). It is not always beneficial to have a lower cost of sales. With these two products, it means that the margins will be slightly more with the traditional method, but your L&O is under-recovered, therefore the under-recovered amount will be seen as an expense and will reduce the profits.

The disadvantage if the cost of sales is lower with the traditional method than with ABC, as it means another product is carrying the loss in labour and overheads. This might create an unavoidable issue when the other product which might be carrying product 1's under-recovered L&O, might not do too well in that year and the budgeted tonnage might not be made. ACME Fertilizer will suffer losses because of this product, but won't know why. Thus, the losses per product as well as the overall loss effect will be greater, and other financial implications might have a huge effect.

When looking at the current way of how things are done at ACME Fertilizer compared with calculating the cost of sales of each product under the same circumstances and costs occurred, the following cost of sales variances is identified. By making use of the current standard costing, the following value in overheads will be under-recovered; meaning cost of sales was too low.

*	Product 1	=	Difference in cost of sales x demand
	(L&O recovery)	=	- R22.99 x 180 000 tons
		=	- R 4 138 776.49 ( <i>under recovery</i> )
**	Product 2	=	Difference in cost of sales x demand
	(L&O recovery)	=	- R23.90 x 130 000 tons
		=	- R 3 106 745.56 ( <i>under recovery</i> )

**Table 4.12.3: Cost of Sales differences – product 3**

ABC vs. Traditional	Product 3		
	ABC	Traditional	Difference
<b>Raw Material Cost</b>	R 3,444.60	R 3,444.60	R -
<b>Labour</b>	R 35.00	R 36.85	R -1.85
<b>Activity Cost / Overheads</b>	R 9.43	R 12.32	R -2.89
<b>Total Cost of Sales</b>	<b>R 3,489.03</b>	<b>R 3,493.77</b>	<b>R -4.74</b>

Source: Own Research

**Table 4.12.4: Cost of sales differences – product 4**

ABC vs. Traditional	Product 4		
	ABC	Traditional	Difference
<b>Raw Material Cost</b>	R 3,740.85	R 3,740.85	R -
<b>Labour</b>	R 35.00	R 36.85	R -1.85
<b>Activity Cost / Overheads</b>	R 11.48	R 12.32	R -0.84
<b>Total Cost of Sales</b>	<b>R 3,787.33</b>	<b>R 3,790.02</b>	<b>R -2.69</b>

Source: Own Research

The costing methodologies' costing seems to be close to each other, especially when looking at Product 3 and 4 in table 4.12.3 and 4.12.4. This does not seem like a big difference, but when the demand is met, it will have a huge variance. Because the above two products are high volume products, it makes them extremely price-sensitive. Product 3 and 4 will have a R1.1 million\* and R600k\*\* respectively loss in margin when the traditional standard costing methodology is followed (as currently being done at ACME Fertilizer). In the end this is a huge amount of money considering that there was only a R4.74 (Product 3) and R2.69 (Product 4) cost of sales difference between the two costing methodologies.

- \* Product 3 = Difference in cost of sales x demand  
(L&O recovery) = R4.74 x 240 000 t  
= R 1 136 832.32 (*over recovery*)
- \*\* Product 4 = Difference in cost of sales x demand  
(L&O recovery) = R2.69 x 220 000 t  
= R 591 262.99 (*over recovery*)

**Table 4.12.5: Cost of sales differences – product 5**

ABC vs. Traditional	Product 5		
	ABC	Traditional	Difference
<b>Raw Material Cost</b>	R 3,787.50	R 3,787.50	R -
<b>Labour</b>	R 17.50	R 36.85	R -19.35
<b>Activity Cost / Overheads</b>	R 7.14	R 12.32	R -5.18
<b>Total Cost of Sales</b>	<b>R 3,812.14</b>	<b>R 3,836.67</b>	<b>R -24.53</b>

Source: Own Research

**Table 4.12.6: Cost of sales differences – product 6**

ABC vs. Traditional	Product 6		
	ABC	Traditional	Difference
<b>Raw Material Cost</b>	R 2,724.15	R 2,724.15	R -
<b>Labour</b>	R 11.67	R 36.85	R -25.18
<b>Activity Cost / Overheads</b>	R 10.35	R 12.32	R -1.97
<b>Total Cost of Sales</b>	<b>R 2,746.17</b>	<b>R 2,773.32</b>	<b>R -27.15</b>

Source: Own Research

Looking at Product 5 and 6 in table 4.12.5 and table 4.12.6, the cost of sales difference between the two costing methodologies is much bigger. The demand of these two products is not as high as Products 3 and 4, therefore Products 5 and 6 are not as price-sensitive as Products 3 and 4. The loss in margin because of the traditional standard costing methodology with Products 5 and 6 carries some substance and is calculated below:

$$\begin{aligned}
 * \quad \text{Product 3} &= \text{Difference in cost of sales x demand} \\
 (\text{Loss in margin}) &= \text{R24.53 x 70 000 t} \\
 &= \text{R 1 716 968.44 (over recovery)} \\
 ** \quad \text{Product 4} &= \text{Difference in cost of sales x demand} \\
 (\text{Loss in margin}) &= \text{R27.15 x 105 000 t} \\
 &= \text{R 2 851 108.30 (over recovery)}
 \end{aligned}$$

#### **4.4. SUMMARY**

The purpose of this chapter was to compare the traditional standard costing method with the activity-driven operational methodology by taking one scenario (same products, same costs per resource) and to cost the products according to each methodology and to conclude the difference in the calculated costs. The results were analysed and recommendations made based on the results of the two different methodologies

By looking at the final results (see table 4.13), it may be argued that ABC reflects a more accurate and true reflection of what the product actually costs. Costs are allocated to activities, and activity costs will be allocated to the product in relation to the consumption of that activity. This ensures that some products are not carrying other products with regards to labour and overhead costs. ABC will reduce the risks associated with economic losses should the target sales and production tonnage not be fulfilled.

**Table 4.13: Cost of sales differences – operating margin loss**

	<b>ABC (ZAR)</b>	<b>Traditional (ZAR)</b>	<b>Demand (tons)</b>	<b>Difference (ZAR)</b>	<b>Difference (ZAR)</b>
<b>Product 1</b>	R 3,327.11	R 3,304.12	180,000	R 22.99	<b>R 4,138,776.49</b>
<b>Product 2</b>	R 2,990.67	R 2,966.77	130,000	R 23.90	<b>R 3,106,745.56</b>
<b>Product 3</b>	R 3,489.03	R 3,493.77	240,000	-R 4.74	<b>-R 1,136,832.32</b>
<b>Product 4</b>	R 3,787.33	R 3,790.02	220,000	-R 2.69	<b>-R 591,262.99</b>
<b>Product 5</b>	R 3,812.14	R 3,836.67	70,000	-R 24.53	<b>-R 1,716,968.44</b>
<b>Product 6</b>	R 2,746.17	R 2,773.32	105,000	-R 27.15	<b>-R 2,851,108.30</b>
					<b>R 949,350.00</b>

Source: Own Research

Findings during this study show that the costs may differ with each methodology followed. It is clear that for some products the traditional standard costing method is under-recovering the applicable overhead costs, and with some products it is over-recovering. This can become very risky when actual demands change from the forecast demand. In this example, the unrecoverable overheads of products 1 and 2 get more or less smoothed out by the over-recovery of the rest of the products. It is illustrated through this case study that altogether ACME Fertilizer would have under-recovered labour and overhead costs worth almost R1 million rand (see table 4.13).

Thus, should the cost of sales be too high, ACME Fertilizer might over-price them in the market and the operating margins will be negatively affected, thus lower profits. Should the cost of sales be too low, it will mean that the L&O will be under-recovered. Although the product will show big margins, the end result might cause a net loss at financial year end.

If the costs of a product are inaccurate, management's decisions will be made on this inaccurate information which might lead to bad and unfavourable results.

With the visibility that an activity-driven accounting framework can provide, unprofitable or non-value adding processes, procedures, activities, resources and product lines can be identified and improved or even eliminated.

This study demonstrated the theoretical and practical advantages of ABC. These advantages will include better cost calculations, quality improvement (operational and with intellectual property) and decision-making at various management levels. It will also leave management, sales and marketing personnel with a better understanding of where to walk away from business if the market price is lower than the actual cost of sales of a product. It will also be beneficial to know to what levels you can drop your margins in order to remain competitive and achieve that competitive advantage and market share.

The next chapter will discuss the overall findings and recommendations from this study. It will include the aims and objectives of the study as well as what the findings were of those objectives by referring back to previous chapters.

# CHAPTER 5: FINDINGS AND RECOMMENDATIONS

## 5.1. INTRODUCTION

Following a thorough investigation into the method currently in use by ACME fertilizer and the embedding of an activity driven operational accounting framework the following has been found and recommendations are made to ACME fertilizer for further consideration.

With the application of Activity-based Costing the planning, control, decision-making and more accurate and reliable costing will be evaluated within the company. By using the results of costing products based on activity consumption, it means that the sales prices can be determined with much more confidence, as the true cost of products is now visible, without unforeseen or surprise costs that will absorb all the profits (Chapter 4, table 4.11, p 63). These days are tough for any business, but if you know the true cost, marketing and sales personal will know up to where to give discounts and when to walk away from business.

The problem statement of the study therefore considers whether the cost implementation process as well as maintenance thereafter is worth it? If the financial benefits are greater than the costs associated with the implementation of an ABC system, it should be considered (Kennet *et al.*, 2007). The primary research problem considered throughout this study (Chapter 1, p 6.) was to prove that it will provide better and more relevant management information.

For this study, six products were used to demonstrate the difference in prices, to the time when cost is calculated based on the activities consumed vs. the traditional method which ACME Fertilizer currently uses.

The hypothesis of this study was proved, and by referring to the results in Chapter 4, Activity-based Costing is indeed a very helpful and supportive tool when calculating the cost of producing goods accurately and to limit the over or under-recovery of labour and overheads (Chapter 4, table 4.13).

## 5.2. RESEARCH OBJECTIVES - RESULTS

The current costing method was identified, analysed and the results compared against those of an activity-driven framework. The major difference in costs was due to the way the labour and overheads are calculated (see table 4.4). This will cause a over or under-recovery of the budgeted costs, as well as the possible over-pricing of themselves in the market or, on the

other hand, surprise costs leading to cause high margins, but a very low net profit even a loss.

- Primary objective: The primary objective of this research was to assess the feasibility of an activity-driven operational accounting framework (Chapter 1, p. 6). To address the above primary objective, the difference in unit rates, calculated on the basis of ABC and traditional costing, highlights the difference that a change in costing can have on the cost of the cost object (Chapter 4, table 4.13, p.68). ABC allocates costs based on the resource and utility consumption, but traditional costing assumes that all products take exactly the same time and effort to manufacture. Therefore ABC brings the actual cost more in line with reality. The cost of a product was determined, compared and analysed, including the labour and overheads based on the current costing method and then compared to the results when costs get allocated based on an Activity-based Costing (Chapter 1, p. 6). The result of the above was tested in Chapter 4. The financial impact of an ABC system will vary. For some products it may cost more when using ABC than with traditional methods. The effect will be either an under-recovery of the labour and overheads or unforeseen expenses only noticed during the financial year end. Looking at product 1, the effect will be a difference of R4.1 million rand which was not brought into the calculation (Chapter 4, table 4.13, p 68). Product 2 will have a R3.1 million unrecoverable costs should the traditional method be used (Chapter 4, table 4.13, p 68). On the other hand products 3, 4, 5 and 6 would have shown a R1.1 million, R590k, R1.7 million and R2.85 million, each respectively, having the higher margin through using the traditional method (Chapter 4, table 4.13, p 68). Thus, ACME Fertilizer could have been over-priced in the market if it was a rigidly competitive market in which they compete. The risk of over-pricing is extremely high, especially in a price-sensitive market.

Other objectives achieved throughout this study are that an activity-driven operational framework is a very supportive supplement to the current system. It gives a better picture of the operational side of the business and unnecessary activities can be visible. Best practices can be followed, as the operational processes and activities are much more visible, with a financial value.

- Secondary objective #1: Ensure the lowest possible cost per ton of fertilizer and thus establish a higher margin, but a high profit at the end as well (Chapter 1, p 6). ABC proved that it won't necessarily provide the lowest cost of sale (Chapter 4, table 4.13, p 68), but rather a more accurate cost of sale – for example the cost of Products 1 & 2 is higher if calculated following the ABC method, than with the traditional method.

Hence, previously the sale of these products could have taken a huge chunk out of the profit.

- Secondary objective #2: More effective and efficient utilization of available resources hence the irrelevant costs will be eliminated and processes can be amended (Chapter 1, p. 6). By benchmarking the Rate per Activity, the problem activities can be identified and looked into. With the current scenario used in Chapter 4, it is evident by looking at the data in chapter 4 that ACME Fertilizer should review its activities (Chapter 4, table 4.8, p 59). The purchasing of raw materials is costing ACME Fertilizer too much, and the current way the company does procurement is not cost-effective. They should look at buying more quantities at a time, thus they can benefit from economies of scale and reducing activities, which will lead to lower cost of production. The best way to save cost, when not reducing productivity, is to streamline and automate processes in order to carry fewer operational expenses. Sorting of products can be eliminated if the process at the bagging plant can be maximized. This process was never seen as an activity which can cost a lot, but only as a 'nice to have'. By looking at the data from the activity-driven cost methodology, unnecessary activities can be identified and costs can be reduced.
- Methods of investigation. During the literature study, all the key components, fundamentals, advantages, disadvantages, implementation procedures and other issues of an activity-driven framework were identified and explained (Chapter 2, p 13-24). All the theoretical information was gathered through articles, magazines, textbooks, financial statements of ACME Fertilizer, SAFOL and FOSKOR, then analysed and commented on. Other internet-sourced documents as well as other case studies all contributed to the final outcome. A pilot study was designed where the general need for an ABC was determined. The sample consisted of fourteen (14) similar companies, of which ten (10) responded (56% response rate).

In order to complete the empirical study, interviews were conducted where information regarding time spent; activities in use and other valuable information was gathered. The information was taken and compared between the two different costing methods. The results were very close, with not a huge financial effect. The assumption was made that all budgeted tonnage was produced and sold, as well as that all budgeted expenses were accurate.

### **5.3. RESEARCH SYNOPSIS**

The study initially highlighted the importance of cost control and the management thereof. Management should focus on streamlining and improving efficiencies and eliminating non-

value adding activities and processes which will result in lower costs. ACME Fertilizer's background, challenges and cost structure were explained throughout Chapter 1. The research problem was whether an activity-driven accounting framework will provide better and more accurate management information. The primary objective is to determine the feasibility of activity-driven operational accounting framework within the manufacturing industry. The secondary objectives were to get the unit cost lower, and the margin and profit higher and secondly, to reach effective and efficient resource utilization by eliminating non value adding activities. The research method of this study was concluded by means of a literature and empirical study.

As a foundation for the empirical study covered the theory of ABC was identified and discussed by means of the key components, fundamentals, advantages, disadvantages, implementation and other ABC methodologies. It is important that the costs be managed and that process constraints be identified and streamlined. ABC was introduced by Robert Kaplan and Robin Cooper during the late 1980s to overcome the issue of traditional costing methods which only used one cost driver to determine costs. The ABC methodology prescribes that costs must be allocated to activities, and a rate per activity calculated and then passed on to the cost object by means of the resource utilization of the activities. If the financial benefit of implementing ABC is greater than the implementation cost and maintenance thereof, ABC should be definitely considered. The cost of the implementation of an ABC system is at this stage unknown and it can't be confirmed whether the benefit of implementation will be greater than the cost thereof. The cost benefit analysis for ABC for Company O will remain a possibility for future research. ABC is especially useful in companies where a high percentage of the operating costs are indirect, because of process automation and improvements. Although the implementation and maintenance of ABC is a time-consuming and costly process other advantages include visible and more accurate costs, which will help in the decision-making process. ABM is the use of ABC information to assist in management decisions by means of processes and costs in order to satisfy the end customer and increase profits. Another costing methodology married to ABC is Time-driven ABC which is an efficient, quicker and less costly method which will also deliver good results.

The study also considered ACME Fertilizer's business model and costing methodology in accordance with Porter's Value Chain. The focus of this chapter is on the Value Chain and it explains how products must go through different channels in order to add value to the end product. ACME Fertilizer's current costing methodology is analysed and by comparing it to the rival company's costing methodology it is evident that ACME Fertilizer must review their current costing methodology. A pilot study, in which 14 companies responded, indicated that

there is a need for ABC, but most of them are still very unfamiliar with the principles, although they might look into it.

The key aim of the empirical study was to determine the difference between using ABC as your cost base vs. the current costing method of ACME Fertilizer. The result proved that ABC won't necessarily reduce your cost, but rather give a much more accurate costing. Six products were chosen and the results were compared. Products 1 and 2 were under-recovering as per current method, thus negative margins were obtained. Products 3 and 4 will slightly over-recover, but because the demand for these two products is very high, higher margins will emerge because of a more accurate costing method. Products 5 and 6 have a lower demand, but the costs were overstated and had probably carried some overheads used to manufacture one of the other 4 products. With the more accurate costing, the price might be able to be reduced which can lead to an increase in volumes.

Chapter 5 was the final chapter where the study's findings and recommendations were made. The hypothesis, method of investigation and objectives reached were discussed and the final recommendation concluded the study.

#### **5.4. RECOMMENDATION**

By looking at the results, it is evident that a proper costing method/system is crucial in any company. The results are extremely volatile, and very sensitive. If the market turns out that the demand for a specific product is higher than budgeted, and the current costing is lower than the actual cost of products, it can cause huge financial losses and will have long term negative effects.

An Activity-driven system should be used in addition to the current ERP system, and the two systems should run parallel. When the costs are visible, the non-value added processes and activities can be eliminated and financial benefits can be received. Once the financial benefits received have exceeded the cost of the implementation of the system, it will have been worth the costs – keeping in mind the annual/monthly maintenance costs.

The challenging part is to use the successful implementation of an ABC wisely in order to improve processes to drive lower costs. Based on the case study, Company O needs to go and revisit their business plan and seek where they can save time and money, by streamlining processes and eliminate non-value adding activities. There are room for improvement on cost efficiencies within the procurement department by hedging exchange rates, economies of scale price negotiations and tender processes. Fixed and Variable costs must

be reviewed, and eliminated if it is not adding value. Company O must investigate which of their products are not profitable and those should be discontinued.

## **5.5. LIMITATIONS OF THIS STUDY**

In order to complete this study, a questionnaire survey was completed (see Appendix 1, p 77), and it was assumed that the results were correct and not misleading. The sample used was not based on statistical information and was too small to determine the actual impact it will have on the company, thus the study remains limited. The interviews held with ACME Fertilizer's financial and operational representatives were restricted to their knowledge. Competitors could not be approached as there was an investigation pending, by the Competitions Commission, within this industry. For the purpose of this study, it was assumed that all commodity prices (supply and demand) as well as any foreign currencies remain consistent and that there were no fluctuations, thus averages were used for calculation purposes.

## **5.6. RECOMMENDATIONS FOR FURTHER RESEARCH**

This study leaves the following opportunities for further research:

- The impact of alternative costing methodologies in service industries on the costing of services. Other costing methodologies like TDABC can be investigated in order to overcome current issues that are too complex to be dealt with within the ABC model.
- A stronger focus on the financial benefit vs. the cost of implementation by increasing the sample size based on statistical information can be beneficial and will prove the benefits to companies who are considering ABC.
- Alternative but relative costing methodologies like TDABC can be investigated in order to overcome current issues that are too complex within the ABC model.

# APPENDIX: PILOT STUDY QUESTIONNAIRE

Marne van der Linde

APPENDIX 1

Student number: 12567353

North-West University

Embedding an Activity Driven Operational Accounting Framework: A case study

## Questionnaire

### Introduction

I am a Master Student at the North-West University. I am doing research on costing systems within organisations, especially within the Manufacturing Industry. You have been selected to contribute to my research project by providing data about your company, your insight, processes and procedures, etc. Herewith, I promise that all information will be treated strictly confidential, and that your name and the company's name will not be published.

I will be most grateful if you would take a few minutes to complete this questionnaire of 20 questions and return it to me before 31 March 2010. Your responses will be used - anonymously - to analyse the need for an Activity Driven Operational Accounting Framework for South African Manufacturers. Please answer as clearly and honestly as possible.

Should you have any queries, please contact me (082 305 3371).

Thank you

Kind Regards

Marne van der Linde

<b>Questions</b>					
<b>GENERAL</b>					
1	Is your company in the FMCG industry?	Yes	No	Not sure	
2	If no, please specify which industry.	_____			
3	What is your current position in the Company?	_____			
4	Are you familiar with the term "Activity-Based Costing"?	Yes	No	Not sure	
5	Will it be difficult to get the managements buy-in should ABC be implemented?	Yes	No	Not sure	
6	Will you say that your company is exchange rate sensitive?	Yes	No	Not sure	
7	Is there any non value adding activities that you know of?	Yes	No	Not sure	
<b>MANUFACTURING OF GOODS</b>					
8	Do you make use of "Bill of Materials" for products manufactured?	Yes	No	Not sure	
9	How often do you change the Cost of Sale of products?	Weekly	Monthly	Quarterly	Yearly
10	What are the components of the Cost of Sales of a product?	Raw Material	Labour	Overheads	
		Tranport	Other		
12	Do you allocate different Labour and Overhead charges to different products?	Yes	No	N/A	
13	Is the management of overheads within operating units a major concern for the business?	Yes	No	Not sure	
14	Do you know which processes are followed in the plants, eg process flow chart?	Yes	No	Not sure	



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