Adoption factors for the implementation of Activity Based Costing systems: A case study of the Libyan cement industry

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DEDICATION

This thesis is dedicated with love to spirit of my parents for their priceless heritage of education, integrity and love.

Gebril

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Indeed all praise and thanks is due to Allah, the Lord of all that exists, who has enabled me to complete this endeavour.

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I am very grateful to the respondents who took time to reply and who participated in the interviews, especially the interviewees from the two case study organisations, the Libyan Cement Company and the Ahlia Cement Company, as their diligent participation made this research possible.

I would like to dedicate this thesis to my family and wish to express my deep sense of gratitude to them. This effort would not have been possible without the extraordinary love and support given to me by my entire family and, in particular, I would like to express a profound appreciation for the love, encouragement and support of my wife.

DECLARATION

I declare that this thesis is based on an original investigation and full acknowledgment is given to all the sources used. This study has not been previously submitted for a degree or a similar award at any institution. To the best of the researcher's knowledge and belief, this work contains no material previously published or written by another person where due reference is not made in the work itself.

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Abbreviations

ABC	Activity Based Costing
ACC	Ahlia Cement Company
AMT	Advanced Manufacturing Technologies
BCA	British Cement Association
CAD	Computer Aided Design
CAM	Computer-Aided Manufacturing
CIM	Computer Integrated Manufacturing
FMS	Flexible Manufacturing Systems
GPC	General People's Committee
HIB	Housing and Infrastructure Board
JIT	Just-In-Time
LCC	Libyan Cement Company
MRP	Material Requirements Planning
TCS	Traditional Cost System
TQM	Total Quality Management

Abstract

This study aims to identify and assess the viability of the adoption and implementation of the Activity-Based Costing (ABC) system in the Libyan cement industry (LCI).

The main expected contribution to knowledge is represented in the development of an analytical framework on the adoption factors of the ABC system in the LCI.

The originality in the current study lies in bridging the gap in the knowledge and understanding of ABC system practices in the Libyan context. This study is the first to be conducted in a Libyan context as no previous empirical research has been undertaken on the subject of the ABC system in the Libyan environment.

From this research it is expected that a deep understanding of the key factors that would encourage other Libyan organizations to adopt the ABC system can be gained which, in turn, would help them to become more efficient and more effective (by providing these organizations with a clear picture of where resources are being spent and whether money is being made or lost).

The research started by gathering the adoption factors (eight factors) of the Activity-Based Costing system through addressing and analysing the literature published since 1987. Ascertaining these adoption factors helped the researcher in the framing of the interview questions; these factors were used as a guide to collect and assess the relevant data for this study in order to obtain valid results.

The interpretivism philosophy was selected for this research. The research method used was the qualitative research method and the research strategy was multiple embedded case studies. The main data was gathered via face-to-face semi-structured interviews and documentation and direct observation were also used as other sources of evidence to enhance the research validity and reliability. The semi-structured interviews were conducted with employees from the top, middle and shop floor levels of the Ahlia Cement Company and the Libyan Cement

Company. The various data were collected and analysed systematically by using thematic analysis.

The results of the study show that ABC can be adopted in the Libyan cement industry due to the existence of most of the necessary factors required for the adoption of the ABC system in the Libyan cement environment.

Key words: Activity-Based Costing, traditional cost accounting, the Libyan cement industry.

CHAPTER ONE

INTRODUCTION TO THE RESEARCH

1.0 Introduction

This research identifies and assesses the viability of the adoption and implementation of ABC in the Libyan cement industry.

The purpose of this introductory chapter is to establish the background of the research area, the aim, objectives and underlying research questions, the importance of the research, the expected contributions to knowledge that could emerge from the completion of the research, a brief indication of the research methodology and the overall layout and structure of the thesis.

1.1 The Background and Research Problem

Libya is located in North Africa with a Mediterranean shoreline of more than 1,800 kilometres. It is bounded by the Mediterranean Sea to the north, Niger, Chad and Sudan to the south, Egypt to the east, Algeria and Tunisia to the west. Libya is the fourth largest country in Africa and is seven times the size of the United Kingdom. The country covers 1,775,500 square kilometres. However, over 90% of the land is either desert or semi-desert. The Libyan Desert is part of the Great African Sahara Desert. Libya's population is about 6,422,772 According to the Libyan Mission at the United Nations (2013), the majority of the population is urban and grows on average by 4.2 percent annually. Most Libyan people are Sunni Muslims and are young; almost 50 percent of the population are under 15 years old and 86 percent are urban residents and live in the north of Libya (Soliman, 2011).

The Libyan cement industry involves two companies: the Libyan Cement Company (LCC) and The Ahlia Cement Company (ACC). The Libyan Cement Company (LCC) was a public company and changed to a private company in 2006 as a share holding company. Production started in this company in 1972 with one factory but it now has four plants; the Benghazi plant produces 800,000 tonnes a year. The Hawari plant, which was established in 1978, produces a total

of 1 million tonnes a year. In 1987, some adjustments were made to the Hawari plant production lines in order to produce sulphate-resistant cement which was suitable for the construction of the man-made river project (World Report, 2004). Both the Hawari plant and the Benghazi Plant are located in the south of Benghazi city. The El-Fatayah factory is the third factory which was established in 1982 with two production lines that have a 1 million tonnes per year production capacity. This factory is located near Dherna city. LCC also has a factory that produces cement packaging which was established in 1975 in Benghazi city. This factory produces 200,000 bags per day. All these plants exist in the eastern region of Libya (LCC, 2008). More details on the LCC can found in Chapter Four.

The Ahlia Cement Company was established in 1965 under the name General Cement & Building Materials Corporation (GCBMC). In 1988, GCBMC was renamed as the Arabian Cement Company; then, in 2005, it changed from being a public company to being a private company, as a share holding company under the name 'Ahlia Cement Company'. It has six plants: El-Mergeb (in Al-Komes); Suk Elkamis (in Tripoli); Lebda (in Lebda); Zliten (in Zliten); a bag making plant (in Al-Komes) and Alklata (in Tripoli). All of these sites are located in the western region of Libya (ACC, 2009). More details on the ACC can found in Chapter Four.

There has been an enormous change in the manufacturing environment over the last three decades. Production in manufacturing companies has been facilitated by computers, computer incorporated systems and robotics. These automatic systems enable manufacturing companies to produce products which were previously considered impossible to produce but which are now being manufactured. The adoption of new technologies has increased competition worldwide due to globalization and has allowed the manufacturers in the Far East to compete with the western markets in various products. Globalization ensures that manufacturing organizations constantly search for improvement in order to be able to continue to exist and thus they look to adopting new and advanced strategies in manufacturing and management accounting in order to remain competitive. To achieve this objective, organizations have improved their management methods; the activity

based costing (ABC) system being one of them. ABC is considered to be a promising accounting method that is used by organisations to help in the improvement of processes in order to obtain more profit and cost effectiveness in competitive environments instead of the traditional system of accounting which is considered not efficient enough to determine the cost of, and the profitability obtained by, each product; such a traditional system cannot calculate all the factors involved in the production process. According to Dorgham, (2007), the implementation of ABC system is a complex process because it takes a lot of time, money and efforts therefore; firstly, organizations have to take into account the availability of the adoption factors of ABC system in their environment before the implementation stage in order to overcome of these obstacles.

Manufacturing companies in Libya are undergoing some organizational changes in order to compete in the local and global markets and this requires changes in manufacturing and management strategies. As in every developing country, Libyan manufacturing companies are inclined to manufacture products in order to obtain maximum profit by using their available resources. Many studies have found that the impact of globalization is greater in developing countries, such as in Libya, than in the developed countries (Burns and Scapens, 2000). Therefore, the researcher believes that most of the developing countries need to adopt the ABC system in their organizations to promote their competitiveness within the local and global market and there is a lack of empirical studies on the adoption of the ABC system in the world in general and in Libya in particular (see Chapter Two).

Due to managerial, technical and financial problems Libyan cement companies have suffered and are still suffering and this reflects on their productivity and competitiveness (Elmagri, 2013; Binsaoud, 2002). Therefore, this study focused on finding a resolution within the financial side in order to reduce part of the problems found within cement companies in Libya. Hence, the researcher visited the Libyan cement companies in August 2010 and asked the directors of the financial departments about the cost accounting system which they used in their company. These financial directors stated that they were still using the traditional

costing system and that they were not familiar with the ABC system. Therefore, the researcher decided to examine the factors that would encourage the cement industry management to adopt the activity-based costing system within the Libyan cement companies in order to enhance their performance and competitiveness.

1.2 The Importance of the Study

There are a number of factors which make this study a valuable area to investigate. These factors are discussed below.

1.2.1 The Importance of the Concept

The progressive use of advanced manufacturing technologies (AMT) has made traditional costing systems become out-of-date by creating an overhead-intensive environment (Brimson, 1997). Such systems do not allow organizations to compete successfully in the current business environment (Cunningham, 1992). Although recognizing the problem is a good beginning, the pressing need now is for a solution. ABC has emerged as the key alternative to traditional costing systems. It recognizes that many overhead costs vary in proportion to changes other than production volume. By identifying the cost drivers that cause costs to change and assigning costs to products on the basis of cost driver usage, ABC can more truthfully measure the resources consumed by products. This cause and effect relationship provides a superior way of determining relevant costs. Moreover, ABC can be used for a range of cost management applications such as cost reduction, activity-based budgeting, performance measurement, benchmarking of activities, process management and business process re-engineering (Drury, 2006).

Hergert and Morris (1989) argued that the traditional costing system, primarily developed to measure true costs, has been bereft of significant innovation for the last 60 years and is not able to provide the data required by the recent strategic planning frameworks of the 1970s and 1980s.

Berliner and Brimson (1988) pointed out that many organizations are struggling with important economic issues, such as how to improve product cost

information, how to cost justify capital investments, how to change decision support tools like product-abandonment models and make/buy decisions, and how to revise performance measures that currently encourage only short-term productivity.

New developments have occurred in manufacturing technology. Most organizations use advanced manufacturing technologies (AMT), such as computer aided design (CAD), robotics and flexible manufacturing systems (FMS). AMT has revolutionized the manufacturing shop floor and has dramatically changed manufacturing cost-behaviour patterns. Usage of AMT has caused overhead costs to rise dramatically and they now go beyond direct costs.

The ABC system is a relatively new means for calculating the costs of products as it only came into being in the 1980s. The implementation of this system has achieved remarkable results in determining the accuracy of costs which has changed prices and led to improvements in profitability (Bisbe et al., 2007). The most important reason for adopting the ABC system (instead of the traditional costing system) is the intense competition that faces contemporary industrial organizations (Roztocki et al., 1999). Therefore, current organizations need to manufacture high-quality products with less cost in order to be able to compete and this is only possible with rational decisions based on accurate information about the costs. The traditional costing system cannot provide accurate information about costs (Johnson, 1991); thus most current industrial organisations have tended to adopt the ABC system after the confirmation of the possibility of its implementation (Ashour, 2007).

Berliner and Brimson (1988) and Brimson (1997) have stated that traditional costing systems do not sufficiently support the objectives of international competition and the AMT environment for several reasons: firstly, the philosophy of absorbing overhead costs by allocating them on the basis of volume-related production has caused distortions in overhead costs' allocation. Some products are overcharged while others are subsidized. Thus, profitable organizations lose out by overpricing and unprofitable organizations win through under-pricing.

Secondly, these organizations that use traditional costing systems are overwhelmed by high overhead rates resulting from incorrectly traced costs and they do not pinpoint the activities that generate avoidable costs rather than customer-perceived value. Thirdly, information obtained from traditional costing systems is usually unhelpful for strategic cost analysis because it does not help an organization understand the behaviour of costs from a strategic perspective.

1.2.2 The Importance of the Cement Industry in Libya

This study applies to the cement industry which is one of the most important industries in the Libyan economy. The importance of this industry is due to the fact that it produces cement which is necessary in producing concrete and construction materials for constructional development. Moreover, cement plays a necessary role in the building of modern civilizations; without it no house, school, hospital, road, or bridge would be built. It has been classified as the second largest consumed substance in the world after water (BCA, 2007). Furthermore, this industry is one of the most important strategic industries in Libya after the oil and iron industries. The Libyan market is witnessing an increased demand for cement as a result of the extraordinary rise in the building industry especially after the establishment of the Housing and Infrastructure Board (HIB) in 2006 (GPC 2008). HIB focuses on the implementing and overseeing of housing and infrastructure projects, renovating and regenerating neighbourhoods that have under-developed areas, and developing cities and villages to suit the needs of modern civil life, etc. Another reason why the demand for cement has increased is that the government has offered low interest housing loans to individuals as well as to construction cooperatives in order to invigorate the building industry and promote economic development.

1.2.3 The Dearth of Empirical Studies

There is a lack of empirical studies regarding the adoption of the ABC system in countries around the world and in Arab countries specifically (Al-Otaibi, 2006). The system of ABC is considered as modern cost system relating to the allocation of indirect costs, which measures the cost of the product accurately and objectively and, to the best of the author’s knowledge, no study on ABC has been

carried out in Libyan organizations. Therefore, this research is expected to open the door to more studies in the Arabic world in general and to the Libyan environment.

1.3 Research Outline

This part of the introductory section will present the research aim, objectives and questions.

1.3.1 Research Aim

This study aims to identify and assess the viability of the adoption and implementation of ABC in the Libyan cement industry.

1.3.2 Research Objectives

To achieve the aim of this study, the following objectives have been formulated:

- To review the literature in the area of ABC in order to have a deep understanding of the factors that will help organizations in adopting the ABC system;
- To identify a list of these factors to use in field work in the cement industry in Libya;
- To conduct an empirical study to examine the key factors that will help the managements in the cement industry in Libya to adopt or not adopt the ABC system;
- To provide recommendations to the management in the cement industry in Libya to help them to adopt the ABC system.

1.3.3 Research Questions

As the aim and objectives of this research need to be informed by a series of research questions, the following questions have been formulated to achieve these objectives:

- Why does the cement industry in Libya need to adopt an ABC system?
- Are the factors that enable the adoption of the ABC system present in the cement industry in Libya?

1.4 Research Methodology

There is no definite rule as to which methodological paradigm to select when doing research. The most appropriate one will depend on the nature of the study. Research methodology is the use of any strategy, approach or tool that helps in the data collection and in the analysis of the gathered data in order to answer the identified research questions. In the literature there are two main models for research methodology: the nested model and the onion model (Keraminiyage, 2013). The present study adopted the onion model which involves six elements for organising the outlines of the research methodology as follows: research philosophy, research approach, research strategy, research method, data collection, and data analysis.

There are two main research philosophies dominant in the literature: positivism and interpretivism or the phenomenological approach (Collis and Hussey, 2009). Easterby-Smith et al. (2008, p57) described positivism research as: "*The social world exists externally, and its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition*". Positivists prefer using statistical analyses of data collected by means of large-scale empirical surveys (Amaratunga et al., 2002).Whereas interpretivism is a phenomenon that is mainly focused on the specific way that people approach the world based on their previous experiences, using language as a medium of communication (Easterby-Smith et al., 2008). It is a subjective phenomenon that is based on factors such as awareness, depth of perception, an in-depth understanding of the phenomenon and interpretation based on personal experiences in order to answer what, why or how questions (Collis and Hussey, 2009). *The interpretivism philosophy* is an appropriate philosophy for the current study because the researcher wants to gather rich information from the points of view of the study participants (based on their experience) in order to investigate the possibility of adopting ABC in the cement industry in Libya.

According to Saunders et al. (2012) there are two main research approaches, the deductive and inductive approaches. The deductive approach is a theory testing process which commences with an established theory or generalisation and seeks

to establish, by observation, whether it applies to specific instances. The inductive approach is a theory building process, starting with direct observation of specific instances and then seeking to establish generalisations about the phenomenon under investigation. It is more suited to interpretivism research philosophy (Hyde, 2000). In this study, the researcher has chosen to combine the deductive and inductive approaches: a list of factors necessary to investigate the adoption of ABC will be derived from the literature and then investigated in the case study institutions (deductive). After that, the findings from the fieldwork will be incorporated into the existing theory (inductive).

Yin (2009) defined case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context using multiple sources of evidence (as in this research). It is an appropriate method if the researcher wishes to gain a rich understanding and rich descriptions of the context of the research. It is a worthwhile way of exploring existing theory and enables the researcher to be immersed in real life which can provide powerful insights (Saunders et al., 2012). Yin (2009) pointed out three conditions which can be used to select the appropriate strategy for research:

- The type of research question posed;
- The extent of control an investigator has over actual behavioural events;
- The degree of focus on contemporary as opposed to historical events.

In this research, the case study strategy has been selected in order to gain a depth of understanding of the information necessary to identify and investigate ABC adoption in the cement industry in Libya.

Positivism and interpretivism philosophies are represented by two main types of research methods in social science, namely quantitative and qualitative (Easterby-Smith et al., 2008). This research focuses on meaning rather than numbers and the philosophy of the study is interpretivism. Hence, a qualitative method for collecting the data is the most suitable approach to be used in this study.

The data were collected from 27 semi-structured interviews and triangulated with other sources such as documentation and direct observation to enhance the validity and reliability of the research results.

The data was analysed by using a thematic analysis approach that involves a general procedure which was recommended by Collis and Hussey (2009) for those who not familiar with analysing qualitative research.

1.5 Ethical Approval

This study was concerned with the ethical side of the scientific research, where the researcher applied for ethical approval before conducting the pilot and actual field study from the Research Ethics Panel at the University of Salford. The researcher obtained the approval of the project by the Research Ethics Panel on 11th March 2011 with reference no: REP11/008 (see Appendix A).

1.6 The Expected Contribution to Knowledge

This research will bridge the gap in the knowledge and understanding of ABC practices in the Libyan context. As far as the researcher is aware, this study will be the first conducted in the Libyan context as no previous empirical research has been undertaken to investigate the possibility of adopting ABC in the Libyan cement industry.

1.7 Content of the Thesis

This research is divided into six chapters as follows:

Chapter 1: Introduction

This presents the initial focus of the study by introducing the background to the research, the general nature and purpose of the study which includes the importance of the study (the justification of the research), the research aim and objectives and the research questions. In addition, it presents a short description of the research methodology, the expected contributions to knowledge by the study and the structure of this thesis.

Chapter 2: Literature Review

In this chapter the key research issues will be identified. It will further elucidate and clarify the diverse terminologies and issues surrounding the main research

topic. These will assist in the development of a theoretical understanding of the phenomena being studied. Past and present academic studies on the topic will be reviewed. Counter arguments will be explored.

Chapter 3: The Libyan Context

This chapter will review Libya and its cement industry providing the contextual background on the geographical, political and economic aspects that influence the working environment of the cement industry in Libya.

Chapter 4: Research Methodology

The methodological steps used to guide the research process will be discussed here. The methodology used will also be justified and the chosen research philosophy, approach and techniques will be described in detail.

Chapter 5: Research Findings and Discussion

This chapter will present the findings and there will be a discussion of the empirical investigations that were carried out within the two case studies: the Libya Cement Company (LCC) and the Ahlia Cement Company (ACC). The findings were produced from 27 face-to-face semi-structured interviews. The research findings are validated by conducting eight more interviews with Libyan cement policymakers and academics.

Chapter 6: Conclusion and Recommendations

Finally, in this chapter, the conclusions and how the research aim and objectives are achieved will be discussed. Recommendations for future work and the limitations of the thesis will be presented.

1.8 The Research Journey

The research was divided into five stages as shown in Figure 1.1. This research started by using secondary data (books, articles, documentation, reports, etc.) in order to write up the background, discover the need for the research, to support the selection of the research methodology and also to provide a list to the elements necessary for the adoption of ABC. The adoption factors that have been gathered from the literature helped the researcher in preparing the interview questions. The second stage of this research is conducting the field study by using multiple sources for qualitative data collection; primary data (document review) and secondary data (semi-structured interviews and direct observations) that helped to

enhance the research validity and reliability. Then, the data was analysed systematically by using a thematic analysis approach. Next, the research findings were discussed. Finally, the conclusions were drawn and recommendations were made.

The research process:

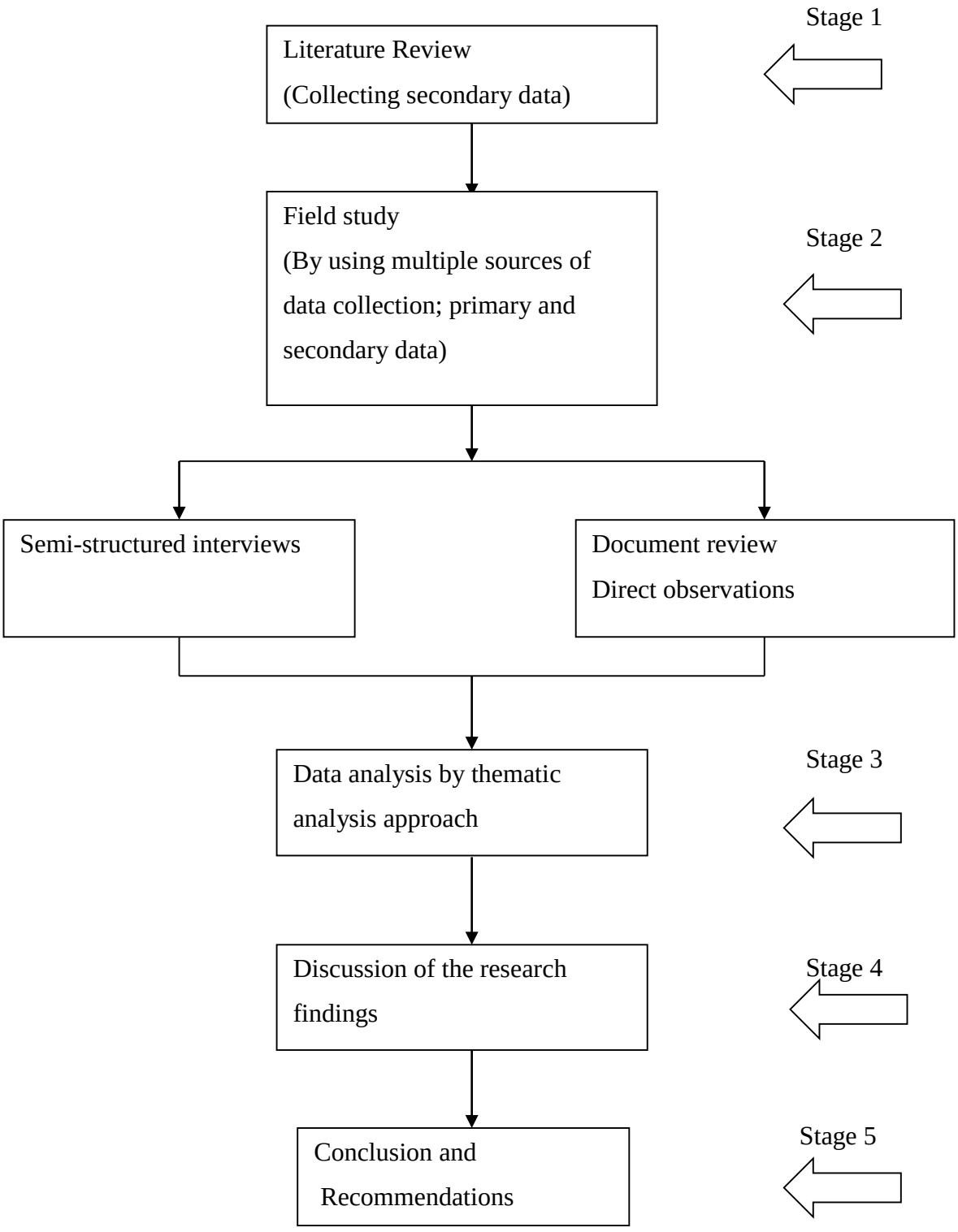


Figure 1.1: The research journey

1.9 Chapter Summary

This introductory chapter has offered an insight into the research study. It has highlighted the reason why this study should be conducted and why it is valuable for the Libyan cement industry. It has considered the aim, research questions and objectives to be achieved; it has also identified the expected contributions to knowledge and an indication of the methodology to be adopted has been provided. Finally, an outline of the structure of the thesis and the research process has been identified as well.

CHAPTER TWO

REVIEW OF ACTIVITY BASED COSTING

2.0 Introduction

Manufacturing organizations require costing information in order to take decisions. Management accounting is required by the managers of organizations to plan an approach for their production strategy in order to keep a competitive position in the market (Bisbe et al., 2007). The process of management accounting is composed of recognition, measurement, accumulation, investigation, organization, understanding and communication of the information in order to allow managers to undertake strategic assessments for the organization (LangWeld-Smith, 1997). It can be stated that management accounting is an integrated part of the management's responsibility to take decisions and use resources efficiently. The process of management accounting can be further defined as observing the nature, scope, purpose and attributes of managerial accounting. Efficient management accounting information is composed of three attributes and these are the technical, behavioural and cultural aspects.

2.1 Manufacturing and Accounting Response

The manufacturing and accounting response refers to a change in the environment. As the ways of managing have changed organizations have searched for an alternative method of management to cope with the competitive market. Hoque (2004) argued that the business environment is different in developing and already developed countries but most of the research that is being undertaken presently is on developing countries. This observation was made in order to assess the changes in an organization concerning the factors of management, such as manufacturing and accounting (Hopper and Hoque, 1994). Libya, being a developing country, is going through many manufacturing and accounting changes and thus requires a management system to cope with all the requirements needed. Competition has increased worldwide due to globalization and so manufacturing organizations have changed their strategies towards manufacturing

and accounting. According to Kassim et al. (2003), globalization has affected the organizational environment.

Manufacturing companies in Libya, as in every developing country, are inclined to manufacture products in order to obtain maximum profit from using their available resources. Much research has found that the impact of globalization is greater in developing countries, such as Libya, rather than in the developed countries, government support being one of the reasons (Burns and Scapens, 2000). A government's position and the establishment of that position directly affect manufacturing companies. Special attention is given to manufacturing companies globally in the form of incentives. Established governments are able to provide better facilities for their manufacturing organizations resulting in less change in organizational environments. Manufacturing organizations in developing countries, on the other hand, are frequently forced to struggle because of the absence of enough government support.

Libyan organizations are also undergoing some organizational changes in order to compete in the global market and this requires changes in manufacturing strategies. Management change in the manufacturing department may be enough to make the changes required but it can often require changes in other support mechanisms such as technological support and accounting.

Multi-level and complex manufacturing environments require a costing method to determine an accurate estimation of the cost of products (Shields, 1997). A traditional system of accounting is not considered efficient enough to determine the cost and the profitability obtained by each product; such a system cannot calculate all the factors involved in the production process.

According to Waweru et al. (2004), various management concepts for businesses have been used as experimental strategies in order to compete globally. Manufacturing organizations search for improvement and thus adopt new and advanced strategies in order to remain competent. To achieve this objective, organizations have improved their management methods; activity based costing

being one of them. Although other methods of management have also been developed such as Kaizen costing, process improvement and total quality management, activity based costing is considered to be a promising accounting method to be used by organizations (Fichman and Kemerer, 2002). These techniques help in the improvement of the process in order to obtain more profit and cost effectiveness.

2.2 Changes in the Manufacturing Environment

Manufacturing companies are undergoing many organizational and management changes globally, including those in Libya. There has been an enormous change in the manufacturing environment over the last three decades. Production in manufacturing companies has been facilitated by computers (Lucas and Baroudi, 1994), computer incorporated systems and robotics. These automatic systems enable manufacturing companies to produce products which were previously considered impossible to produce but which are now being manufactured. The adoption of technology increases competition globally and has allowed the manufacturers of the Far East to compete with the western markets in automobile production and electronics. The new manufacturing environment allows manufacturing organizations to produce competitive products with the help of computer-aided machines according to the increased demands of the customers.

Although the manufacturing environment has been improving continuously it was the era of the industrial revolution that brought about rapid changes (Hoque et al., 2001). Companies adopted basic costing methods in the medieval era; later some organizations improved their costing methods according to the technologies and techniques available, but the evolution of the manufacturing environment continued to prosper. Late in the 20th century the use of advanced manufacturing techniques was introduced Karshenas and Stoneman, (1993). The Advanced Manufacturing Techniques (AMT) involved the use of computer integrated manufacturing and flexible manufacturing systems which enlarged the quantity of the products made and also resulted in the reduction of the man power requirement in the production phase. The quality of products increased to a remarkable extent by the use of AMT and almost all manufacturing organizations

adopted these methods of production alongside traditional costing techniques (Deruntz and Turner, 2003).

2.3 Importance and Benefits of Advanced Manufacturing Technologies (AMT)

Manufacturing companies nowadays are aided by automatic techniques of manufacturing which are known as advanced manufacturing technology; this reduces the set-up time, enhances flexibility and improves quality (Choe, 2004). It provides cost effectiveness by reducing faults in the product and assuring the quality of every piece.

Huang and Liu (2005) emphasized the importance of the use of information technology in industry by stating that advanced manufacturing techniques have provided a new horizon for the manufacturing industries by providing a flexible response to the market requirements. Beede and Young (1998) have stated that, with the help of AMT, organizations have gained the ability to test new products without additional resources and possibly with only a minimal additional cost and thus they can react to market requirements (Idris and et al., 2008). Not only are the market requirements met but the quality also improves. The integrated use of designing tools, computer administration and robotics' manufacturing guarantees the quality of a product. The amount of scrap-waste is reduced by early diagnosis which is performed on site, in place of waste products being found after the inspection of the end products by managers.

Manufacturing using advanced technology is also considered safer as it reduces human interaction with huge manufacturing machines which reduces injuries and accidents.

A computer-aided machine occupies relatively less space than conventional systems do, so this decreases the inventory level thus reducing the floor space (Grūnberg, 2004).

Numerical control machines (NC), computer aided design (CAD), computer aided manufacturing (CAM), flexible manufacturing systems (FMS) and computer integrated manufacturing (CIM) are some of the advanced manufacturing technologies commonly used nowadays.

2.3.1 Numerical Control Machines

Numerical control machines can be programmed to accomplish manufacturing tasks whereby, in the past, the set-up or the instructions were previously stored using punch cards. The numeric control machines in use nowadays store these instructions and set-up in computers which are called Computerized Numeric Machines. These machines are designed to automatically perform functions with flexibility in order to produce products in a repetitive manner. The machine is set-up for a function just once, thus reducing the set-up time, and does the same function repeatedly without the need of an attendant, reducing the need of manpower. The perfectly repeated actions guarantee the quality of the product.

2.3.2 Computer Aided Design/Computer Aided Manufacturing (CAD/CAM)

CAD and CAM work together from the process of designing to the process of manufacturing. CAD assists the product designers in designing a product and in consulting with a production engineer for the approval of the design. Instead of designing manually and then assessing the cost, CAD helps the designers to evaluate the cost and design without physically designing the product (Harris, 1996). Through CAD the product can be viewed from different angles and then simplified by reducing the number of parts. Product engineers can evaluate the cost of the production and, if they believe the design is not appropriate, they can ask the designer to simplify or redesign it. CAM incorporates numerically controlled machines, robots and flexible manufacturing systems used for the automated manufacturing of products. Robots perform repetitive tasks unattended with perfection to assure the quality of the product.

2.3.3 Flexible Manufacturing Systems (FMS)

Flexible manufacturing systems are flexible systems able to produce a product series with the help of semi-independent workstations connected to a computer network. They also comprise machines which can automatically handle materials.

FMS can produce individual parts in different quantities, so any customer demand in variation can be met. The automated handling reduces manpower and thus reduces cost. FMS, by producing a product series, facilitates product mix and the manufactured product can be varied with a variation of the demand (Adler, 1988).

The key advantages of the system are guaranteed quality and the low requirement for space and inventory (Attaran, 1986).

2.3.4 Computer Integrated Manufacturing (CIM)

The manufacturing environment has been completely automated with the help of CIM; it integrates different types of automated manufacturing technologies and enhances the automatic production of the products. CIM completely eliminates the need for human labour by the use of computerized machinery and robots.
Libyan organizations, especially within the cement industry, have improved their functions and processes by implementing advanced manufacturing technologies. Use of advanced manufacturing technology requires an advanced accounting system for the evaluation of the cost of the product.

2.4 Change in Market Conditions and Customer Expectations

With the implementation of advanced manufacturing technology not only organizational behaviour has changed, but also the market conditions and customer expectations have altered (Okay, 2010). Increased interaction between countries (resulting in global competition) and rapid changes in interest and exchange rates have affected market conditions. Manufacturing products are in high demand.

In Libya the increase in trade and the developments in the Libyan industries have increased the demand for products. The market requires new and innovative products with high quality and increased quantity as advanced manufacturing techniques are being adapted (Okay, 2010).

Customers are defined as having requirements, needs, requests, and preferences for choosing products; as well as the capability to choose (Kaplan and Norton,

1996). Customers are continually affected by factors which includes the financial factor. They have high demands when economic conditions are favourable otherwise the demands lowers and so does the market. According to Akyol et al. (2005), traditionally, consumer demands have not always been kept in consideration and industries have persisted in producing as they have always done. As global competition grew and customer demands increased, organizations were then inclined to produce according to the customer demands. Not only were manufacturing organizations inclined to accomplish the demands of the market and the customer, they also wished to obtain a competitive position. Manufacturing companies worked on their supply chain management and produced the most profitable product which could be produced by using their existing resources (Ivanov and Teich, 2009).

Manufacturing organizations were forced to produce new and inventive products as the product cycle reduced and there was a constant demand for modern products. For their survival manufacturing organizations implemented advanced manufacturing technologies for flexibility and effectiveness (Baines and Langfield-Smith, 2003).

Libya is faced by such a competitive marketplace. Considerable efforts have been undertaken by the industries in Libya to implement new and innovative techniques of manufacturing. The cement factories in Libya, like other Libyan industries, have adopted advanced methods of production. Alongside the use of information technology for manufacturing purposes, an accounting method is also required to improve the accurate evaluation of the cost of the product.

2.5 Accounting's Response to Technological Change

Karshenas and Stoneman (1993) referred to the practice of the implementation of advanced technologies as 'Diffusion'. It results in changes in costing methods and in the structure of an organization. Suitable management accounting methods are required to be adopted for the proper implementation of advanced manufacturing techniques.

Research has been undertaken by examining seven manufacturing organizations in the electronic products sector and observing some of the factors which affect costing such as organizational structure, the aggressive and vibrant environment of the market, production tools, cost configuration of the product, management pressure and weakening economic performance. Innes and Mitchell (1990b) classified these factors into three groups: motivators, catalysts and facilitators.

2.5.1 Motivators

Motivators are the factors that manipulate costing in a common manner, such as the aggressive conditions of the market, organizational structure, production tools, product cost configuration and short product life cycles.

2.5.2 Catalysts

The factors which cause changes directly are considered as catalysts, such as loss of market share, deprived economic conditions, the occurrence of a similar product by a competitor, a change in the accountant and changes in the organization.

2.5.3 Facilitators

Facilitators are factors which assist managers in dealing with accounting change, such as the accounting workforce and computing resources.

The affect caused by these three factors results in management costing change. Motivators and catalysts tend to create change which is effective in the hands of a proper facilitator. A cement factory in Libya is also affected by these factors and thus involves changes in costing. It is recommended that such changes in costing be dealt with by the use of activity based accounting techniques.

To control the inventory in an effective manner a suitable costing system is required. Although much effort has been put into the improvement of inventory policies, more research needs to be done on the determination of the various cost factors which includes holding cost and ordering costs (Upping and Oliver, 2011). Previously, capital cost was considered as the significant part of the cost and other factors were neglected which, naturally, therefore affects the cost of the product.

According to Johnson and Kirchain (2009) cost evaluation techniques can be classified into the following types:

- Intuitive: this is based on the experience of the evaluator.
- Analogical: the cost is evaluated in comparison to the cost of a similar product.
- Parametric: the cost of the product is estimated according to the cost of the parameters employed by the designers.
- Analytical: the work is distributed into simple tasks and the total cost is evaluated by adding them together. Activity based costing can be considered as an example of this method.

Gunasekaran (1998) stated that activity based accounting is different from the traditional methods. Traditionally, only the production cost was considered rather than the activities associated with production, and the indirect factors which could have influence on the total cost were not considered; all these factors are now considered in ABC. ABC is nowadays implemented in the electronics, automotive, aerospace, aircraft manufacturing, ship building and telecommunication industries. Ben-Arieh and Qian (2003) further elaborated that the use of advanced manufacturing techniques requires an advanced method of accounting to analyse all the aspects of the production process. This statement is further supported by Foster and Swenson (1997). Although ABC was designed only for manufacturing organizations, due to its use of automatic methods of function, it is widely being used in other organizations such as marketing, engineering and development organizations.

Traditionally, the cost of a product has been calculated by adding the total direct labour cost to the total cost of raw materials, applying it to the volume and then dividing it to obtain the cost per piece. However, in the activity based costing method, as stated by Arnick and Boons (1998), the allocation method is used to apply variable, fixed and overhead costs directly to a product, all of which are considered as actions required for production. The cost of a product is

individually calculated in ABC by adding the cost of the raw materials and the cost of the services or activities required (Shields, 1995).

2.6 Effects of Technological Change on Cost Accounting Systems

Management accounting systems provide information on the financial conditions of products for the managers of an organization and allows them to take decisions based upon this information. According to Abdel-Kader and Luther (2008), it also encourages users of these accounting systems to accomplish their goals and attempt to implement organizational change. An improper accounting approach may lead to an inappropriate use of resources and thus a reduction in the performance of the organization.

Tishlias and Chalos (1986) argued that, with the use of advanced manufacturing technology, factors such as variation in the purchase price can have a negligible effect. Due to fast production methods a long term association between the retailer and the industry is established and orders for large quantities are placed (rather than piece by piece orders) which thus eliminates the effect of a rapid change in the prices of the products.

Traditionally, costing included any faulty goods, but such faulty goods are currently avoided by the use of AMT. Errors can be identified on the production site, thus the cost incurred by checking and rechecking the products by managers is no longer experienced.

The implementation of advanced manufacturing techniques requires a huge investment in terms of the installation of machinery, robotics and computers. Such increased capital investment has changed the cost structure of many products, such as products in the electronics and automotive industries. Chalos (1986) further argued that the way of costing of a product has changed greatly as many factors which were previously considered as vital to be included in the costing structure have been eliminated; an example is that the occurrence of overheads is no longer associated with an increase in direct labour, although many companies still considers labour hours as an element in the product cost.

ChenHall (1997) states that, role of the management costing system is not only to provide accurate information about the cost of the product, but also improves organizational culture. Due to increased competition and the change in manufacturing environment, the organizations are inclined to empower its employees to incorporate team work. The interpersonal relation among the employee and the employer has changed. The managers of the modern organizational structure require accurate and relevant information which can easily provide by the advanced management accounting methods.

The organizations implementing advanced manufacturing systems produce products of short life cycles, which are in low volume. Such organizations require frequent setups, changeovers, movement of the materials and inspections of the quality, which require an appropriate accounting system.

2.7 Traditional Cost Accounting (TCA) Systems

2.7.1 Background of TCA

The need for recording business transactions was felt long before the technological advancements of mankind. This was the need that has made accounting the language of business. Financial accounting, which is seen as the father of accounting systems, is no more than recording business transactions by making financial results available via journals, balance sheets, and in many more similar business recordings (Vanderbeck, 2012).

However, Weygandt et al. (2009) stated that this form of financial accounting has many limitations. They further stated that one of the limitations of financial accounting is that it identifies the products' cost in segments. According to Gupta et al. (2008), these disadvantages created the need for cost accounting which is one of the branches of accounting that deals with recording, accruing and inferring existing and future costs. Three parts of any accounting system are financial, cost and management accounting (Weygandt et al., 2009).

The significance of cost accounting information in the successful performance of business activities has long been recognized in the world of business worldwide. Today this importance has increased significantly as companies are determined to make their products competitive by controlling costs. For Gupta et al. (2008) the management of any organization requires cost accounting as it provides information about current operational costs under the guidance of which future planning is made. However, Horngren et al. (1999) were of the opinion that cost accounting is all about the allocation of resources in the most effective way in order to achieve high profit margins.

2.7.2 Definition of TCA and its Nature

Bruns and Kaplan (1987) defined the traditional cost system as the allocation of indirect costs to cost objects by employing direct labour and machine hours. It is an old system of accounting. The process in which costs are allocated to various departments within organizations instead of to job activities for a particular time period is known as the traditional accounting system (Jackson et al., 2008).

Walker (2009) defined traditional cost accounting as a distribution that centres on collecting costs through managerial units, while for Jackson et al. (2008) a costing system that does not split cost by job or is not distributed by each division of the mechanized procedure is called traditional cost accounting. According to Fields (2011), the allocation of manufacturing fixed costs (indirect production outlays) to products on the basis of a dimension metric like direct work hours or manufacture appliance hours is a traditional costing system.

Sople (2009) defined the traditional accounting system as a costing that assigns overheads to cost items randomly on volume- centred measures which are based on the notion that there is a connection between fixed costs and volume- centred computations.

In general, traditional cost accounting is a system of employing various methods for the distribution of overhead manufacturing costs to the finished goods (Horngren et al., 1999). According to Garrison and Noreen (1999), in the

traditional methods of cost accounting the allocation of a company's indirect costs to the manufactured items is done on the basis of degree such as the production hours of machinery, direct labour hours, etc.

The allocation of industrialized operating costs to goods by employing only machine or labour hours implies that these hours are the primary basis of the company's operating costs (Gupta et al., 2008). According to Weygandt et al. (2009), this is sufficient for the factory's exterior fiscal statements. However, according Young and Selto (1991), there are various ways of driving down manufacturing fixed costs today; this is so because some customers require diversity in the goods they demand whilst others can be satisfied only by receiving a large amount of similar products.

According to Hopwood (1978), the traditional techniques of cost accounting are insufficient when the producer needs to find out the exact cost of specific goods for particular consumers. This is the reason why the activity based costing system (ABC) was designed in order to overcome the defects in the traditional cost accounting system.

The traditional cost accounting system employs only a single driver, whether labour or machinery, to distribute a company's fixed cost which includes fixed manufacturing costs (Bruns and Kaplan, 1987). The distribution of all the costs of several activities by employing a single driver becomes problematic in the cases where there are different goods in demand (Abernethy et al., 2001).

According to Banker et al. (1995), the allocation in the traditional cost accounting system is misleading as the costs of undertaking various activities fall in a single cost pool and is divided by various production hours by machinery or labour hours. This division results in a single average rate that is functional for all goods irrespective of quantity or of the involvedness of various activities, which is why within such a system there is no correlation between the cost of various activities and the amount of the production hours of either machinery or labour (Kaplan, 1988). However, Walker (2009) was of the opinion that this defect in the

traditional cost accounting system can be avoided by employing the ABC system where several costs' pools are created and the costs are distributed according to their origins.

According to Bruns and Kaplan (1987), consumed resources like direct labour, materials, energy and machine-related costs are calculated by volume-related distribution bases. However, traditional costing systems, which assume that all goods utilize all resources as a percentage of their production volume, offer vague product costs (Cooper, 1987).

2.7.3 Overhead Allocation

Expenditure which is made on aspects of production and services, the identification of which cannot be made economically with the help of specific sealable cost units, are defined as overhead costs (Walker, 2009). However, Kaplan (1984) was of the opinion that indirect costs are also known as overhead costs. Innes and Mitchell (1990) explained the indirect nature of overhead costs as them having to be distributed reasonably and specifically among various units of cost.

The function of an organization that has authority to acquire cost is kept in mind before the classification of overhead costs which includes production, distribution, administration and selling of overheads (Michael and Cecily, 2008). Except for general overheads, the majority of operational cost is classified by overhead allocation (Gordon and Namyanan, 1984). However, Walker (2009) stated that fixed production costs are of great significance as manufacturing is the key business function that changes inputs into finished goods within the organization.
According to Shank and Govindarajan (1993), the production or manufacturing department is composed of various production costs' centres and service cost centres such as the stores and the repairs' sections. Gordon and Namyanan (1984) argued that there is a direct connection between the production process and manufacturing costs' centres unlike service costs' centres which only offer support to the manufacturing cost centres.

According to Kaplan (1984), the analysis of overheads, whether production overheads or any other type is based on the choice of suitable cost centres. He elaborated that this selection further depends on several factors such as the accessibility of information and the desired control level. Innes and Mitchell (1990) pointed out the second level of examination of overheads which is the determination of overheads' cost for every cost centre. However, Gordon and Namyanan (1984) stated that this stage can only be arrived at by the process of overheads' allocation along with distribution.

According to Macintosh and Scapens (1990) the allocation of cost cannot be achieved without classifying cost to particular cost centres. They elaborated upon this point by presenting the example that a packing division cost centre will deal with the wages of the manager of the packing section of an organization. However, Shank and Govindarajan (1993) stated that wage cost allocation over cost centres such as stores and repair sections are not necessary.

2.7.4 TCA System Deficiencies

According to Cooper and Kaplan (1988), the traditional cost accounting system is incapable of obtaining a source-concerning distribution of the costs of logistics to cost elements as they are primarily based on production. Cooper and Kaplan (1988) explained that logistic costs include operational costs i.e. costs pertaining to transport (custom and trade), financial costs (inventory, security) and non-economic costs (insurance).

However, Macintosh and Scapens (1990) argued that the reason behind this incapability is not the production focused accounting, but the nature of the logistic costs which are operational costs. For Warren et al. (2011) the traditional cost accounting system provides incorrect information pertaining to the logistic costs of goods which then leads to incorrect decision-making regarding the goods. For Johnson (1990), one of the key deficiencies of the traditional cost accounting system is that the logistic costs (transaction, financial and non-financial costs) are not included in the product costing but are part of the overhead costs, sales, etc. However, Atkinson et al. (1997) argued that this deficiency can be overcome by

applying two different approaches i.e. absorption secondary costing (or a refinement of traditional cost accounting) and an activity based cost accounting system.

For Cooper and Kaplan (1988), absorption secondary costing (or a refinement of traditional cost accounting) and activity based cost accounting are different. Warren et al. (2011) pointed out a common deficiency of traditional accounting systems is that they are out-dated and are not widely in use because of the development of ABC accounting system and because they give inappropriate, unpredictable information. Atkinson et al. (1997) stated that the traditional cost accounting systems can only be employed successfully where the costs and revenues of the programme can be calculated easily.

According to Cooper and Kaplan (1988), at the present time the direct costs of any organization can hardly be tied in with the management costs which are one of the key deficiencies of the traditional cost accounting system. Warren et al. (2011) stated that traditional cost accounting systems give past data to regulators, citizens and managers instead of the latest information; this past data is insufficient to assist managers in taking appropriate decisions. Johnson (1990) stated that demand for productivity against declining resources is increasing day by day and that this exerts pressure on accountability. Johnson (1990) further wrote that managers need to examine the activities that yield more gain; this is only possible when the correct information pertaining to the efficiency of the programme is available.

According to Dent (1990), traditional accounting systems are beneficial as long as the purpose is to gather budgetary information such as which service should change and which programme should be funded, etc. However, according to Hopwood (1978), the traditional system is deficient when the aim is to manage an organization by gathering information pertaining to the organization.

For Johnson (1990), a limited capability is one of the key deficiencies of traditional accounting systems as factors such as the introduction of technological

assets and outlays, along with multifarious processes, have made the role of management very complicated. Warren et al. (2011) argued that the restricted potential of traditional accounting systems can be attributed to the changing role of management and increasing services, as well as operational costs.

According to Atkinson et al. (1997), due to various factors, the traditional concept of cost has been altered and today the operational costs represents all the actions that are essential for the delivery of management services. However, Askarany (2006) added that a greater part of the outlays are represented by costs today making the nature of costs complex and difficult to utilize for the purpose of programme or customer analysis.

Cooper and Kaplan (1988) stated that organizations that operate on a small scale by employing limited resources and workers aim at producing a limited output which is why the number of their customers is also small. This kind of organization can easily make the best use of standard accounting systems. However, Dent (1990) wrote that the deficiencies of the traditional accounting system will affect an organization once the volume of their goods and customers start expanding. This is so because costs are incurred at variant rates from one action to another and according to customer type (Warren et al., 2011). According to Johnson (1990), the standard cost accounting systems are incapable of hunting down the discrepancies in cost relating to a variety of customers of organizations.

Dent (1990) stated that traditional cost accounting systems depend on materials instead of activities which are why they provide limited information and thus they probably do not provide adequate information as required by the managers of organizations.

Warren et al. (2011) stated that the information provided by traditional accounting systems and processes are very distorted, cumulative, late and irrelevant and thus are of little assistance to managers in making decisions and in planning. The direct allocation of operational cost to activities is not possible by employing traditional cost accounting processes because they are incapable of creating an

association between activities and outlays (Johnson, 1990). According to Cooper and Kaplan (1988), the traditional accounting processes are not developed on the premise that resources are utilized whilst performing activities.

Atkinson et al. (1997) argued that the cost deficiencies in traditional accounting processes can be overcome by calculating the cost for each separate activity relating to each process instead of calculating the total cost of services. Hopwood (1978) was of the opinion that standard accounting processes, as well as not functioning properly, are also incompetent in tracing organizational actual costs. However, Warren et al. (2011) suggested that the way out of using a traditional cost accounting system can be taken by adopting the activity based costing approach because it removes the distortions of the traditional costing approach.

The purposes that are appropriate for traditional accounting systems are to register everyday business deals and the provision and control of daily information that is required to make operational decisions (Dent, 1990). Johnson (1990) stated that the best way to make use of traditional accounting systems is to employ them alongside the activity based accounting process so that the information that is tracked by both systems can run in parallel. Cooper and Kaplan (1988) stated that the deficiencies in traditional accounting systems can be overcome by employing technological advancements and by using traditional and activity based accounting systems side by side.

2.8 Activity Based Costing System (ABC)

This section will meet the second research objective, namely to identify a list of the adoption factors of the ABC system to use in field work.

2.8.1 Background of ABC

The activity based costing system is used to assist in the accounting of requirements, as the traditional cost accounting system of an organization expresses the cost in general components. An effective costing method has great implications as costing information is used for financial practices or for internal decision-making purposes. The traditional technique of allocating costs has been

recognized in three stages, the growth of overheads within the manufacturing divisions, the provision of non-production units' charges to manufacturing departments and, lastly, the distribution of subsequent manufacturing departments costs with overheads to numerous goods, services or consumers (Karolefski, 2004).

According to McGraw (2006), activity based costing is a technique that helps in defining precise costs. Fundamentally, the ABC system allocates production expenditures to all inputs such as products, services or other customer-based activities that are performed. All the activities that take place and, therefore, dispose of resources are then known as cost components and the relative costs are then identified with reference to casual and direct association with overheads, activities and production expenses.

Roztocki, et al. (1999) further stated that activity based costing is a technique that is being increasingly implemented to develop the truthfulness of merchandise-cost figures. The previous traditional costing structures allocated production costs subjectively, principally upon direct labour time periods but direct labour times usually do not passably characterize the proportion of unintended resources expended by a definite cost entity in a definite time. Consequently, manufactured goods' price falsification happens. Activity based costing offers a resolution to this issue by observing the production structure as being composed of different actions. It allocates the charges of these undertakings to cost articles by expending cost drivers that characterize the depletion of secondary properties by price objects more precisely than subjective distribution roots.

2.8.2 Definition of the ABC System

Horngren et al. (2006) defined ABC as an "approach to costing that focuses on individual activities as the fundamental cost objects. It uses the costs of these activities as the basis for assigning costs to other cost objects such as products or services".

Kaplan and Atknson (1989) defined ABC as “a method that seeks to understand better the factors that create demand for overhead and support resources based on the demand made by the individual products”.

ABC is a system that is based on the collection of indirect costs within an organization into cost centres to be distributed to the final product by cost drivers in order to get to the real cost of the final product, which, in turn, leads to supporting more competent management decision-making.

2.8.3 General Review of the ABC System

Emerging in the global arena in the late 1980s and starting in the USA, the ABC system of costing has spread all over the world. In the study undertaken by Cooper in 1991 it was seen that the traditional method of costing was not fully justifiable in real-life situations as it did not implement and allocate cost efficiently. The traditional method of accounting measures the cost of basic inputs such as material and labour. As these costs are rated as the most importance, all other costs are assigned as manufacturing overheads without any further detailing. The ABC system of accounting is more realistic when cost allocation is determined as it allocates all the costs and also helps in correct analysis (Mula, 2012).

Alsaeed (2005) explained that, until the middle of the 1980s, traditional cost accounting did not try to identify the elements of indirect costs for the finished products produced. In fact, generally, a large component of indirect costs were collected and arbitrarily assigned to products on the basis of direct labour or machine hours. This led to assigning a higher portion of indirect costs to a product or products which should have been allocated a small portion of the indirect costs, or, on the contrary, a low portion of indirect costs were assigned to a product or products instead of a high portion. Unfortunately such practices were not reliable and, consequently, led erroneously to incorrect costing and pricing decisions.

Assessments undertaken by Cohen et al. (2005) showed that even at the present time when ABC is widely known many organizations around the world still do

not use it and continue to employ the traditional method of accounting. In the United Kingdom only a 10% increase was found in ABC implementation from the 1990s to 2000. In the United States of America, the rate of ABC implementation was much higher than that in Europe. Following recent research undertaken, it can be seen that in the UK more than 25% of large firms have moved over to the ABC accounting system but elsewhere in Europe the rate remains low (Baird et al., 2004).

To explain the ABC system in-depth, the characteristics of costs and information need to be assessed. With the ABC system, there is an improvement in the accuracy of the cost information in an organization. The traditional costing system falls behind as its basic determinant in calculating costs is identified through labour hours and labour hours do not exemplify a clear implementation of resources especially in capital extensive organizations. Due to the traditional cost system there is sometimes a disparity between products costs and, in such cases, the ABC system is used. The ABC system easily divides the manufacturing system into different activities and then assigns costs weightages to the activities on the basis of their importance. With the help of this division and with the respective allocation of activities and costs, organizations can then obtain proper production costs.

An exceptional characteristic of the ABC system is that it looks at all activities taking place in the manufacturing arena and then works out the manufacturing costs with relevance to the activities. The management thus obtains complete information when making their decisions as a complete list of activities and costs are brought together. With this information, managers can easily look at the processes, their relevant costs and how to decrease them with variance to their imminent activities.

2.8.4 Design of the ABC System

When talking about the design of the ABC system, Gurses (1999) stated that activity based costing consists of two stages. The first stage derives and allocates costs to the probable activities relevant to the product manufacture. When a price

or cost is assigned to a resource it then turns into a cost element. A cost pool, on the other hand, is referred to as the combination of all the cost elements linked with a solitary activity (See Figure 2.1).

Once the first stage is complete, the second stage moves on to assign the relevant costs and cost pools to the activities chosen with respect to their importance and association with resources. The final costs that are assigned together to products are then known as cost objects.

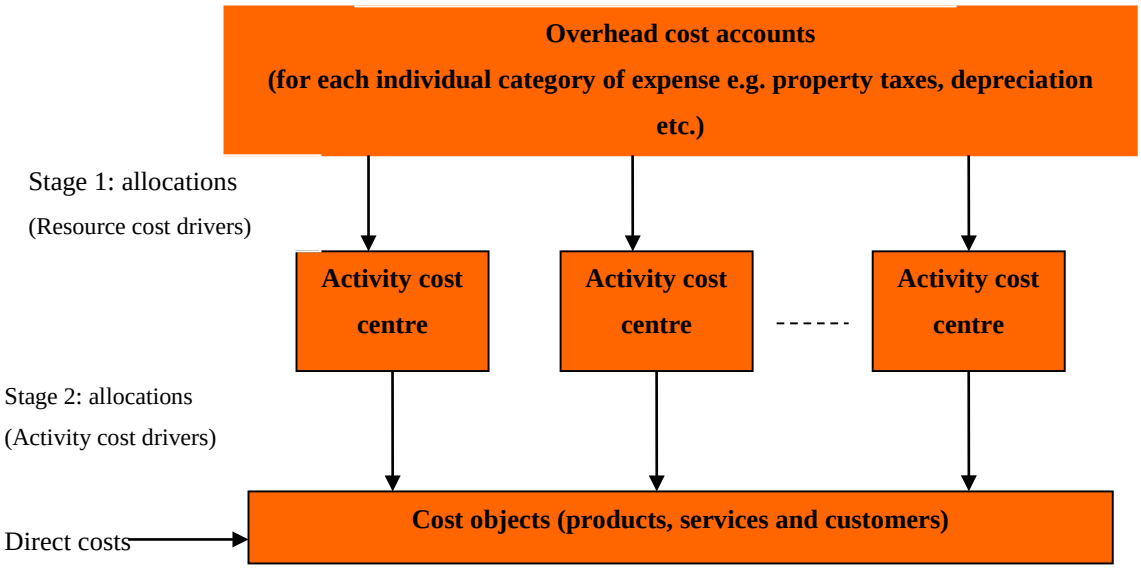


Figure 2.1: Activity based costing system

To give a more detailed view of the design of the ABC system, one can use Gunasekaran's (1999) research. According to him, the elementary principle of the ABC system is to classify the actions of a business and hence to compute the cost of each activity and then the cost of the merchandise is established on the utilisation of activities. According to Gunasekaran (1999), there are ten components within the design of ABC.

2.8.4.1 Purposes of the ABC System

Before determining a design it is important to know the specific purpose for which it is going to be utilized. Usually, organizations aim at following a list of objectives when choosing to implement ABC systems; such a list was identified by Turney (1996) during his research:

- To provide information regarding production commitments with the aim of inspiring and encouraging ideas;
- To deliver data regarding non-manufacturing activities or on any activities not related to production activities (non-value adding) that will enhance cost decline in these areas;
- To offer project engineers cost data that leads to low prices and high quality product design;
- To provide facts to monitor market behaviour;
- To deliver material in order to compute pricing approaches.
- To distribute product costs in order to compute relative product profitability;
- To project a system that cost regulates the charge of shares which go into goods and monitors the market resolutions.

2.8.4.2 The Team Chosen

To incorporate ABC costing into an organization there needs to be an implementation team that should include members from all the important sectors of the organization as departmental representatives. Gunasekeran (1999) stated that there needs to be at least four members in the team to make sure that the system works smoothly. According to his study, there needs to be four significant job titles within the team: an engineer who knows about the application of strategic management, an accountant who knows the organization's accounting applications, a manufacturing department manager or supervisor and, finally, an industrial engineer. Together, these four job holders could easily facilitate the application of ABC in an organization.

2.8.4.3 Managerial Concerns

Taking on board the fact that the ABC system will influence the whole organization, it is important that management understands the concept and no disruptions are caused in the workplace. Before adopting the ABC system, it is important for organizations and their departments to comprehend the complete amount of products manufactured, the diversity of the different product lines that will be incorporated, the significance of overheads and an acceptance of the fact that they grow, the distribution of these overheads and the calculation of overheads relating to labour or machine hours and, finally, the supply chain with reference to distribution and customer representation. Once all these factors have been considered, the team can start the ABC application process.

2.8.4.4 Explanation of Activities

After management has comprehended the ABC costing system, the design needs to identify the probable activities taking place in the production area and their significance with respect to costs and their identification. The basic step of ABC is to define activities and categorize them into hierarchal definitions to define the distribution of resources and activities implied in the manufacturing process.

2.8.4.5 Definition of Principal Cost Drivers

Principal cost drivers are another important aspect of ABC design. The ABC team needs to define the cost drivers, i.e. the elements that affect the cost and description of activities. The task of the cost drivers is to take the costs from the accounting books and assign them to the activities and the groups formed.

2.8.4.6 Activity Cost Pools

An activity pool is defined as the costs connected to a given set of actions in the product generation process. The cost drivers are defined with respect to their activities and once they are all combined them then turn into cost pools. The ABC design needs to incorporate two basic cost pools; the first is that all distinguishable costs need to be implied to generate a completely absorbed activity cost pool. The second most important thing is that the costs used for the

ABC decisions need to be valid and to be related to the work processes so that there is no problem with information reliability and variability.

2.8.4.7 Determining Secondary Cost Drivers

Secondary cost driver must also be determined; this is evaluation of the amount of the activity demanded by each object.

2.8.4.8 Define Cost Objects

Cost objects are of two types: part and product. The cost object type 'part' is used to make decisions on the purchase, while cost object 'product' gives an accurate cost of the product.

2.8.4.9 Comparing Product Cost with Traditional Cost

Costs obtained from activity based costing and costs obtained from traditional costing are compared in order to understand the advantages of the former.

2.8.4.10 Developing a Framework for the Implementation of ABC

Implementation of the ABC system is somewhat organization specific. The system should be understood and evaluated and then a framework should be designed for its implementation.

2.8.5 Importance of the ABC System

There has been a move away from the traditional accounting system for calculating costs of the products to a new method which is the ABC costing system. The new system for costing (the ABC system) has gained immense recognition globally. The basic reason behind this is the nature of ABC costing. Firstly, this costing system looks at reducing costs for overall activities. Rather than looking at given expenses, the ABC system incorporates them into activities and hence provides an organization with a detailed outlook as to the amount of overheads falling into different processes. Secondly, the ABC system is a measurement of performance. The statistics and details provided by the cost drivers and the cost pools help in analysing the performance of employees as they provide volume measurements on operational performance in relation to the given activity and the work hours invested. ABC costing is important as it provides an

organization with a good overview concerning its decisions and assists them in making realistic decisions about their production processes and activities and the costs implemented during these actions.

The ABC system has become an important aspect of modern accounting (Kaplan, 1988; Cooper, 1988; Johnson, 1990; Innes and Mitchell, 1990). It has raised serious questions about traditional cost concepts, has exposed the weaknesses of conventional cost allocation methods and has expanded the role of accounting information with respect to process improvement and organizational development. Kaplan (1984), Cooper and Kaplan (1987) and Johnson, (1991) have stated that cost accounting principles were initially established when production environments and market conditions were different from those of today.

2.8.6 Implementation of the ABC System

According to Gurses (1999), there are six basic steps in implementing the ABC system which are as follows:

- Establishing a team;
- Determining the design choices;
- Training;
- Collecting information;
- Constructing an ABC systems' model;
- Post-implementation evaluation.

2.8.6.1 Establishing a Team

In the first stage a multifaceted team needs to be brought together which would then design the preliminaries of the ABC model with respect to the company's activities. The team needs to be active throughout the project time and should primarily include three to six people and these team members should all be representatives of departments such as marketing, finance, manufacturing and from other important areas of the organization to make sure that, along with the accounting calculations, the MBO (Management by Objectives) is also followed.

2.8.6.2 Determining Design Choices

Before a team starts to design and implement the ABC system they need to take six major questions into account and assess them:

- Is the ABC system going to be a single system or will it be assimilated with the prevailing system?
- Is there a need to formally design and approve the design before it is implemented?
- Which member ought to take responsibility for the "proprietorship" of the ABC design?
- What is the precision of the system going to be like?
- Does the system amass chronological costs or imminent costs or both?
- And, finally, should the design of the system be composite or simple?

2.8.6.3 Training

Gurses (1999) stated that the third step in the implementation process for ABC is training. To make sure that the ABC system is carried out flawlessly, there needs to be effective application, performance, consumption and approval of the ABC system. For the ABC model to work there needs to be three sets of training programmes carried out for the administration, the implementers and the users. For the ABC to be successfully implemented in an organization it firstly needs to be understood by the administration and for this effectual training needs to take place. The implementers comprise the multifaceted team and even though they represent their own heads of department it is not probable that they will have complete knowledge about the ABC system prior to the team being assembled hence they need to be taught about enterprise needs, software prototypes and project development. The entire workforce is associated with using the ABC system output information and for them to take efficient decisions they firstly need to understand the system, hence training is a prerequisite for these people to make sure they understand the benefits of the system and comprehend them in their decision-making.

2.8.6.4 Collecting Information

To make sure that the ABC model is successfully implemented, the implementers primarily need to be confident about their collected information. The team should coordinate with management and collect vital, reliable and valid information to make sure that before the ABC system is projected the information used is actually correct.

2.8.6.5 Constructing an ABC Model

The tasks undertaken before the construction of an ABC model are important but constructing the ABC model itself is the most significant responsibility in the entire implementation process. To create an ABC model the team that is given the responsibility of the project needs to assess the organization's processes, resources, cost drivers, cost centres and activity centres. They then need to break them down and constitute them into flowcharts to comprehend the implication of cost distribution.

The team should firstly identify the activities involved in the manufacturing processes and break them into categories, adding whatever activities are related to the prime headings under each category. Once this is done, the resources and costs used by these actions need to be derived and it is preferable that the cost drivers that demonstrate a cause-and-effect connection should be chosen when determining both resources and cost drivers.

2.8.6.6 Post-Implementation Evaluation

Just like any other model, the ABC system also needs to be evaluated after its implementation. Usually hidden problems and interruptions occur and this stage helps in eliminating any problem that might surface and in making sure that the accumulated results are perfectly reliable.

2.8.7 Difference between Traditional Cost Accounting and Activity Based Costing

From analysing the ABC system it can be concluded that the second stage of the ABC system shows the differences between the traditional costing system and the

ABC system. Traditional systems allocate the cost of only one cost driver which is direct labour cost; however ABC understands that there are other costs drivers present whose costs need to be considered for accurate costing. Chong and Chong, and Cable, (2002) also elaborated that products are the focal point for cost analysis in traditional costing methods; however, activities and the resources used by the activities were neglected and these are focused on by the ABC system.

Ismail (2010) identified that ABC enables management to identify opportunities to further develop processes and also provides essential information for cost reduction. Management can obtain accurate information regarding each activity and its overhead by using the ABC system and thus can observe the focal points for cost reduction.

The evolution of the manufacturing environment requires a cost system that can cope with any changes. Agbejule (2006) stated that, previously, products were produced in high volumes with long production runs and long life cycles whereas, nowadays, products are produced in low volumes with low production runs and a shorter life cycle. Products were mostly produced with small variations for the domestic market; however, with the increase in globalization, products now have higher variety of ranges and are targeted for the international market. In the past the production line was basically composed of human labour making direct labour costs a big consideration. On the contrary, nowadays, technology has replaced human labour in most places and information processing costs have been reduced. Thus rather than direct labour, more indirect resources and activities are used.

The changes in the manufacturing environment have made it more flexible, have increased the demand for information and have made it highly receptive to customer expectations, thus decreasing cost accounting. The use of manufacturing technologies, such as the just-in-time method, robotics and flexible manufacturing systems have replaced the direct labour element reducing it to only 10% of the cost and have increased the overhead cost to 35% and other material accounts to 55%; thus accounting only for direct labour costs will bring cost distortion and an ignorance of the costs of other resources and activities being used (Cooper, 1988).

On the other hand, Hardy and Hubbard (1992) reported that, in many organizations, direct labour which used to constitute 40% to 60% of the total cost of a product has decreased to 5% or less. On the other hand, indirect costs have significantly increased to 50% or more of the total cost. Traditional costing systems that generally use direct labour as a basis for allocating indirect costs do not reflect these changes in the cost structure. As a result, these systems have become unable to present the true product costs (Holzer and Norreklit, 1991).

Some situations of diversification such as volume, complexity, material and setup are known to have cost distortions. ABC solves all these problems and provides information for the identification of the overhead components accurately. The information obtained by the ABC system helps management in making decisions on product design, development, production and distribution.

A simplified example that illustrates how ABC is different from TCS in a manufacturing environment is given below.

Company X manufactures two products known as product A and product B. Product A is a low volume item, on which sales are only 5,000 units each year. Product B is a high volume item, on which sales are 25,000 units each year. Both products require 3 direct labour hours for completion. The total manufacturing overhead costs is: £1,350,000.

If TCS used:

Therefore, the company should work 90,000 direct labour hours (DLH) each year:

Product A: 5,000 X 3 DLH = 15,000 H.

Product B: 25,000 X 3 DLH = 75,000 H.

90,000 H.

The overhead rate = £1,350,000/90,000 = £15 per hour.

The overhead costs of unit A = 3 h x £15 = ***£45****.*

The overhead costs of unit B = 3 h x £15 = ***£45****.*

If ABC used:

Activities	*Traceable costs*	*Product A*	*Product B*	*Total*	*Rate per Activity*
Machine hours	*423,900*	*15,000*	*75,000*	*90,000*	*4.71*
Set-Up	*310,500*	*3,000*	*2,000*	*5,000*	*62.10*
Inspection	*216,000*	*5,000*	*3,000*	*8,000*	*27.00*
Production orders	*109,350*	*300*	*500*	*800*	*136.69*
Purchase orders	*121,500*	*200*	*800*	*1,000*	*121.50*
Heat and Light	*168,750*	*15,000*	*75,000*	*90,000*	*1.88*
Total overhead	*£1,350,000*				

Activity and cost	*Rate per Activity*	*Product A*		*Product B*	
		No. of Activity	*Total*	*No. of Activity*	*Total*
Machine hours	*4.71*	*15,000*	*70,650*	*75,000*	*353,250*
Set-Up	*62.10*	*3,000*	*186,300*	*2,000*	*124,200*
Inspection	*27.00*	*5,000*	*135,000*	*3,000*	*81,000*
Production orders	*136.69*	*300*	*41,006*	*500*	*68,344*
Purchase orders	*121.50*	*200*	*24,300*	*800*	*97,200*
Heat and Light	*1.88*	*15,000*	*28,125*	*75,000*	*140,625*
Total overhead assigned			*£485,381*		*£864,619*
Overhead cost per unit		*£97.08*		*£34.58*	

		TCS		*ABC*	
	Units	*Unit cost*	*Total cost*	*Unit cost*	*Total cost*
Product A	*5,000*	*45*	*225,000*	*97.08*	*485,381*
Product B	*25,000*	*45*	*1,125,000*	*34.58*	*864,619*
Total overhead costs			*1,350,000*		*1,350,000*

2.8.8 Motivations for Adopting ABC

ABC is useful for the computation of the accurate cost of products according to Gunasekaran et al (1999) which is, thus, a motivational factor for its adoption. An adopter of the ABC system needs to believe that its implementation is very important and necessary for the evaluation of product costs. The benefit of obtaining accurate and reliable product costing is very important in the motivation to adopt ABC. ABC also assesses improvements in processes which is another

motivational factor for using ABC; this is undertaken by tracing the costs of related activities and thus in identifying weaknesses in the processes. The identification of weaknesses gives managers the opportunity to improve the processes. ABC is also useful in pricing decisions and in producing product mix by identifying upon which products there should be a focus. ABC is also helpful in other management decisions such as choosing a product to be produced or to be purchased.

2.8.9 Support for, and Usage of, ABC

During a survey it was observed that the usage and the support of ABC in providing product information and process improvement, in assisting in decision-making for price and product mix, and in assisting in making decisions for sourcing supported the implementation of ABC (Everaert et al., 2008). Although ABC is an accounting system, yet its use is not only motivated by its accounting function, but also because it helps in the improvement of processes and decision-making.

2.8.10 The Adoption Factors of ABC System

The traditional cost system has less cost pools and less cost drivers which resulted in incorrect costs for products and activities. However, according to Wang et al. (2004), the ABC system provides a better method for the collection and analysis of cost information. Many companies have started to adopt the ABC systems which have been developed by several accounting and consultancy firms.

In Table 2.1 the researcher has gathered the factors that enable the adoption of the ABC system from a literature review of the literature published since 1987 and has assembled eight factors: *size of the organization, innovation, top management support, internal champion support, overhead costs and cost structure, usefulness and importance of cost information, product diversity, manufacturing flexibility and complexity, and intensity of the competition.* These factors will be used as a guide to collect the relevant data from the field study and will play a significant role in the process of selecting the appropriate research methodology.

Table 2.1: The factors that enable in the adoption of ABC system as presented in the literature published between the years 1987-2013

Factors / Author	Organizational				Technological			Environmental
	Size of the organization	***innovation***	***Top management support***	***Internal champion support***	***Level of overhead costs and cost structure***	***Usefulness and importance of cost information***	***Product diversity manufacturing flexibility and complexity***	***Intensity of the competition***
Bruns and Kaplan (1987)								✓
Johnson and Kaplan (1987)	✓				✓	✓		
Cooper and Kaplan (1988)							✓	
Cooper, R (1988) a	✓				✓	✓	✓	✓
Cooper, R (1988) b								✓
Drury (1989)					✓	✓		
Blayney, Joye and Kelly (1990)	✓							
Simons (1990)								✓
Cooper and Kaplan (1991)								✓
Parker and Lettes (1991)	✓							
O'Reilly et al. (1991)		✓						
Banker and Potter (1993)								✓
Dartar et al. (1993)غير موجود							✓	
Foster and Gupta (1993)							✓	
Estrin et al. (1994)						✓	✓	
Baker (1994)					✓		✓	
Mitchell (1994)					✓			
Jenkinson and Hui (1994)					✓		✓	
Anderson (1995)			✓			✓		✓
Innes and Mitchell (1995)	✓		✓					
Premkumar and Potter (1995)			✓	✓				

Shield (1995)	✓			✓				
Prescott and Conger (1995)	✓		✓	✓				
Libby and Waterhouse (1996)								✓
Chung et al. (1997)	✓						✓	✓
McGowan and Klammer (1997)			✓					
Van Nguyen and Brooks (1997)	✓						✓	✓
Bjornenak (1997)	✓				✓		✓	
Clarck et al. (1997)	✓							
Foster and Swenson (1997)				✓				
Booth and Giacobbe (1998)	✓				✓		✓	
Cooper and Kaplan (1998)	✓				✓	✓	✓	✓
Kaplan and Cooper (1998)					✓			
Kaplan and Atkinson (1998)						✓		
Krumweide, R (1998)	✓		✓			✓	✓	
Anderson and Young (1999)	✓							
Malmi (1999)							✓	
Innes et al. (2000)	✓		✓					
Chen et al (2001)	✓				✓		✓	✓
Guilding and Mcmanus (2002)								✓
Brown et al. (2004)	✓		✓	✓	✓		✓	
Baird et al. (2004)	✓	✓				✓		
Khalid (2005)	✓						✓	
Chongruksut and Brooks (2005)	✓		✓		✓	✓	✓	✓
Drury and Tayles (2005)	✓						✓	
Horngren et al. (2006)						✓		

Ruhanita (2006)			✓			✓		
Al-Omiri and Drury (2007)	✓	✓				✓		✓
Lana and Fei (2007)			✓					
Liu (2007)			✓	✓				
Askarany and Smith (2008)	✓							
Cinquini et al. (2008)						✓		
Pavlatos and Paggios (2009)						✓		
Askarany et al. (2010)	✓							
Aldukhil, Y (2012)	✓		✓				✓	
Ismail et al. (2013)						✓		

The rest of these sections will discuss the adoption factors of ABC system that have been collected from reviewing the literature of the ABC system and the relevant literature.

2.8.10.1. Size of the Organization

In a survey of companies, it was observed by Naranjo-Gil (2009) that larger companies were more inclined to adopt the ABC system than smaller organizations. Companies which have larger product lines and a higher degree of competitiveness use ABC systems to a larger extent (Lin et al., 2001). The size of an organization is related to the number of employees working in the company, the quantity of sales and the quantity of total assets. Larger companies have more resources, both for management and for the development of a complex cost system, such as the ABC system. Askarany and Smith (2008), for instance, explained that companies with more than 600 employees and more than 200 million USD working assets are considered large-sized companies. Furthermore, Khalid's (2003) study showed a positive correlation between the size of the company and the use of the ABC system.

2.8.10.2 Innovation

An innovation can be a new technology or service and can also be a change in existing technology or products. According to Askarany (2006), Rogers (2003) provided a similar definition for innovation; he stated it "is an idea or practice, or object that is perceived as new by an individual or other unit of adoption". Innovations led by management generally require sufficient IT resources and the ability by an organisation to accept the experience of, and be adaptable to, change. This characteristic of being open to change/innovation is associated with and identified as, being one of the factors for the successful adoption of ABC (O'Reilly et al., 1991; Baird et al., 2004). According to Damanpour (1991), innovation is an idea which may relate to a programme, system, policy, process and service or plan that is new to the organization that could be implemented. Organisations might expand their projects, manufacturing, or managerial innovation in order to respond to the current market needs for top quality products with affordable prices for consumers. So when an organisation decides to

introduce innovation/innovations to its projects to realise its set objectives, it would equally be in need of developing and innovating its accounting system too, to assist it in having access to more detailed and up-to-date financial information. Moreover, Askaray et al. (2008) argued that the organisations that adopt innovation policies were more likely to adopt the ABC system instead of the traditional costing system since the ABC provides them with the more appropriate and detailed information required.

2.8.10.3 Top Management Support

Top management support is positively associated with the adoption of ABC. Brown et al (2004); Prescott and Conger (1995) and Cohen et al. (2005) further identified that a lack of management interest/support is one of the reasons for the non-adoptation of the ABC system. In the same vein, Majid and Sulaiman (2008) explained that the support of top management is crucial for the success of the ABC system. Similarly, Liu and Pan (2007) stated that continual top management support is one of the contributing factors to the success of the ABC system. Indeed there is a high percentage of success when top management support the adoption of the ABC system because of the freedom and support given to the system implementers by the top management whereby they have access to all necessary materials required for the implementation. This support also extends to assistance in the solutions of any problems and obstacles that might arise throughout the different phases of the system's adoption and implementation.

2.8.10.4 Internal Champion Support

The support of an individual who plays the role of 'Champion' inside an organization and the willingness of such insiders to accept and adopt new innovations such as the ABC system is a very important factor in the adoption and implementation of the system. The existence of such pro-innovation staff inside an organisation is significant since it would help in educating senior management and users about ABC. Moreover, such staff could bring other employees on board to accept the innovation and assist them in familiarising themselves with the new system, and in understanding the importance of the new system to the

organisation and thereby overcoming any resistance to change within the organisation (Baird et al., 2004; Premkumar and Potter, 1995; Shield, 1995).

2.8.10.5 Overhead Costs and Cost Structure

Overhead costs have become an extra burden on the cost of products which leads to distortions in the traditional cost accounting systems and make them ineffective and problematic for calculating the actual cost of products (Brown et al., 2004; Kaplan and Cooper, 1998; Bijornena, 1997; Van Nguyen and Books, 1997; Baker, 1994). Moreover, Kaplan and Cooper (1998) recommended that companies with high overhead costs should use much more sophisticated cost accounting systems such as the ABC system since it would help these companies in avoiding waste in costs and their ability to allocate overhead costs to product would be more accurate. Moreover, ABC is considered the best cost accounting system used in present-day companies. The studies also found a positive correlation between high overhead costs and the use of the ABC system in the companies under investigation. The same finding was also confirmed by Booth and Giacobbe's (1998) study as they found companies with high overhead costs are likely to adopt the ABC system. Furthermore, Vieira and Hoskin (2004) and Majid and Sulaiman (2008) considered the overhead costs of an organization to be a factor that assisted in the adoption of activity based costing. Companies that have more overheads in the manufacturing of products tend to adapt ABC systems, rather than companies that have lower overheads. This is because the computation of more overhead costs is the main element of the ABC system, differentiating it from the traditional cost systems. As previously stated, the ABC system helps in the allocation of indirect costs or overheads to the final cost of the product; thus it is more beneficial to companies that have higher overheads.

2.8.10.6 Usefulness and Importance of Cost Information

Due to the changes that have taken place in the modern manufacturing environment, it has consequently become more flexible. Detailed information on the manufacturing of products has gained a lot of importance and such information can be obtained through the use of the ABC system since it can provide the required information about any product in an accurate and detailed

way. This will assist in informing the decision-making process regarding, for instance, the reduction of costs and pricing polices (Ismail, 2010). The use of the ABC system is, therefore, highly important in providing the essential information that helps organisations identify the accurate and detailed costs of their products which, in turn, assists the managerial decision making process when planning for both short and long term periods. Such detailed information can also effectively improve the control and monitoring process on the overhead costs by identifying their sources. Moreover, the detailed information about products obtained from the ABC system assists in making strategic decisions such as the decisions on the suspension of, or the expansion of, the manufacture of certain products and it also helps the company to compare between the costs of manufacturing and purchasing a certain part of a product. The detailed information provides information on the expenses according to the activities which, in turn, helps the organisation to reduce or stop high cost activities by reducing both the time and effort required to undertake such activities and instead to focus on the low cost activities (Thaher, 2002).

Furthermore, Al-Omiri (2007) stated that there are some factors that affect the usefulness and importance of cost information, namely:

- The organisation's use of the cost information in pricing decisions.
- The efforts exerted in reducing the costs.
- The need for the investigation of the costs.

Noreen (1991) stated that organisations may adopt a certain cost accounting system such as the ABC system if it provides them with comprehensive and accurate information about costs that can be used to inform the decision making process.

2.8.10.7 Product Diversity, Manufacturing Flexibility and Complexity

According to Schoute (2011) and Abusalama (2008), a diversity of products is also a major factor in the adoption of activity based accounting. Companies that have many diverse product lines are known to use ABC systems as allocating cost to a diverse product range is more difficult than the allocation of cost to a lower number of products. The companies that have a wide product range have higher

operational complexity. Greater product complexity and diversity increases the costing distortions arising from traditional cost systems. Product diversity includes production volume diversity, size diversity, complexity diversity, material diversity and set-up diversity (Cooper and Kaplan, 1988; Cooper, 1988). Moreover, researchers such as Cooper and Kaplan (1988), Chen et al. (2001), Alsaeed (2003), Brown et al., (2004) and Chongruksut & Brooks (2006) found the same result and stated that companies with diversity in production and more production lines are more likely to use the ABC system as the allocation of the overhead costs to a large number of products and production lines is more complex than the allocation to fewer products and production lines; the ABC system was introduced to solve such problems. The traditional cost accounting system is insufficient to accurately track a large number of costs of individual products since these costs are diverse and this, in turn, leads to cost distortion and affects pricing decisions. Furthermore, according to Alsaeed (2003), there is a positive correlation between production diversity and the adoption of the ABC system. Other researchers such as Al-Mulhem (200), Bjorenak (1997) and Krumwiede (1998) also confirmed this finding.

2.8.10.8 Intensity of the Competition

Competitive pressure is another factor that assists in the adoption of the ABC system, as identified by Tsai (1998) and Abusalama (2008). The companies with a higher competitive market have low profit margins and thus require precise cost information. The determination of profitability is only possible in a company with low profit margins. The level of competitiveness can be evaluated by observing the number of competitors and the percentage of export sales, as companies having a higher percentage of export sales have higher competitiveness than companies performing only in the domestic market. Companies that have a higher export range tend to adopt ABC systems rather than those companies that have lower export ranges. Some researchers such as Al-Omiri and Drury (2007), Guilding, Mcmanus (2002), Simons (1990), Cooper (1988)b and Bruns & Kaplan (1987) have noted that organisations that operate in highly competitive environments have a great need for sophisticated cost accounting systems such as the ABC system in order to enable them to accurately estimate the costs of the

products they manufacture and the services they offer to customers, since mistakes made by using the traditional system in such competitive environments can be disadvantageously exploited against the organisation by the other competing organisations. Moreover, competition is considered as one of the most important factors in the competitive environment and causes both accounting professionals and researchers to look for a superior cost system to help organizations to overcome the challenges presented by the competition. To this end, Cooper (1988) suggested that companies that face strong competition should consider the adoption of the ABC system as an alternative to the traditional cost accounting system which is normally used in less competitive environments.

2.9 Chapter Summary

This chapter provided an overview of the changes in the manufacturing environment and in technological developments. It also discussed the changes in market conditions and customer expectations and the cost accounting response to these changes. Moreover, it presented an overview of traditional cost accounting and the deficiencies of this system, in addition to a general review of the ABC system, its design and how to implement it.

Finally, the chapter moved to a discussion on the adoption factors of the ABC system, as found from the literature that was published since 1987. These factors have been listed into eight categories: size of the organization, management innovation, top management support, internal champion support, overhead costs and cost structure, usefulness, importance of cost information, product diversity and manufacturing complexity, flexibility, and the intensity of the competition.

By end this chapter the first and second objectives of the study have been achieved which in turn will help in enhancing and facilitating interpretation of the research findings.

The next chapter considers the Libyan context in which this research fieldwork takes place.

CHAPTER THREE

THE LIBYAN CONTEXT

3.0 Introduction

This chapter presents an overview of Libya and its cement industry providing a contextual background on the geographical, political and economic aspects that influence the working environment of the cement industry in Libya.

3.1 Libya's Geography and Population

Libya is located in the centre of North Africa with a coastline of almost two thousand kilometres. The north is bordered by the Mediterranean Sea; the south by Sudan, Chad and Niger; the east by Egypt, and the west by Algeria and Tunisia. The area of the country covers approximately 1,775,500 square kilometres. It is the seventeenth largest country in the world in terms of area and is about seven times the size of the United Kingdom. It is the fourth largest African country. About 90% of its land is either desert or semi-desert. The coastal strip is affected by the Mediterranean Sea climate while the rest of the country is affected by the Saharan climate (NAID, 2002).

Libya's population is about six and a half million according to the Libyan mission at the United Nations (2013). The majority of the population is urban and the population grows on average by 4.2 % annually. Most Libyan people are Sunni Muslims and young; almost 50 percent are under 15 years old and 86% are urban residents living in the north of Libya (Soliman, 2011).

3.2 Historical and Political Background

Historically, Libya was the name of the territory, located in North Africa between Egypt and Tunisia, which was the homeland of the Libo tribe that inhabited this region for thousands of years. In 1934 Italy adopted the name "Libya" for the area of modern Libya which is a union of three historically distinct regions, namely north-eastern Cyrenaica or Barqa, north-western Tripolitania, and the more remote south-western region of Fezzan (Blanchard, 2012; Pappe, 2005). In the Second World War, Libya was an important battleground in the North Africa campaign

and emerged from the fighting as a ward of the Allied powers and the United Nations (Blanchard, 2012; Pappe, 2005).

On 24th December 1951, the United Kingdom of Libya became one of Africa's first independent states with United Nations' supervision and assistance. A federal system of government was established with the central authority vested in King Idris Al-Sanussi (1951-1969). The first parliamentary election was held in February 1952, one month after independence (Ibid).

In September 1969 while King Idris Al-Sanussi was receiving medical treatment abroad, army officers, including Gaddafi, undertook a military coup against him. As a result of this coup, the ruling system of the monarchy was annulled and Libya was declared a Libyan Arab Republic and the Revolutionary Command Council (which consisted of officers who were involved with Gaddafi in the ousting of King Idris) became the supreme authority in the country (Jibril, 2011).

In 1977 Gaddafi held a monopoly of power by dissolving the Revolutionary Command Council. He announced the power of the people and resigned from the presidency. (The essence of this announcement was that the Libyan people governed themselves through the People's Congresses which were established by an order from Gaddafi, but most Libyan people refused to attend these Congresses because of their frequent disputes and their lack of relevance to what people wanted.) Gaddafi's resignation was merely a constructed issue and was not credible. Subsequently, he cancelled the 1951 state constitution and changed the name of Libya from the Libyan Arab Republic to the Socialist People's Libyan Arab Jamahiriya (Jibril, 2011). Also, upon this announcement of the power of people, the state's laws were meant to be changed in the light of the perceptions and ideologies of Gaddafi's Green Book (Ahmad, 2013).

According to the Green Book and to later slogans, Gaddafi ensured that factory workers went to their factories and demanded to become partners and not employees, and thus all workers in Libyan factories owned 10% of the factories' shares. This also applied to the cement plants featured in the cases studied.

The experience of that time, after the announcement of the power of the people by Gaddafi, was described by Jibril (2011) as a mixture of communist primitive ideas with chaotic touches. Also, Gaddafi's regime (1969 - 2011) was marked by hostility to the West. He instilled his ideas in people's minds, through his slogans which were publicised in all Libyan villages and towns and through the imposition of the teaching of his ideas from the Green Book to all stages of education in Libya. There was a fear of strangers and an avoidance of intervention by Western powers in the country's affairs.

In the mid-1970s Gaddafi started to nationalize all the Libyan industries and enterprises in general and the oil industries and enterprises in particular to prevent, as he claimed, the intervention of Western powers in the country's affairs (Ahmed, 2013).

As a result of Gaddafi's policy of hostility against the West, the United Nations imposed economic sanctions and banned flights to and from Libya in April 1996; thus the Libyan people lived in isolation from the international community until September 2003 at which time Gaddafi abandoned the production of conventional weapons (Falola et al., 2012).

Gaddafi allowed foreign companies under government control to invest in Libya after the country was removed from the United States' list of terrorist states in May 2006. This was allowed by these companies participating or merging with a Libyan partner/organisation. As an example of this, in 2008, the Libyan Development Fund (owned by the government) established a new company named the Joint Libyan Cement Company (JLCC) with the Asamer Company (an Austrian investor). The JLCC purchased 90% of LCC shares and the other 10% of the company shares were owned by employees.

The Gaddafi regime (1969-2011) is acknowledged to have been erratic in the management of the institutions and organisations of the state, including governmental administration and the legal system, due to the way in which the administrators of units were appointed; they were selected based on their loyalty

and obedience to the top of the pyramid of the state (i.e., to Muammar Gaddafi and his revolutionary forces) (Ahmad, 2013).

The criteria for selecting the administration of any organization in Libya were not based on scientific qualifications and on experience in the field of management and development even though these were the skills that the country desperately needed as a developing country (dependent almost entirely economically on the revenues from oil exports).

On 15th February 2011, Libya experienced a full-scale revolt against Gaddafi's dictatorship and, in the city of Benghazi; the National Transitional Council was established to administer the areas of Libya under rebel control. The NTC issued a Constitutional Declaration in August 2011 in which it set up a road-map for the transition of the country to a constitutional democracy. The NTC governed Libya until 8th August 2012 after which it handed power to the General National Congress (GNC) which was elected by Libyan people on 7th July 2012.

Currently the interim government's mission is to facilitate the state's business on a temporary basis. It does not have the right to amend or cancel any laws or regulations until after the preparation of the country's constitution and after the election of a permanent government that is expected to be elected in 2014 (NTC, 2013).

3.3 Economic Background

The main sources of Libya's income are oil and natural gas and then gypsum and iron (gasandoil.com, 2007).

According to the U.S. Department of State, oil and gas accounted for approximately 98% of export revenue in 2012, 75% of its government receipts and 25% of its gross domestic product. According to *Oil and Gas Journal* (OGJ), the proven crude oil reserves were 48 billion barrels (as of January 2013), the largest endowment in Africa and among the ten largest globally. 80% of Libya's proven oil reserves are located in the Barqa region in the eastern half of Libya

(EIA, 2013).

Libya adopted economic reforms in response to international pressure and, in conjunction with the lifting of UN sanctions in September 2003 (especially with the increasing potential of the oil sector), worked towards transforming its socialist-oriented economy to a more market-based model through applying for WTO membership, reducing subsidies and implementing a privatisation strategy (CIA, 2013). Libyan economic policy has, in recent times, focused on developing non-oil manufacturing such as cement, iron and steel and other sectors in order to reduce the country's heavy dependence on oil (freegk.com, 2013).

It was very difficult to separate an assessment of Libya's economy from Libya's political ideology during the rule of the Gaddafi regime. The regime authorities were involved in the day-to-day operations in terms of changes in responsibilities or authorised budgets, organisational structure, location or site, employment conditions and personnel and management appointments. This all led to a state of instability causing a reduction in productivity and raising the cost of products. There were also continual changes in government and institutional laws, rules and regulations which, in turn, affected the stability of the Libyan organisations that were controlled completely or in part by the state; units such as the cement, iron and steel and other industries (Ahmad, 2013; Shihub, 2009).

The Libyan economy was affected by the Libyan people's uprising against the Gaddafi regime and, at that time, the Libyan oil and natural gas exports suffered a near-total disruption (EIA, 2013).

3.4 The Social and Cultural Structure in Libya

Libyan social life during the reign of King Idris (who ruled Libya after independence from the time of the British Mandate until the military coup by Gaddafi in September 1969) followed the common Islamic traditional mode of living. Such a traditional lifestyle, tribal-based and religious, was part of every aspect of the regime and also influenced the way in which policy was formed by the government.

Such a traditional lifestyle was not able to continue unaltered as tribal and village social structures were affected by various pressures. Rural people started to take on a modern lifestyle as the country was undergoing economic changes. Consequentially, rules and values started to change as materialism and wealth prevailed (Barakat, 1993).

Nevertheless, social life was noticeably more conservative when compared to other countries in the Arab world despite the government's continuous efforts to alter Libyan society after the discovery of oil, and when revolutionary ideas were spreading in the period following the 1969 coup (Obeidi, 2001; El-Fathaly and Palmer, 1980). This view was also held by Jodie and Gorrill (2013) when they argued that, in Libya, as a Muslim state, the heritage of Islam is deeply rooted in the character of the Libyan people; that it is an integral part of daily life and that Islamic rule pervades Libyan culture and customs, providing the structure for individuals' behaviour in both social and business contexts. Therefore, they recommended that companies who plan to invest in Libya should respect this, particularly in the area of dress, language and behaviour.

Loyalty to the family and to the tribe is deeply rooted in Libya and the tribal system is still strong in society despite the government's efforts to weaken its role. The former government realised the importance of such a role in supporting its policies and when implementing certain programmes the government ensured that they did not negatively impact upon the role of the tribes (Ahmad, 2013; Obeidi, 2001).

3.5 Overview of the Libyan Cement Industry

Cement manufacturing is one of the most important industries in the Libyan economy. The importance of this industry is due to the fact that it produces cement which is vital in producing concrete and construction materials for constructional development. Cement has been classified as the second largest utilised substance in the world after water (BCA, 2007). In Libya the raw materials required for cement manufacture can be found locally and there is a high demand for this product as an outcome of much recent construction and the on-

going rapid development in the country (Hokoma et al., 2008). Furthermore, the establishment of cement manufacturing units is an initial step taken in the making of a modern industrialised economy (Elbah 2005; Libyan Industrial Research Centre Report, 1992).

There are only two companies manufacturing cement in Libya: the Libyan Cement Company (LCC) and the Ahlia Cement Company (ACC). These two companies are discussed in detail later in this chapter. The first establishment of a cement works was in 1965, when the ACC commenced with one cement plant which began production in 1969 at Al Khums, 150 km east of Tripoli. From then onwards, the industry has grown steadily and, at present, there are eight cement plants with a capacity of 9.7 million tonnes a year (Elbah, 2005; GCM, 2013).

3.6 Raw Materials

The key raw materials for cement production are limestone, clay, silica, iron ash, and fuel such as oil. The factories are located in areas in Libya which are rich with the raw materials needed for cement production. Moreover, most of the raw materials available within the country are spread widely, are plentiful and are in forms that quite easy to utilize. (Elbah, 2005; Libyan Industrial Research Centre Report, 1992).

3.7 Cement Companies in Libya

The Libyan cement industry has two cement companies.

3.7.1 The Libyan Cement Company (LCC)

The Libyan Cement Company is located in Benghazi. It has three factories (two in Benghazi and one in Derna) with six product lines. The LCC was established in 1965 to produce cement and building materials as a private company. The first factory started production in 1972 with a capacity of 200,000 tonnes a year and a new production line with capacity of 400,000 tonnes a year was added in 1974. Then a new factory was built in 1975 that produces cement packaging and a third production line was built in 1977 with 400,000 tonnes/year capacity in 1977. In 1982, a new factory was established (El-fatayah Factory) with two production lines to produce 1 million tonnes/year in Derna city, 350 km east of Benghazi. By

2010, the production capacity had increased to 2.5 million tonnes a year (see Appendix B) and it now has been made into three factories.

In 1977, the government took control of all the private sector following Gaddafi's instructions and thus LCC was then owned by the Libyan government. In 2005, the Libyan government made some changes by transferring the ownership of some economic plants from government ownership to the private sector in order to improve the performance of the economy, to increase the productivity of the factories and also to improve the income and standard of living of individuals. The government transferred the ownership of 90% of the shares in LCC to a Libyan government holding company named the Economic and Social Development Fund (ESDF) and 10% of the shares remained with the employees of LCC. In 2008 the ESDF established a new joint company named the Joint Libyan Cement Company (JLCC) with an Austrian investor company (Asamer Holding, a private company specialising in cement, gravel, stone, concrete and the refinement of mineral raw materials) in order to support the development of the Libyan cement industry. The Asamer hold 56% of JLCC and ESDF hold 44%. In same year, JLCC took over 90% of the LCC shares from ESDF (LCC, 2008) (see appendix C).

3.7.2 The Ahlia Cement Company (ACC)

The Ahlia Cement Company (ACC) was established in 1965 under the name General Cement & Building Materials' Corporation (GCBMC). The GCBMC started the actual production of cement in 1969 after building the first factory (El Mergeb Factory) in El Mergeb, a city east of Tripoli. The name of the company changed to the Arab Cement Company and became a state-owned company resulting from a merger between the GCBMC and the Souk El Khamis General Cement & Building Materials' Corporation. The Arab Cement Company operated four plants: El Mergeb with a 330,000 tonnes/year capacity, and Souk, El Khamis, and Lebda each with a 1 million tonnes/year capacity. In 2005 the capital of the company was raised to LBD 600 million and the name was changed again to the Ahlia Cement Company (ACC). Moreover, the government sold ACC shares to the National Investment Company (65.9%), to the Economic and Social

Development Fund (ESDF) (32.8%), to the ACC employees (1.7%) and to ordinary people (0.6%) (see Appendix D) following the Libyan Government trend at that time for transferring ownership of some economic plants from government ownership to the private sector in order to improve the performance of the economy, to increase productivity within factories and also to improve the income and standard of living of individuals (ACC, 2014; Arabic News, 2005).

3.8 The Future of the Cement Industry in Libya

Libya is a developing country with substantial revenues and it is continuing to grow. It is necessary to increase domestic production of cement in order to meet an ever-growing demand. In 2008, the Libyan Government encouraged the private sector and foreign investors to invest in different economic plants in order to increase production and improve quality and meet demand. The cement industry increased cement production to 7 million tonnes a year but the competition resulting from importing similar items into the Libyan market by other traders decreased the sales and forced the Libyan cement companies to reduce production and lower prices. This decline in production and prices continues, causing losses and worsening returns for investors (Elbah 2005; GCM, 2013).

3.9 Chapter Summary

In this chapter an overview of the Libyan context has been discussed in order to create an understanding of the environment where the research took place. Information has been provided about Libya's geography and economic background. The social structure in Libya, raw materials and the cement companies in Libya (the Libyan Cement Company and the Ahlia Cement Company) were discussed. Finally, the possible future of this industry in Libya has been highlighted. The next chapter will discuss the methodology adopted to achieve the aim and objectives of this study.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.0 Introduction

This chapter aims at providing the appropriate research methodology in order to accomplish the objectives of the research, thereby answering all the research questions upon which this study is based. Research methodology is the use of any strategy, approach or tool that helps in data collection and in the analysis of the gathered data in order to answer the identified research questions (Chandler, 2006). Therefore, this chapter includes the research methodologies that are used to answer the research questions along with the rationale and usefulness of those strategies and methodologies in the context of this study. This research will adopt the onion model to outline the research methodology in this study.

4.1 Defining Research

According to Hussey and Hussey (1997), research is not an easy concept to be defined, nor does it have any specific standard definition. It is rather a complex construct that is context specific and may vary in its meaning with changing situations and contexts. But there is an agreement that research can be defined on the basis of some common features that it possesses in general; that it is an investigation process that is aimed at generating knowledge and is systematic in its nature (Hussey and Hussey, 1997). According to Collis and Hussey (2009), research can have a variety of purposes that may include:

- Amalgamation and review of already available knowledge.
- Enquiring into existing problems.
- Suggesting sound solutions to those problems.
- Taking into consideration general problems.
- Creation of new systems that work better.
- Explaining a new phenomenon.
- Creating new knowledge, and
- An amalgamation or synthesis of any of the above purposes.

This research is based on an investigation of the cost accounting systems in the cement organizations in Libya and whether such systems are keeping pace with management and technological changes. Therefore, this research can be defined as inquiring about the problems that face the cost accounting systems in the Libyan cement sector, as well as working on suggesting appropriate solutions for them.

4.2 Type of Research

Research can be classified as exploratory, descriptive or exploratory/analytical research (Saunders et al., 2012). Exploratory research "aims to seek new insights into phenomena, to ask questions, and to assess the phenomena in a new light" (Ibid: 592). Collis and Hussey (2009) referred to exploratory/analytical research as research usually conducted on a research problem where there has been few or no earlier studies. Descriptive research is research that describes phenomena as they exist. Therefore, descriptive research seeks to find out what is happening and to obtain information on the characteristics of a particular problem. Analytical or explanatory research is a continuation of descriptive research; it goes beyond merely describing characteristics to analysing and explaining 'why' or 'how' the phenomenon is happening (Ibid).

The present research is an explanatory and exploratory/analytical study whose aim is to identify and assess the viability of the adoption and implementation of ABC in the Libyan cement industry.

4.3 The Research Methodology Model

In the literature there are two main models for research methodology: the nested model and the onion model (Keraminiyage, 2013). In the nested model, there are three elements constituting research methodology: research philosophy, research approach, and research techniques. Whereas, in the onion model, there are six elements that form research methodology: research philosophy, research approach, research strategy, research method, data collection, and data analysis (see figure 4.1). The current study adopted the onion model because it holds more details on research methodology.

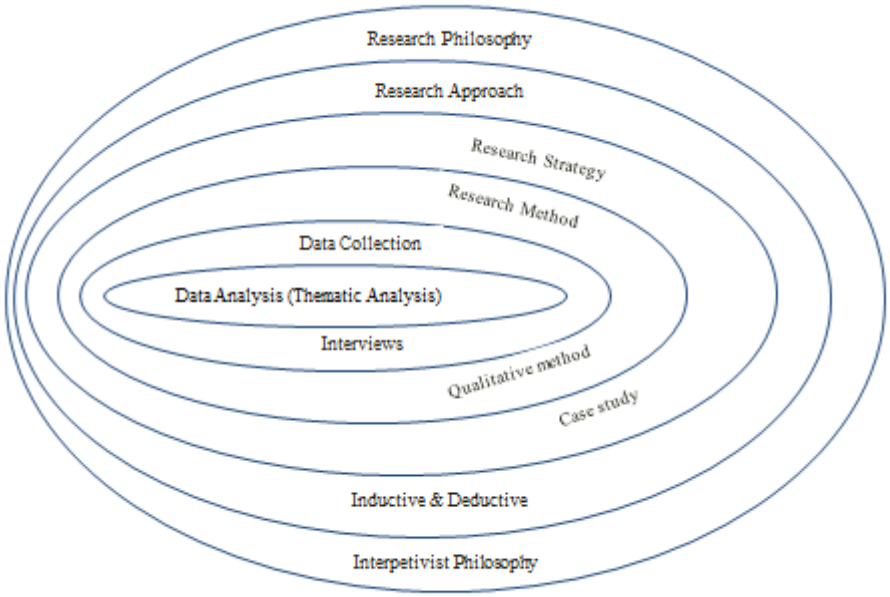


Figure 4:1: Research Methodology Model (the idea adopted from Saunders et al., 2012)

4.4 Research Philosophy

Research philosophy concerns the researchers' thoughts and cognitive patterns and depicts the way a researcher approaches the research question which, in turn, leads to the specific way research is undertaken. The philosophy depends upon certain factors including the aim of study, the scope and objectives, the hypothesis and research questions that are to be tested in the study, and the significance of the study for society (Saunders et al., 2012). So there is no specific procedure or rule that can be regarded as the best possible philosophy for undertaking research; it is rather a context and situation specific phenomenon (Yin, 2009).

There are two main research philosophies dominant in the literature: positivism and interpretivism or the phenomenological approach (Hussey and Hussey, 1997). Easterby-Smith et al. (2008, p57) described positivism research thus: "*The social world exists externally, and its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition*". Positivists prefer using statistical analyses of data collected by means

of large-scale empirical surveys (Amaratunga et al., 2002; Gummesson, 2000; Morgan and Smircuch, 1980).

Interpretivism is a phenomenon that is mainly focused on the specific way that people approach the world based on their previous experiences, using language as a medium of communication (Easterby-Smith et al., 2008). It is a subjective phenomenon that is based on factors such as awareness, depth of perception, an in-depth understanding of the phenomenon and interpretation based on personal experiences in order to answer what, why or how questions (Collis and Hussey, 2009). According to this philosophy, the researcher is a part and a participant in the whole process of research and not an independent being, as thought by the positivism philosophy.

Based on the nature of this research which focuses on meaning rather than measurement and because the researcher wants to gather rich information from the points of view of the study participants (based on their experience) in order to investigate the possibility of adopting ABC in the cement industry in Libya, therefore, the interpretivist philosophy has been adopted as the research philosophy.

4.5 Research Approach

According to Saunders et al. (2012) there are two main research approaches, the deductive and inductive approaches.

The deductive approach is a theory testing process which commences with an established theory or generalisation and seeks to establish by observation whether it applies to specific instances. This approach is used more with the positivism research philosophy.

While the inductive approach is a theory building process, starting with direct observation of specific instances and seeking to establish generalisations about the phenomenon under investigation and is more suited to a phenomenological research philosophy (Hyde, 2000).

Table 4.1: The major differences between deductive and inductive approaches

Deductive approach	Inductive approach
Scientific principles	Gaining an understanding of the meaning humans attach to events
Moving from theory to data	A close understanding of the research context
The need to explain the causal relationships among variables	The collection of qualitative data
The collection of quantitative data	A more flexible structure to permit changes of research emphasis as the research processes
The application of controls to ensure the validity of data.	A realisation that the researcher is part of the research process.
The operationalization of concepts to ensure clarity of definition	Less concern with the need to generalise
A highly structured approach	
Researcher's independence of what is being researched	
The necessity to select samples of a sufficient size in order to generate a conclusion.	

(Source: Saunders et al., 2012)

Creswell (2009) stated that one of the key differences between these two approaches lies in how existing literature and theory are used to guide the research. The deductive approach is designed to test a theory; thus, the literature is used to identify questions, themes and interrelationships before data are collected. Whereas, the inductive approach builds a theory as the research progresses; themes are identified throughout the research process and the literature is used to explore different topics. Table 4.1 illustrates the main differences between inductive and deductive approaches according to Saunders et al. (2012).

Hussey and Hussey (1997) argued that a discussion on the different types of research philosophies and approaches allows the researcher to understand the best way to conduct his/her own personal research, but they suggested that an individual should not feel too constrained when undertaking research; the researcher can move between an inductive and deductive approach.

However, Martin and Cepeda (2005) argued that there is no theory-free research and that all empirical work is based on some fundamental ideas. They noted that all researchers begin with some kind of conceptual framework and that it would be impractical for them to engage in the research process without a framework or without a notion about the relevant concepts in the area of interest. Moreover, Sekaran (2009) and Saunders et al. (2012) suggested that a combination of deduction and induction is not only perfectly possible within the same piece of research, but is often an advantageous approach.

Accordingly, the researcher has chosen to combine the deductive and inductive approaches. A list of factors that is necessary to assess the viability of the adoption will be derived from the literature and then investigated in the case study institutions (deductive). After that, the findings from the fieldwork (e.g. the analytical framework to the adoption factors of ABC system in the Libyan cement industry) will be incorporated into the existing theory (inductive).

4.6 Research Strategy

Saunders et al. (2012) defined research strategy as the plan that is aimed at providing the ways to answer the research questions in order to satisfy the research objectives. Five main types of research strategies, summarised in Table 4.2, were created by Yin (2009) thereby providing the three main conditions that may allow for selection of a certain strategy which is appropriate for the specific study. The conditions include:

- Type of research question.
- Researchers' control of behavioural events, and
- The focus being on present events as compared to past ones.

Table 4.2: Relevant situations for different research strategies

Strategy	Form of Research Question	Requires Control of Behavioural Events?	Focus on Contemporary Events
Experiment	How, Why?	Yes	Yes
Survey	Who, What, Where, How many, How much?	No	Yes
Archival analysis	Who, What, Where, How many, How much?	No	Yes/No
History	How, Why?	No	No
Case study	How, Why?	No	Yes

Source: Yin (2009, p. 8)

The case study method, as identified by Yin (2009), is the most suitable strategy for answering "how" or "why" questions. It helps to understand what the problem is and how and why it occurred and how it is to be solved. If it is not possible for the researcher to control events and the study is to be mainly focused on contemporary events, then the case study is the best type of strategy. The present study focuses on research questions which include: Why does the cement industry in Libya need to adopt the ABC system? Are the factors that enable in the adoption of the ABC system present in the cement industry in Libya? The event is contemporary and the researcher has no control over this phenomenon. Moreover, one of the strengths of the case study method is that it allows a researcher to use a variety and combination of sources and a number of different data types as a part of the study (Denscombe, 2003). It is also the most adopted strategy when the research is qualitative in nature (Brotherton, 1999).

Therefore, based on the above discussion, the researcher adopted the case study strategy for this research, firstly, because it is the most suitable and appropriate research strategy for this research and, secondly, to gain a greater understanding of the information required to investigate the factors that will encourage the Libyan cement industry administration to adopt ABC.

4.7 Single Case Study or Multiple Case Studies

Case studies can be carried out in one organisation (a single case study) or in more than one organisation (multiple case studies). Yin (2009) stressed that the single case study is an appropriate strategy to use when the case represents an extreme or unique case. Voss et al. (2002) believed that although a single case study offers greater depth of understanding it has limitations on the generalizability of the conclusions drawn. Yin (2009) argued that researchers who prefer to adopt a single case study as a research strategy needs to have a strong justification for this choice. Yin (2009) and Lee (1992) observed that multiple case studies are more common and are generally used to replicate findings or to support theoretical generalisations. Indeed, multiple case study research increases external validity and helps to protect against observer bias (Voss et al., 2002; Leavy, 1994).

Furthermore, there are two types of design for a multiple case studies' strategy: multiple holistic and multiple embedded case studies (Yin, 2009). *Multiple holistic case studies* involve a single unit of analysis. *Multiple embedded case studies* include multiple units of analysis.

In this study, multiple embedded case studies have been selected. This will involve multiple realities being derived from top management, middle management and shop floor management level which could provide data to enrich the findings. As a result of these considerations, it was decided that the appropriate research design for the present study would be multiple embedded case studies (in the Ahlia Cement Company and the Libyan Cement Company) replicating the same phenomena under different conditions.

4.8 Research Method

In social sciences, the positivist and interpretivist philosophies are represented by two main types of research method, quantitative and qualitative (Easterby-Smith et al., 2008).

Table 4.3: Key features of qualitative and quantitative research

Qualitative	**Quantitative**
Uses small samples	Uses large samples
Concerned with generating theories	Concerned with hypothesis testing
Data are rich	Data are highly specific and precise
Reliability is low	Reliability is high
Validity is high	Validity is low
Generalizes from one setting to another	Generalizes from sample to population

(Adopted and modified from Hussey and Hussey, 1997)

Quantitative research is one that is supported by the positivist school of thought and is all about numbers and digits and measuring items in a quantitative way (Collis and Hussey, 2009; Sutrisna, 2009; Easterby-Smith et al., 2008). Quantitative research aims at providing answers for the how much, how often, how many, kind of questions that need to be answered in a measurable form and in the form of numbers and digits (Gummesson, 2000) whereas qualitative research, which is connected with interpretivist philosophy, is based upon the gathering and interpretation of data which is presented in the form of words rather than digits and numbers (Bryman and Bell, 2007). This type of research has its main focus on the process rather than on numbers and formulas (Denzin & Lincoln, 1998) and is able to provide an in-depth and detailed analysis and interpretation of the deeper meanings of a phenomenon under study (Strauss and Corbin, 1998). Table 4.3 lists some of the key features of qualitative and quantitative research concerning data collection methods, as given by Hussey and Hussey (1997).

Moreover, the main reasons for using qualitative methods is the nature of the research as well as the research philosophy according to Hussey and Hussey (1997). Saunders et al. (2012) stated that statistical analysis (quantitative research) requires a minimum sample size of 30.

The research philosophy of this study is interpretivism (that focuses on meaning rather than numbers). Additionally, this research is interested in a deep understanding of the possibility of adopting the ABC system in the cement industry in Libya. The population of the study is less than 30 people because the total number of the employees within the top, middle and shop floor levels that undertake managerial accounting affairs within the Alahlia Cement Company and the Libyan Cement Company is 27. Therefore, for these reasons, qualitative methods are the most suitable methods to be used in this inquiry.

4.9 Data Collection

There are certain sources of data which include primary as well as secondary data and both forms can be utilized by the case study method. Secondary data is data that involves information that is already available in the form of documents, archives or any other form including reports, publications, books etc. This data may be available in hard copy or soft copy or on the internet. Primary data refers to the data that is gathered directly and is first-hand data which is collected with the help of interviews, observations, focus-group discussions and questionnaires (Collis and Hussey, 2009). It has been recommended by several researchers that the case study strategy must first take into consideration secondary data as a part of the literature review (Ghauri and Gronhaug, 2005; Churchill, 1999). Yin (2009) suggested that the case study strategy must use a combination of methodologies which is known as the Triangulation Method. This helps to understand the phenomenon in detail and unveils underlying deeper meanings. Yin identified six main sources of data that can be used in the case study method which are:

- *Interviews:* one of the most important sources of information in a case study. They should be undertaken by conducting a personal interview.
- *Documents:* these may include letters, memoranda, agendas, administrative documents, newspaper articles or any document related to the investigation. These may be used for providing detail and/or support for the verbal accounts.
- *Archival Records:* these include service records, organisational records, lists of names, staff and payroll records, old correspondence and other such records.

- *Direct Observations:* this is a way of collecting reliable evidence, for example when a field visit is conducted during the case study.
- *Participant Observation:* where a researcher fully participates in different activities with the subjects and observes their behaviour by being a part of them.
- *Physical Artefacts:* includes several devices, instruments, tools or any other physical entity that may prove to be useful evidence in the study.

The data that are collected is mainly dependent on the main research questions and the aims and objectives of the research. It is also dependent on the research philosophy, the research approach and the research strategy (Hussey and Hussey, 1997; Easterby-Smith et al., 2008).

Collis and Hussey (2009) agreed that the multi-methods' approach helps a researcher to overcome the possibility of bias associated with a single method. Multiple sources of evidence improve research validity and enhance the reliability of the study (Golafshani, 2003).

Based on the above, the researcher used both sources of data, both secondary and primary data. Secondary data was collected from books, journal articles and online data to achieve the first objective of this study, to explain the research problem, to support the selection of the research methodology and to support the primary data by collecting organisational documents. Primary data was collected through interviews and direct observation. The data triangulation approach was used which involves making use of a variety of data sources (primary data and secondary data) in order to make the study more reliable and authentic, to avoid participants' bias and researcher bias and to improve the research validity and reliability. (Sanders et al., 2012; Easterby-Smith et al., 2008).

4.9.1 Interviews

Interviews may be used as a tool for data collection and can be undertaken face-to-face, voice-to-voice or screen-to-screen (Collis and Hussey, 2009). Face-to-

face interviews can be categorized into three main forms which are unstructured, structured and semi-structured interviews (Easterby-Smith et al., 2008).

Structured interviews: involve the use of a pre-determined interview questionnaire that is standardised. It is mainly used in the quantitative analysis of any phenomenon (Saunders et al., 2012).

Semi-structured interviews: the researcher has an outline of the themes or factors to be covered in the interview. These may differ from interview to interview. This type of interview is suitable with qualitative research and also with explanatory and exploratory research (Saunders et al., 2012).

Unstructured interviews: these are used to explore in-depth a general area of interest to the researcher. The basic goal is to put the interviewees at ease and allow them to express themselves. This type of interview is suitable with exploratory research only (Saunders et al., 2012).

In this research, the researcher used face-to-face semi-structured interviews as the main method of data collection, and documentation review, and direct observations as the other source of evidence to enhance the research validity and reliability. The semi-structured interviews were conducted with the employees from the top management, middle management and shop floor levels who undertake managerial accounting affairs within the Ahlia Cement Company (ACC) and the Libyan Cement Company (LCC).

4.9.2 Number of Interviews

There are no rules governing identifying what is regarded as a sufficient number of interviews in qualitative research in recent literature. The choice of the number of interviews is based on the purpose of the study or on the available time or resources. On other hand, the literature has identified that the size of the sampling in quantitative research should be based on the size of the research population while in qualitative research the number of interviews must be identified based on ‘replication logic’ rather than on ‘sampling logic’. Therefore, experienced

methodologists recommend that the qualitative researcher should keep on interviewing participants until the researcher reaches `replication' (that is, collecting repetitive data and hearing the same stories repeated again and again) or "saturation point" wherein no new information emerges during the interview process (Saunders et al., 2012; Yin, 2009; Easterby-Smith et al., 2008; Creswell, 2009).

Table 4.4: Number of interviews

Company	**Top Management (TM)**	**Mid Management (MM)**	**Shop floor Management (SM)**	**Total**
LCC	2	5	9	16
ACC	2	4	5	11
Total	4	9	14	27

Table 4.5: The level and position of those interviewed

Level	**Identification details**
Top Management (TM)	Senior management and deputy manager; and Head of Management and Financial Department
Middle Management (MM)	Head of Financial Department; Head of Cost Accounting Department; Head of Production Department; Head of Sales Department; and Head of Review Department
Shopfloor Management (SM)	Ordinary employees in departments (financial, cost accounting, production, sales, and review)

In this study, most data came from interviewing 27 employees who work in different managerial levels (top management, middle management and shop floor management levels) in the headquarters and in the different manufactories of the

LCC and the ACC. Details on the three levels of respondents are given in tables 4.4 and 4.5.

4.9.3 Documentation

Documentary information is likely to be applicable in every case study (Yin, 2009). Mason (2004) described documentation as a research method that many qualitative researchers consider meaningful and useful in the context of their research strategy. In this study, the researcher was able to photocopy some of the organisations' documents such as records of financial statements and job descriptions. He also viewed other documents such as sales reports; whilst these were not allowed to be photocopied, the researcher was allowed to take notes.

4.9.4 Direct observation

Sekaran (2009: 254) recommended observational studies as a means of "providing rich data and insights into the nature of the phenomena observed". In addition, there are some specific advantages to gathering data through observation (Sekaran 2009: 214):

- The data obtained through observing events as they naturally occur are generally more reliable and free from respondent bias;
- In observational studies, it is easier to note the effects of environmental influences on specific outcomes;
- It is easier to observe certain groups of individuals, for example, extremely busy executives from whom it may be otherwise difficult to obtain information.

The main direct observations included handwritten notes in relation to the interviewer's observations and impressions taken during the field visit to each organisation and during the interviews. Also, the researcher tried to arrive at least two hours early for the interviews to use direct observation by visiting the work place, and observing the environment of the work place.

4.10 The Field Study

4.10.1 Setting Interview Questions

Interview questions were carefully prepared to cover the key areas in this research in order to collect the credible data needed. The questions were mainly open-ended, broad and indirect questions. They were designed to collect rich, deep and comprehensive information about the factors that affect the adoption of ABC in the Libya cement industry. Consequently, the research aim and questions also the list of the adoption factors of ABC system were used as guidance and looked at several times in order to generate the initial draft of the interview questions (See Appendix E).

4.10.2 Pilot Case Study

The questions asked by researchers, either through interviews or questionnaires should be tested by a pilot study according to methodology research experts (Yin, 2009; Sekaran 2009). Brenner et al. (1985) stated that a pilot study is carried out to assess the validity and credibility of the interview questions and procedures. Also Yin (2009) and Collis & Hussey (2009) recommended testing interview questions by conducting a pilot study on people who are similar to those in the real case study, in order to refine the interview instrument and to improve the data collection procedures.

In this research, the researcher conducted two pilot studies to test and to check whether the questions were understandable to the interviewees and that they were comprehensive enough to cover the research problem. They were also used to ensure that there was no ambiguity in the questions and to estimate the interviews' duration for the real case study appointments. After the initial draft of the interview questions was discussed with the supervisor and feedback taken into account, the first pilot study was conducted in UK with three PhD students who work on related subjects. In each pilot study the researcher took a copy of the research questions, aim, objectives and some background information on ABC and on the factors affecting its adoption. The researcher then sat with each interviewee and discussed the draft and the processes of collecting the data. Next

the researcher made some changes to the draft based on the comments that were received in the pilot study. This step is supported by Ghauri and Gronhaug (2005) who argued that it is very useful to let somebody else see the problem statement and the questions to be asked in the interviews in order to look for any similarities. The second pilot study was conducted with five employees from different managerial levels in LCC, one from the top management, two from middle management and two from the shop floor. The same procedure was followed as in the first pilot study. The researcher made some changes in the questions (such as language adjustments, re-phrasing and re-arrangement) in order to make them understandable and clear.

4.10.3 Translation into Arabic Language

The interview protocol was developed in the English language and, because the official language in Libya is Arabic, the questions were translated into the Arabic language by the researcher and a PhD specialist who has graduated from UK. They were checked by another Libyan who is a proficient English language speaker. The interviews were conducted in Arabic and, for the purposes of analysis and in order to minimise any misunderstandings arising from inaccurate translation, the Arabic version of the interviews were translated in English and then back into Arabic.

4.10.4 Conducting the Actual Case Study

The researcher started collecting data at the beginning of December 2011 and completed the collection of data by December 2012. Delays in data collection were due to the absence of employees caused by the conflict in Libya. This conflict started on 15th February 2011 and caused suspension of work in all companies and in all sectors in the country.

During December 2011 and January 2012 the researcher collected some data from the employees who had returned to work in LCC. Then the researcher collected the rest of data from both companies (LCC and ACC) between August and December 2012 through semi-structured interviews as well as from direct

observation and from documentation review. The time undertaken for each interview fluctuated. In general, it was between thirty to forty-five minutes.

The researcher carried out some steps in order to demonstrate the validity of the research and to overcome bias. These steps were as follows:

- Before starting the actual interviews, the researcher visited and introduced himself to the top management in both companies in order to build up a rapport and to get permission to conduct the interviews at the three management levels. The researcher used a student research letter that was provided by his university as a proof of the research that was being conducted. Such a step is supported by Easterby-Smith et al. (2008) and Ghauri & Gronhaug (2005).
- Because of security and cultural aspects, the researcher procured official permission to interview any employee from the head of department of that employee.
- The researcher introduced himself in each interview to the interviewee, explained the purpose of the study and confirmed that their personal information would be kept confidential by using the information letter and consent form (see Appendices F & G). Furthermore, since their cooperation was necessary, the researcher ensured that the interviewees felt relaxed and comfortable in giving their answers.
- The interviews were arranged at times convenient to the interviewees. All the interviews were conducted on organization premises and in a comfortable place chosen by the interviewee.
- During each interview the researcher took notes and copies of any documentary evidence that seemed to be relevant were also made. On the same day, each interview was transcribed as a full written record and the interviewees were asked for confirmation of their answers and to give any comments. Such a step is supported by Yin (2009), Creswell (2009) and Ghauri & Gronhaug (2005).
- The mother tongue of the researcher and the interviewees is Arabic thus all the interviews were conducted in Arabic which the researcher felt would

enable the participants to feel relaxed and comfortable while responding to the questions (Saunders et al., 2012).

- The researcher started interviewing without knowing how many participants he would interview and he continued until he felt that most answers had become repetitive and that the information collected was enough to achieve the research questions, aim and objectives.

Most interviewees were patient in granting the researcher extra time. As a result, the researcher was impressed with the interviewees' friendliness and the display of interest in the research. The procedures undertaken gave the researcher confidence in the accuracy of the interview process which, in turn, increases the reliability and validity of the research.

4.10.5 Ethical Approval

Ethical aspects had to be considered in this study. The researcher applied for ethical approval before conducting the pilot studies and the actual field study in order to ensure that the interviewees' safety, confidentiality and interests were at the forefront of any action/interviewing undertaken.

4.11 Generalisation

In the literature on research methodology, there are two types of generalisations: statistical generalisation and theoretical generalisation. Yin (2009) argued that using statistics to generalise from a sample to a population is one type of generalisation. On other hand, interpretivists generalise their findings from one setting (environment) to a similar setting (environment). It is possible to generalise patterns, concepts or theories from a particular environment (very few cases or even a single case) to other environments (called theoretical generalisation) if the researcher has obtained a comprehensive and deep understanding of the activities and behaviour studied (Collis and Hussey, 2009).

The nature of this study is to build up theory, the philosophy of this research is interpretivism and the main data collection is via semi-structured interviews; consequently, the generalisation of the findings from this research is a theoretical

generalisation and by that these research findings can be generalised into the literature on ABC. Furthermore, the research findings can be generalised from the companies within the Libyan Cement Industry to other organisations that have a similar internal and external environment.

4.12 Evaluating the Credibility of the research findings

Researchers who are conducting quantitative or qualitative research need to demonstrate the credibility of their findings (Saunders et al., 2012). *Validity* and *reliability* are commonly used as criteria for evaluating the credibility of a research methodology in deriving its findings (Ibid). Validity refers to the accuracy and trustworthiness of the instruments, data and findings in the research (Creswell, 2009; Bernard, 2000), whilst reliability refers to the ability to obtain the same findings if the same method, data collection techniques, procedures and analysis are used on a second research sample (Yin, 2009: LeCompte and Goetz, 1982). Creswell (2009) and Golafshani (2003) argued that reliability is a part of the validity of any research and a necessary element for determining the overall validity of a scientific research and enhancing the strength of the results.

Validity and reliability in this research were constructed by using multiple sources of evidence as given in the following:

- Multiple case study strategies were used rather than a single case study.
- Multiple sources of data collection were used, such as semi-structured interviews, direct observation and documentation.
- The interview questions were carefully prepared and refined with the help of the supervisor and two pilot studies were conducted before the actual study.
- The draft transcripts of the interviews were approved by returning them to the interviewees in order that they could read them and then they were signed and validated by the interviewees.
- The research findings were discussed and linked to findings found in the literature review in order to increase the credibility of the research.

- Finally, in order to raise the research validity, the results of the study were presented to eight Libyan cement policymakers and academics. These participants agreed that the results complied with the reality and would help the LCC and the ACC to determine the costs of their products more accurately (Further details are given in section 5.5).

4.13 Data Analysis

There is no standard approach to the analysis of qualitative data. Interpretivists, for instance, resist categorising or coding their data, preferring to work from the transcripts of interviews (Saunders et al., 2012). It was indicated by Saunders et al. (2012) that using the transcripts or notes of qualitative interviews or observations by thoroughly reading and re-reading them is one approach to analysing this type of data.

Collis and Hussy (2009) stated that the main method of analysing qualitative data can be by classifying the data into the quantifying methods and the non-quantifying methods which include general analytical procedures. This method is suitable for all types of qualitative research. Some authors such as Braun and Clarke (2006) and Boyatzis (1998) called the general approach for analysing qualitative data 'thematic analysis'. Boyatzis (1998: 4) has argued that thematic analysis is "*not another qualitative method but a process that can be used with most, if not all, qualitative methods…*". Collis and Hussey (2009) stated that the general analytical procedure approach (thematic analysis) provides the methodical rigour and the systematic processes which are required. Braun and Clarke (2006: 79) defined thematic analysis as "*A qualitative analytic method for: identifying, analysing and reporting patterns (themes) within data. It minimally organises and describes your data set in (rich) detail. However, frequently it goes further than this, and interprets various aspects of the research topic*"

On the other hand, researchers who use multiple case studies as the main strategy for their research can organise the data analysis process into two stages: within-case analysis and cross case analysis (Yin, 2009; Ayres et al., 2003; Creswell, 2009).

Based on the above discussion, this research is qualitative research and the main research strategy is multiple case studies and, therefore, the data was analysed by using *the thematic analysis approach* which includes general procedures for analysing. It offers an accessible and flexible approach to analysing qualitative data especially for those not particularly familiar with qualitative research (like postgraduate students) (Collis and Hussey, 2009).

In addition, the analysis and discussion is organised in two stages: *within-case analysis* (which means analysing each case separately and drawing conclusions for each case) and *cross-case analysis* (in this stage the similarities and differences among the findings of the cases will be discussed and the cases findings will be combined as an attempt to answer the research questions); these stages are recommended for multiple case study research.

In order to deal with the huge volume of qualitative data that has been collected via the multiple case studies, general procedures for the thematic analysis was set up as follows:

- The research aim and questions were taken into consideration by the researcher at all stages of the analysis.
- All interviews were written into Microsoft Word. The interview transcripts were returned back to the respondents for confirmation that they were a true record of what was said and all the notes from the direct observations were written into Microsoft Word and were linked to their interview transcripts.
- Any material collected by interviews, documents or direct observations was carefully referenced.
- The researcher started the analysis by reading and re-reading the transcripts of the interviews and the notes of the direct observations and documents many times and thus became very familiar with the data (this step in the process was supported by Saunders et al., 2012; Creswell, 2009).

- Next, the researcher started coding the data. Coding refers to '*the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon*' (Braun and Clarke, 2006: 88).

  After the data was coded, the researcher grouped the codes into small categories according to the themes which emerged dependent upon the research questions (such a strategy is supported by Saunders et al., 2012; Collis and Hussey, 2009). In this process, eight themes were identified (size of the organization, innovation, top management support, internal champion support, overhead costs and cost structure, usefulness and importance of cost information, product diversity, manufacturing flexibility and complexity and intensity of the competition). Both case studies were analysed separately. Then, the findings from both case studies were combined and discussed.

4.14 Chapter Summary

This chapter has provided an overview of the research methodology. Based on the aim, objectives and research questions of this study, the interpretivism philosophy was chosen as the research philosophy and the deductive and inductive approaches were selected and justified. A multi-case study approach was adopted as the strategy for this research. The data collection tool chosen was face-to-face semi-structured interviews for the main source of evidence and this is to be triangulated by documentation and direct observations. Finally the data is to be analysed by using the thematic analysis.

CHAPTER FIVE
RESEARCH FINDINGS AND DISCUSSION

5.0 Introduction

This chapter presents the findings and discusses the empirical investigations carried out within the two case studies. The findings were produced from 27 face-to-face semi-structured interviews.

The literature review elicited factors that should encourage the cement industry in Libya to adopt ABC and listed them in eight factors. The aim, objectives, research questions which are stated in chapter one guided the researcher in the collection of the relevant data.

As stated, the main purpose of this study is to identify and assess the viability of the adoption and implementation of ABC in the Libyan cement industry. In order to achieve this aim the following research questions were designed:

- Why does the cement industry in Libya need to adopt the ABC system?

- Are the factors that assist in the adoption of the ABC system present in the cement industry in Libya?

This chapter will present the findings using intra-case analysis and cross-case analysis; these methods are recommended for multiple case study research (Yin, 2009). This means that each case will be analysed and discussed separately, illustrating the similarities and differences among the findings of the cases; then the findings from the separate cases will be combined.

5.1 Characteristics of the Interviewees

In this study, the data came from interviewing 27 employees who work at different managerial levels in each case namely:

- Top management (TM): Senior management and deputy manager; Head of Management and the Financial Department.

- Middle management (MM): Head of Financial Department; Head of Cost Accounting Department; Head of Production Department; Head of Sales Department; and Head of Review Department;
- Shop floor management (SM): Ordinary employees in departments (financial, cost accounting, production, sales, and review) (see tables 4.4 and 4.5).

The researcher decided to include all these levels in order to gain in-depth information and clear perceptions on the issues covering ABC in the Libyan cement industry.

5.2 Background to Case Study LCC

The Libyan Cement Company (LCC) was established in 1965 and is located in Benghazi city with four factories (two production lines each); three of them manufacture four types of products: ordinary Portland Cement, Sulphate-Resistant Cement, Gypsum and Lime and the fourth factory manufactures cement bags. The total production capacity in 2010 was 2.5 million tonnes a year of cement (more details are given in section 3.7.1).

The total number of participants from this case study was 16 participants: 2 participants from TM, 5 participants from MM and 9 participants from SM (see tables 4.4 and 4.5).

5.3 Background to Case Study ACC

The Ahlia Cement Company was established in 1965 and is located in the western region of Libya. It has six factories producing five products (ordinary Portland Cement, Sulphate-Resistant Cement, Gypsum, Lime, and packaging bags). The total production of this company is 3.330 million tonnes a year (ACC, 2014) more details are given in section 3.7.2.

The total number of participants from this case study was 11 participants: 2 participants from TM, 4 participants from MM and 5 participants from SM (see tables 4.4 and 4.5).

5.4 The Research Findings

This section presents the findings from both cases, LCC & ACC. The data was analysed according to eight themes: size of the organization, innovation, top management support, internal champion support, overhead costs and cost structure, usefulness and importance of cost information, product diversity, manufacturing flexibility and complexity and intensity of the competition.

5.4.1 Size of Organisation

According to many researchers (e.g. Naranjo-Gill, 2009; Line et al., 2001), there are a number of factors upon which the size of an organisation is measured. Some of these factors are the number of employees, the working capital and the annual sales of the company. They also noted that large-sized companies normally tend to apply the ABC system much more than small-sized companies. Askarany and Smith (2008), for instance, explained that companies with more than 600 employees and more than 200 million USD working assets are considered large-sized companies. Furthermore, Khalid's (2003) study showed a positive correlation between the size of a company and the use of the ABC system.

To obtain data on the size of the companies, participants from the two companies were asked, during interviews, the following two questions:

What is the value of the company's assets?

How many employees do you have in your company?

LCC Case

LCC participants responded to these two questions by providing relevant documents showing that the production working assets in the company were LYD 363 million (290 million USD) and the current number of employees at different levels of employment in the company was 2,465. Therefore, the company is a large-sized company (Appendix H).

ACC Case

ACC participants responded to the questions by also providing relevant documents which also showed that the company is a large-sized company as its

working capital was LYD 408 million (326 million USD) and the number of employees was 3,234 at different levels of employment. Accordingly, the company is a large-sized company (Appendix K).

Discussion:

From the responses of the participants in both companies and from the documentation seen, it is clear that both companies are large-sized companies (given the large size of both their working capital and the number of employees). These findings comply with statement of Askarany and Smith (2008) in that companies with more than 600 employees and more than 200 million USD working assets are considered large-sized companies. These findings suggest that both companies are suitable candidates for adopting more accurate and advanced financial systems for their cost accounting such the ABC system which is recommended by Naranjo-Gill (2009), Kalid (2003) and Line et al. (2001).

5.4.2 Innovation

According to Askarany (2006), innovation can be a new managerial technology or service and can also be a change in the existing technology or products. Rogers (2003:12) provided a similar definition for innovation as "an idea or practice, or object that is perceived as new by an individual or other unit of adoption".

Organisations might decide to expand their projects, their manufacturing, or their managerial innovation in order to respond to the current market's needs for top quality products with affordable prices for consumers. Thus, when an organisation decides to introduce innovation into its projects in order to realise its set objectives, in reality, it also needs to develop and innovate its accounting system too, to help it store more detailed and up-to-date financial information. Moreover, Askarany et al. (2008) argued that organisations that adopt innovation policies are more likely to adopt the ABC system instead of the traditional costing system as the ABC system provides them with the more appropriate and detailed information required.

To explore whether the cement companies in Libya have adopted any innovation policies in the past, whether there are any future plans in this respect, and also to explore the extent to which modern technology is used in manufacturing, the researcher set the following questions:

> *Has any management and/or manufacturing innovation taken place in your company? If so,*
>
> *Has there equally been a concomitant innovation in the company's cost accounting system?*

LCC Case

From the LCC participants' responses to the above questions, it turned out that the company had invested LYD 200 Million (160 Million USD) in the previous three years to innovate the factories' management and technical systems so as to upgrade these factories in order to improve quality, to increase the manufacturing capacity and also to reduce manufacturing defects. The upgrading process was also aimed at reducing carbon emissions and thus preserving the environment. Additionally, all the respondents confirmed that the company's financial system had not been innovated and remained the same.

In this respect one of the participants (TM1) said:

''When we took over the management of the company, we restructured and developed the company's different departments and we improved the means of communication between these departments. We also upgraded and modernised the factories to improve quality and to increase production and also to reduce manufacturing defects. The production level used to be 1.5 million tonnes per year but it has currently, following the modernisation process, reached 2.5 million tonnes per year and the plan is to reach 3 million by the end of 2011..... As for the company's cost accounting system, we have not yet upgraded it''.

TM2 followed a similar line and added:

''We took over the management of the company back in 2008. Since then we have set up a multi-phase plan to upgrade and modernise the company's factories and to modernise the system of management in order to improve the quality and to

increase production. We have so far spent LYD 200 million in this respect. Among the developments we have made, was the replacement of the dust filters with up-to-date technology filters compliant to the European technological criteria which help preserve the environment by reducing the level of the emission of dust…… as for the company's cost accounting system, we have not yet upgraded it ''

Participants from both the higher and lower levels of management confirmed that there has been innovation in managerial and technical aspects. However this innovation did not include altering the long lasting traditional cost accounting system of the company. Below are some examples of their responses.

MM1 said:

''Indeed the company has upgraded the level of production which previously did not exceed 1.5 million tonnes per year and it has now exceeded this level and reached 2.5 million tonnes per year. The company has also organised intensive training sessions for all employees to familiarise them with the operation of the new and advanced machines in the factories". MM1 also added *"there has not been any innovation so far for the company's cost accounting system. I am still using the same traditional cost accounting system since I was started in this company from more than 20 years ago''.*

Another respondent MM2 confirmed:

''The new management has set up a new organisational structure, in line with its new policy, to improve the performance and the means of communication between employees in different departments, levels of management and factories. The management has also modernised and upgraded the factories to assure the high quality of the products which are currently experiencing fierce competition in the market. The company, however, has not yet upgraded its accounting system''.

Another respondent SM5, working in the company's cement packaging factory, stated:

''The cement packaging factory has recently been fully modernised. Previously, we used to experience a lot of faults in the factory. There were also big losses in

the quantity of the paper used for manufacturing. However, following the maintenance and modernisation process, the factory has now become semi-automated and there are almost no manufacturing defects anymore''.

In addition to this, the researcher also reviewed some documents received from the company's staff confirming the amounts spent on the innovation process in the company's factories. The researcher also obtained external photos of one of the factories before and after the installation of the new and up-to-date dust filters which confirmed the positive impact that the innovation has added to the factory's surrounding environment (Appendix L).

From the above, it was noticed that the management of the LCC has adopted a comprehensive innovation plan to upgrade and develop all its factories and departments. However, the company's accounting system has not yet been equally altered. Thus the company needs to upgrade its accounting system to keep pace with its current innovation trend and also to enable the company to better compete in selling its products in the market.

ACC Case

From the responses from all the participants in this company, it also turned out that the company has spent part of its annual budget on the maintenance and modernisation of its factories in order to increase production and assure the quality of its products and thus increase the sales. The company has also upgraded its management at different levels but it has not equally upgraded its cost accounting system to keep pace with the developments that have taken place in the other departments. Below are excerpts from the responses of the participants.

A respondent TM1 stated:

''The company has set up a plan over the last few years to innovate and renew its factories in order to improve the quality of the products and to increase the level of production. However, due to the fierce competition that our products experience in the market and also due to the arrival of parallel competing imported products in the market following the lifting of the UN imposed economic

embargo on Libya, prices went down and so did our sales which, in turn, led to a decrease in the company's profits from LYD 95 million in 2008 to LYD 15 million in 2010 and sales from 2.5 million tonnes in 2008 to 1.7 million tonnes in 2010 ... as for our financial system, no, we have not upgraded it'' (Appendix M & N).

One more participant, TM2, confirmed what TM1 said above and stated:

''The company has renewed and developed some of the factories and work is still underway to develop some more factories in order to improve the quality of the products and to increase the level of production. The company, however, experiences a fierce competition in the local market which has caused a dramatic decrease in the levels of sales over the last three years. Given this, the company therefore needs a new strategy whereby it can reduce the costs of manufacturing to reach to a reasonable competitive price for its products to increase profits''.

Participants from both the middle and lower levels of management made similar comments. A participant, MM1, stated:

''In the past, we used to sell all our products and we used to have a long waiting list of orders for our products. Customers used to wait for many months for us to get their order ready for them. However, after the Libyan market was opened up to imports from abroad, following the lifting of the UN imposed economic embargo on Libya, foreign cement, imported from neighbouring and other countries, with cheaper prices than ours, has arrived in the market. This made us rethink the costs, how they accrue and we are reconsidering the cost accounting system''.

Another participant, SM1, working in one of the factories, stated:

''The factory has been maintained and new high-tech equipment has been installed. Some environment-friendly dust filters have also been installed and they are now under test. Such equipment will help reduce the manufacturing defects''.

SM2 said:

''The newly installed equipment and machines will save much time in the production process since they are speedy. Moreover, since these machines are

high-technology and flexible machines, the time spent on the set-up of the machines to manufacture various products will be significantly reduced compared to the past when more much time and efforts were spent on this process''.

All the participants from the financial section in ACC agreed that the existing traditional cost accounting system did not connect well with the innovation and development that is taking place in the factories. Below is a response from one of the participants, SM3, from the financial section in ACC:

''There is indeed development going on in all the company's departments and factories but we, in this department (cost accounting department) are still using the same traditional cost accounting system".

Discussion

It is clear that both companies LCC & ACC have adopted an innovation policy which has manifested itself in technical innovations in the different factories of both companies. They have installed new and high-technology equipment and machinery and also maintained and modernised some other existing equipment and machinery to assure the quality and the quantity of production as well as attempting to reduce manufacturing defects and preserve the environment.

Both companies have also developed their managerial system but the cost accounting system in both companies has not been upgraded in order to keep up with the development processes that have been taking place in other departments. It was suggested by Askaray et al. (2008) in their study that organisations which set up innovation plans were found to be much more likely to use modern cost accounting systems (such as the ABC system) instead of the traditional costing system as the ABC system provides an organisation with more detailed and up-to-date financial information when required. This, in turn, helps the organisation set reasonable prices for its products and allows it to better compete in the open market as in the case with the Libyan market.

5.4.3 Top Management Support

Brown et al. (2004) found that organisations/companies are more likely to adopt ABC systems when top management supports the introduction of such systems. Put differently, there is a positive correlation between the support of top management in organisations and the adoption of ABC systems in these organisations (Conger, 1995). In the same vein, Majid and Sulaiman (2008) explained that the support of top management is crucial for the success of the ABC system. Similarly, Liu (2007) stated that continual top management support is one of the contributory factors to the success of the ABC system. Indeed, there is a high percentage of success when top management supports the adoption of the ABC system because of the freedom and support given to the system implementers by top management, whereby they have access to all the necessary materials required for implementation. This support also extends to the solutions given to any problems and obstacles that might arise throughout the different phases of the system's implementation and adoption.

Accordingly, the following questions were asked to ascertain the extent to which the top management supports the implementation and adoption of the ABC system in their companies:

> *Are you willing to support the development of cost accounting systems in your company?*
>
> *Do you think you company needs the ABC system. If so, why?*

LCC Case

From the responses of the participants in LCC from both the higher and middle levels of management**,** it turned out that all the participants were willing to support the development and adoption of any new cost accounting system such as ABC in their company, particularly if such systems provided more detailed information about the overhead costs to inform the company's top management in the decision making process.

Below are some examples of the company participants' responses.

One of the participants, TM1, stated:

''I told you, the company invested LYD 200 million (160 million USD) in the development of its factories in order to improve quality and increase production. It also developed its IT and managerial systems. This in turn led to an increase in both the quantity and quality of the production. We are currently looking at how to decrease the prices of our products to make them competitive in the market and thereby increasing our sales. As for the ABC system, we will look at it and we will indeed support its introduction and adoption in the company if it provides information about costs, particularly the overhead costs and if it is more accurate than the current traditional cost accounting system in place''.

In a similar way, another participant, TM2, said:

''Due to the competition in the market and due to our concern about the increase of our production, we are compelled to review the prices of our products. I am therefore willing to support any effort to upgrade and develop the current cost accounting system and I believe that the ABC system would be appropriate since it would help us accurately calculate the costs of our products''

Yet another participant, MM1, explained that:

'We are currently using the traditional cost accounting system which in my view does not provide accurate information about the cost of products. Given that the company is reviewing the prices of its products to compete in the market, it indeed first needs to upgrade this system in order to be able to accurately calculate the costs of its products at different stages of manufacturing and then, accordingly, it can review the prices of its products. We will support any efforts in this respect. As for the ABC system, given my knowledge about it, I think it would be the most suitable cost accounting system for the company''.

ACC Case

As was the case with LCC, most respondents from ACC welcomed any move to upgrade and develop the company's current financial system. They also expressed their readiness to adopt the ABC system provided that it helped provide more detailed information about costs and overhead costs' control, so that the company could reduce the prices of its products and continue to operate, particularly so

after the decrease in sales and revenues the company had undergone during the previous years.

Below are some examples of ACC participants' responses.
One of the participants, TM1, stated:
''Based on the information we have obtained from our current cost system, we have decreased our sales to the minimum level. However, I think this system needs to be developed to cope with the development of our factories and to curb the overhead costs. In case the company decides to develop the current financial system, we will indeed support such a decision to avoid the closure of some of our factories due to the decrease in the sales…… In fact the company needs a cost accounting system such as the ABC system to control the overhead costs''.

Another respondent (TM2) said:
''The expenses of the company are high as a percentage of the size of the revenues and the working capital. Such an issue was discussed in one of the meetings of the cost accounting department during which a decision was taken to review the company's current cost accounting system in order to control the costs. I personally support the introduction of an alternative cost accounting system that will help us in eliminating the overhead costs. I think the company would much benefit from the ABC system since it, to a great extent, can accurately calculate the costs''.

Moreover, most of the participants from the company's mid-level management felt the same way. One participant (MM1) stated that:
''As we can see from the financial reports, there has been a decrease in the company's sales due to the competition in the market and due to the high cost of our products which has resulted from the high costs of raw materials and other costs which requires a review by the company's top management". And then he added *"I actually have little information about the ABC system but I believe that this system provides more accurate information about the costs of our products and thus would help us eliminate the distortion of the overhead costs. As the*

current cost accounting system needs to be developed, I would support the ABC system if the company decides to adopt it''.

In contrast to participant MM1, another participant, MM2, stated:

''There is indeed a decrease in the company's sales due to the high costs of manufacturing and due to the availability and competiveness of other similar products in the market. So the use of a new cost accounting system needs funds which will further increase the cost manufacturing. We might also not gain any benefit from the use of such a system, so it would be wise to stick to the current traditional system given the fact that we are familiar with it and we do not have the time nor the energy to learn how to use the new alternative system''.

However, MM3 provided a different view to that of MM2 and stated:

''We have all the potential equipment and qualified personnel and all we need is some training sessions for the staff on the use of the ABC system and thereby we can dispose of the overhead costs and control the market''.

From the responses of the participants from ACC, it became clear that most participants from both the higher and mid-level of management were prepared and willing to adopt any system that could develop the company's cost accounting system. They were also willing to support the adoption of the ABC system provided that it was appropriate for the company and helped provide more detailed and accurate information about the costs. There were, however, two participants that provided negative responses. These negative responses might be due to the participants' age and attitude. The researcher noticed that both participants were approaching the age of sixty and they did not seem to have any willingness to get involved in any training sessions to learn how to use any new alternative cost accounting system.

Discussion:

From the responses of the participants in both cases, both companies need to develop their cost accounting system since they required more accurate and detailed information about their manufacturing costs. Most participants from both

higher and mid-level of management in both companies were willing to support the adoption of any new cost accounting system such as the ABC system. The adoption of such system would be timely, especially if it takes into consideration the recent modernisation and development of the company's factories and management departments and the fierce competition it experiences in the market which requires a decrease in the manufacturing costs and thus a decrease in the prices of the products to compete with similar available products in the market. Such support from the top management would help in the success of the adoption of ABC and is consistent with the conclusions of Majid and Sulaiman (2008), Liu (2007), Brown et al. (2004) and Conger (1995).

5.4.4 Internal Champion Support

Permkumar and Potter (1995) and Baird et al. (2004) stressed the importance of pro-innovation staff inside an organisation and the willingness of such insiders to accept and adopt new innovations such as the ABC system. The existence of such pro-innovation staff inside an organisation is very important since these staff members could bring other employees on board in accepting the innovation, in familiarising them with it, in helping them to understand the importance of the new system to the organisation and, thereby, overcoming any resistance to change within the organisation.

To explore whether there was a pro-innovation individual among the employees and whether this individual was knowledgeable about the ABC system, as well as exploring whether there were any supporters among the employees to adopt the system, the participants were asked the following questions:

> *Have you tried to introduce any cost accounting innovation into your company?*
>
> *Do you know about the ABC system? If so, what do you think of it?*
>
> *Would you support the adoption of the ABC system into your company?*

LCC Case

From the responses of all the participants in the company, the researcher noticed that all the participants confirmed that there has been no upgrade to the cost

accounting system in the company and that the current system in use is the traditional cost system. As for their knowledge about the ABC system, it turned out that most of the respondents had no knowledge about this system. However, three of the respondents reportedly had knowledge about the system and they thought that it would help the company to accurately analyse the costs and dispose of the overhead costs. Those three respondents also expressed their readiness to support the ABC system if the company should adopt it. Below are some examples of their responses.

A participant, TM1, stated:

''No, I haven't tried to submit any proposal to the company to innovate and upgrade the current cost accounting system and I actually don't have any idea about the ABC system''.

Another participant, MM1, said:

''We are still using the traditional cost accounting system to calculate costs and we haven't tried to innovate this system to keep pace with the innovation advancements that the company has undergone. Yes, I do have knowledge about the ABC system and I think it is an excellent system for cost accounting. I am also ready to fully support it should the company decide to adopt it''.

Moreover, participant SM1 stated:

''The management of the company has renewed the computers we use but they have not upgraded the software for the financial system. I don't know about the ABC system.''

Another participant SM2 stated:

''I haven't submitted any proposal to the company to develop the cost accounting system. I have knowledge about the ABC system as I studied it in university. I think it is very useful system since it a new system and it will help the company control and dispose of the overhead costs. I will do my best to make this system successful if it is used in the company''.

Yet another participant, SM3, said:

''The company has not developed the cost accounting system and I think it needs innovation… I know the ABC system. It is a new system that provides more information about costs and it is better than the existing traditional system. I hope the company adopts the ABC system since we have all the necessary resources to implement it''.

ACC Case

From the responses of all the participants in the company, the researcher noticed that all the participants confirmed that there has been no innovation to the cost accounting system in the company and that most of the respondents have no knowledge about the ABC system, apart from two participants who claimed to have knowledge about the system and they expressed their readiness to support an upgrade to the existing cost accounting system if the company were to set up such a plan. Below are some examples from the participants' responses.

One of the participants, TM1, stated:

''I haven't submitted any proposal to the company to develop the current cost accounting system.....… I have knowledge about the ABC system and I think it would be better for the company to use it instead of the current system since it will help the company to accurately analyse the costs in more detail. It will also help the company to identify the cost pool that has alteration costs so as to control them .....… I am also ready to fully support it should the company decide to adopt it''.

A participant, MM1, said:

''We are still using the same traditional cost accounting system. It has never been changed for ages… I haven't heard about the ABC system before but I will indeed support its adoption in the company if it is better than the existing system''

Another participant, SM2, stated:

''We have been using the same traditional cost accounting system since I started work in this company. We have got used to this system as it is easy to use and I haven't heard about the ABC system before''.

Yet another participant, SM3, said:

''The company has not upgraded its cost accounting system… I personally know the ABC system because I studied it in college. I believe the company needs such a system particularly if we take into consideration that the company has high and various expenses. The ABC system can help in handling such expenses as it is suitable for the purpose… I will support the introduction of the ABC system into the company should the company decide to adopt it''.

Discussion

From the responses of the participants in both companies, LCC & ACC, it can be concluded that there are some individuals among the employees in both companies who have knowledge on the ABC system and they are convinced that the system is useful for the companies. They also expressed their readiness to support its use should their companies decide to adopt it. This enthusiasm, in turn, would help bring the rest of the employees on board and convince them about the merit of the system in improving the cost accounting system and thereby overcome any obstacles that might otherwise arise during the different stages of system application. These findings corroborate the findings on overcoming resistance to change as reported in the literature (e.g., Premkumar and Potter, 1995; Baird et al., 2004).

5.4.5 Level of Overhead Cost and Cost Structure

A number of researchers (e.g. Brown et al. 2004; Kaplan and Cooper, 1998; Bijornena, 1997; Nguyen and Books, 1997; Baker, 1994) have demonstrated that overhead costs have become an extra load on the cost of products which has led to a distortion in the traditional cost accounting systems which makes them ineffective and problematic for calculating the actual cost of products. The above mentioned studies, therefore, recommend that companies with high overhead costs should use much more sophisticated cost accounting systems such as the ABC system since it would help these companies in avoiding squandering costs and would assist in allocating overhead costs to products more accurately. Moreover, ABC is considered the best cost accounting system used in present-day companies. The studies also found a positive correlation between high overhead costs and the use of the ABC system in the companies under investigation. The

same finding was also confirmed by Booth and Giacobbe's (1998) study as they found that companies with high overhead costs are likely to adopt the ABC system.

Accordingly, and to investigate the level of the overhead costs in the companies, participants from both companies were asked the following questions:

> *How would you describe the manufacturing process in your company? Is it automated? If so, to what extent?*
> *What is the approximate overall percentage of the overhead costs?*
> *On what basis do you allocate manufacturing overheads to products?*

LCC Case

From the responses of the participants in this company to the above questions, it was found that all the participants confirmed that the company's factories are semi-automated. They also stated that the percentage of the overhead costs is high, constituting 65% out of the total costs. It also appeared that the company used two principles: *the number of units produced and labour hours* as the base on which it allocated the overhead costs to its manufactured products. In other words, the company used two pools to allocate overhead costs to products. To further triangulate these results, the researcher also obtained some documents from a member of staff at the mid-level of management that showed the percentages of both the overhead costs and the overall costs, and also showed the bases used to allocate the overhead costs to the manufactured products. The researcher also, accompanied by a member of staff, conducted a site visit to one of the cement factories as well as to one of the packaging factories to see for himself the semi-automated production process in these factories.

Below are some examples of the participants' responses.

One of the participants, TM1, stated:

'All the company's factories that have been maintained and modernised have approximately now become 90% automated factories. The percentage of the overhead costs is about 60% to 65% out of the overall costs allocated on the basis

of the number of units produced and the labour hours according to the type of the expenses of the final product at each phase of production''.

One more participant, MM1, said:

''Following the maintenance and modernisation process, all factories in the company have around 90% automated operation which is not as it was before when it mostly relied on manpower operation. The new machines and equipment have also reduced the rates of loss and defaults of manufacture…..... the percentage of the overhead costs is 65%, allocated to the products on the basis of the number of units produced and the labour hours according to the type of the cost''.

Moreover, the same participant also showed the researcher some financial reports that described in detail both the overhead and the direct costs and the ways in which the overhead costs were allocated to the products.

Another participant, MS1, emphasised:

''Factories are now operating in a semi-automated way following the process of maintenance and modernisation which has led to dispensing with a number of non-Libyans employees because Libyans employees are protected by law No. 15…..... as for the overhead costs, they have in fact increased and the percentage reaches up to 65% out of the total costs. In respect to the decrease in direct costs, is due to the layoff of some manpower in the factories. The rates of the loss in raw materials have also decreased and so has the energy consumption''.

ACC Case

From the responses of the participants in ACC to the above questions, it was found that all the participants confirmed that the company's factories are semi-automated with an operating percentage of up to 75%. They also stated that the percentage of the overhead costs is high constituting 55% of the overall costs. They also predicted that this percentage might even further increase once the maintenance and modernisation process in the rest of the factories in the company

is completed. Participants also confirmed that the company used two principles: the number of units produced and the labour hours as the basis for the allocation of the overhead costs to its manufactured products.

The researcher also obtained some documents from a member of staff in the company that showed the percentages of both the overhead and the overall costs and the ways by which these costs are allocated to the manufactured products. The researcher also conducted a site visit to one of the factories of the company to explore for himself the phases of product manufacturing and the raw materials used in the production.

Below are some examples of the participants' responses.
One of the participants TM1 stated that:
''The manufacturing process in our factories has now become semi-automated and the operational power of the factories has reached up to 75% and is expected to reach 90% shortly after the factories' maintenance and modernisation process is finalised..... As for the overhead costs, the percentage has now reached around 55% out of the total costs. This percentage is also predicted to increase after the maintenance and modernisation of the rest of the factories is completed, ...… the company uses two principles: the number of units produced and labour hours as a basis for the allocation of the overhead costs to its manufactured products''.

Another participant, MM1, from the mid-level of management stated:
''the percentage of the automated manufacturing process is expected to reach 85% to 90% when the current factories' maintenance and modernisation process has completed.…..... the percentage of the overhead costs has reached up to more than 55% and this percentage is also predicted to increase. We used to allocate these costs to the final manufactured products on the basis of two principles: the number of units produced and labour hours".

Yet one more participant, SM1, from the lower-level of management similarly emphasised:

‘‘75% of the manufacturing process in the factories is semi-automated. As for the percentage of the overhead costs, according to the financial report for this period of the year, it reached up to 55% out of the total costs. These costs are allocated to products on the basis of two principles: the number of units produced and the labour hours".

Discussion

From the responses of the participants in both cases, LCC & ACC, it became clear to the researcher that the manufacturing process in both companies was semi-automated. It also appeared that the percentage of the overhead costs was high compared to the total costs. Both companies were also found to use two principles, namely, labour hours and the number of units produced, to allocate the overhead costs to the products, which is not efficient as it leads to distortions in the costs. From these findings it is recommended that both companies should adopt a more accurate and a more advanced cost accounting system such as the ABC system as recommended by Brown et al. (2004), Kaplan and Cooper (1998), Bijornena (1997), Nguyen and Books (1997) and Baker (1994).

5.4.6 Usefulness and Importance of Cost Information

Changes in the manufacturing environment have made manufacturing more flexible and have increased the demand for information about the costs of products. These facts have made organizations search for alternatives to the traditional cost system to provide more information and details about product cost. The ABC system enables the management of essential information to assist in cost reduction and decision-making (Ismail, 2010). Management can obtain accurate information regarding each activity and its overhead by using the ABC systems and thus can discover the pivotal points for cost reduction. The use of the ABC system is, therefore, highly important in providing the essential information that helps organisations identify accurate and detailed costing of their products which, in turn, informs the managerial decision making process for both short and long term periods of time. The reasons for using the ABC system (instead of the traditional cost system) to provide accurate information for strategic decisions in any organization are also supported by other scholars, such as Al-Omiri (2007), Thaher (2002) and Noreen (1991).

To investigate whether or not the existing cost accounting system in the companies under investigation provides them with adequate information about the costs of their products, the participants from both companies were asked the following question:

> *Do you think the existing cost accounting system provides accurate and adequate information about the costs of products? If so, why?*

LCC Case

From the participants' responses to the question, the researcher concluded that all the participants from all levels of management in the company expressed their dissatisfaction with the information obtained from the existing traditional cost accounting system in the company. This was particularly so when taking into consideration the expansion in the factories since the existing system did not provide important information that assisted them in identifying the detailed and accurate costs of products. Participants also stated that the existing cost accounting system needed to be upgraded and innovated in order to obtain more accurate and detailed information about costs so as to help them reduce costs and assist them in decision making.

Below are samples from the responses of the participants.

One of the participants, TM1, stated that the current cost accounting system needed to be developed and he said:

''The current cost accounting system does not provide accurate information and it needs to be upgraded to obtain more details about the costs of the products, especially after the innovation that has taken place in the factories and the increase in production. This upgrade will help us control the waste costs as well as taking the right decisions regarding the pricing of the products''.

Another participant, MM1, took a similar view and said:

''The decisions on the reduction of the prices of products the company has previously taken were actually based on the information available from the existing cost accounting system which does not reflect the real costs of products, particularly when we have in mind the increase in the overhead costs that resulted from the innovation of the factories. Given this, the company should endeavour to

upgrade its costing system so as to obtain more accurate and detailed information about the overall costs and the costs of each individual product which will help us identify the reason behind the increase in the overhead costs and thereby controlling them''.

Yet another participant, SM1, said:

''The existing costing system does not provide detailed information about the costs, especially if we take into consideration the changes in the cost structure itself. The company's top management is concerned about the increase of the overhead costs which resulted from the innovation undertaken in the factories. We therefore need to upgrade or replace the existing cost accounting system with another system which can provide more detailed information about the costs of the products''.

ACC Case

As in the LCC case, the researcher noticed that most of the respondents from ACC stated that the existing cost accounting system does not provide adequate information about the costs of the products and they also stressed that the system needs to be upgraded so as to keep pace with the innovation the structure of the costs has undergone due to the modernisation that has taken place in the company's factories. The researcher also noticed, however, that two of the participants (one from mid-level management and the other from the higher level of management) provided different responses. One of them believed that the company's existing cost accounting system was suitable and did not need to be changed and that the company should not undertake extra outlay on the introduction of a new system. The other participant did not clearly explain whether the existing system provided suitable information or not.

Below are samples from the responses.

One of the participants, TM1, said:

''The existing costing system does not provide detailed information about the increase in the overhead costs which resulted after the modernisation of the company's factories. I therefore think that we need more accurate details about these costs in order to control them and take the right decisions which are based on the right and accurate information''.

Another participant, MM2, stated:

''We are accustomed to the company's existing cost accounting system and I think it provides adequate information about the costs. The company in fact badly needs to reduce not increase the costs and the use of a new system will indeed increase these costs and expenses''.

Yet another participant, SM1, said:

''According to the current cost accounting system, we calculate and analyse all the direct and overhead costs and we refer them to the company's top management. The top management is indeed aware of whether the process through this system is suitable or not to them''.

Discussion

From the responses of the participants from both companies, LCC & ACC, it was found that most of the participants (apart from two participants) stated that the existing cost accounting system does not provide adequate and detailed information about the costs, particularly concerning the increase in the overhead costs which resulted from the innovation undertaken in the companies' factories. Participants also expressed the need for upgrading the current system to obtain more detailed information about costs in order to help them analyse the increase in these costs and take the right decisions regarding costs. As for the two participants who provided different responses, one of them thought that the adoption of any new cost accounting system would increase expenses and the other participant believed that the top management was aware of the situation concerning cost information and whether or not the current system was suitable for providing such information.

From such responses, it also could be seen that the participants' demand for more detailed information about the cost increases seemed to have resulted from the modernisation and innovation of the manufacturing environment of both companies. The existing traditional costing system cannot provide enough detailed information and, therefore, it needs to be replaced by a new system such as ABC which can provide all the necessary information that helps an

organisation identify accurate and detailed manufacturing costs. It also informs the organisation's decision making process. Such findings are consistent with the recommendations of many researchers (e.g., Ismail, 2010; Al-Omiri, 2007; Thaher, 2002 and Noreen, 1991).

5.4.7 Product Diversity, Manufacturing Flexibility, and Complexity

Companies that have a wide product range have higher operational complexity. Greater product complexity and diversity increases the costing distortions arising from traditional cost systems. Product diversity includes production volume diversity, size diversity, complexity diversity, material diversity and set-up diversity (Cooper and Kaplan, 1988 and Cooper, 1988). Moreover, researchers such as Chongruksut (2005), Brown et al. (2004), Alsaeed (2003) and Cheuelal, (2001) found the same result and stated that companies with diversity in production and production lines are more likely to use the ABC system as the allocation of the overhead costs to a large number of products and production lines is more complex than the allocation to fewer products and production lines. The ABC system should be introduced to solve such problems. According to Alsaeed (2003), there is a positive correlation between production diversity and the adoption of the ABC system. Other researchers (e.g., Al-Mulhen, 2002; Kiumwiede, 1998; Bjorenak, 1997) also confirmed this finding.

To investigate whether there is diversity in the types of products manufactured in the companies under investigation and whether there is flexibility or complexity in the manufacturing process, as well as investigating whether there is diversity in the production lines, the participants from both companies were asked the following questions:

> *How many types of product does your company manufacture?*
>
> *How many production lines do you have?*
>
> *What is the degree of complexity of these products? (e.g., in terms of colour, grade, weight, etc.).*

LCC Case

From the responses of the participants at all levels of management in the company, it was found that all participants stressed that the factories of the company manufacture different types of products and these factories also have different production lines. The products are also diverse in their degree of manufacturing complexity. Some products differed in the raw materials and the ingredients and also some differed in terms of weight after packaging.

Below are some samples from the responses.

A participant, TM1, stated:

''As I have told you earlier, the company has four factories. Three of these factories manufacture both types of cement: ordinary Portland Cement and Sulphate-Resistant Cement in addition to the manufacture of Gypsum and Lime. The fourth factory manufactures cement bags. There are also two lines of production in each of the first three factories. Each product is manufactured individually after ensuring that all relevant manufacturing machines and equipment are set and that the specific temperature is set in the huge cylindrical steel rotary kiln so as to suit each product according to its type as each type of product is manufactured under certain temperatures. As for the raw materials for the manufacturing, there are both common and different materials relating to each type of product. There are also two production lines in the bags' factory to manufacture bags with different sizes according to the type and weight of the products to be packed in those bags. The production process in this factory also needs the set-up of the relevant machinery and equipment prior to manufacturing according to the type of the required bag which also requires certain sizes of paper (i.e. the raw materials) for each type of these products''.

Another participant, MM1, from one of the factories said:

''The factory manufactures three types of products, namely ordinary Portland Cement, Sulphate-Resistant Cement and Lime. Prior to the manufacturing process of each type of these products, the relevant machinery and equipment must have already been cleaned and reset immediately following the previous manufacturing process. They are set-up according to the type of the product to be

manufactured and the kiln is also heated up to a certain degree of temperature to suit the product as each product requires a certain degree of temperature for manufacturing. As for the manufacturing raw materials, there are some common materials that are used in manufacturing of more than one product. There are also some materials that are only used in the manufacturing of some particular products. These materials are added at different stages throughout the manufacturing process at the end of which the products are shipped in bulk or in bags directly to customers or stored in big silos as bulk or stored in bags. Indeed, the manufacturing process is to some extent complex. It has a number of stages and each stage requires certain materials with certain amounts. The materials are also tested by chemical and physical tests by taking samples from each stage of production to ensure compliance with the specifications and quality assurance. Materials that are not compliant with the accredited specifications are discarded. Such a fault has not happened so far following the installation of the new machinery in the factory which has reduced the materials' loss through the manufacturing process''.

A participant, MS1, who was in charge of a kiln in one of the factories also said:
''The kiln that I am in charge of has a temperature around 1,500 degrees Centigrade and it needs to be cooled down after the manufacturing of each type of product and then it is cleaned properly, reset and reheated to a certain degree of temperature to suit the manufacturing process of another product. This process takes many hours to finalise. Following the preparation of the kiln, raw materials are loaded into the kiln through a conveyor belt and some more materials are added in certain amounts according to the type of the product under manufacture. The necessary chemical and physical tests are run on these materials at all the stages of the manufacturing process''.

Another participant, SM2, from the bags factory also said:
''The factory manufactures different size of bags. The factory has two production lines to cater for the demand for the manufactured cement, and lime.....… the manufacturing raw materials are varied and they range from standard paper, fluid glue, dried glue and various inks for printing the badges on the external side

of the packing bags to show the type, weight and the specifications of relevant products''.

ACC Case

From the responses of the participants in this company, it was also found that all the participants at different level of management confirmed the diversity of the products manufactured by the company as well as the diversity of the lines of production in each factory. They also confirmed that the manufactured products are varied in diversity and complexity.

One of the participants, TM1, stated:

''The company manufactures five types of products, namely ordinary Portland Cement, Sulphate-Resistant Cement, Lime and Gypsum and bags for packing We also have a number of production lines in the factories… each product requires the manufacturing machinery and equipment to be set-up in advance according to the type of the product to be manufactured. The kiln needs to be prepared and heated up at a certain degree of temperature to suit the manufacturing process of the products. The manufacturing raw materials are varied. Some of them are used in manufacturing of only certain kinds of products and some are common and used in manufacturing of other products..... The bags factory has three lines of production and it manufactures different kinds of bags to suit the different kinds of products manufactured in the company's different factories''.

Another participant, MM1, who is in charge of one of the factories also said:

''The factory has two lines of production. We manufacture salt-resistant cement. The manufacturing process goes through a number of stages. Each stage requires the addition of certain kinds of raw materials along with the conducting of tests on these materials to ensure their compliance with the relevant specifications. This manufacturing process goes on in this way until it reaches its final stage when the products are stored or directly shipped on vehicles, either packed in bags or in bulk in tanks'' .

A participant, SM1, from the packaging unit said:

''In this unit, as you can see, the products are packed in bags and each bag contains 50kg. The packed bags then are carried on the conveyor belt to the storage units and sometimes they are kept bulk and sent via pipelines to be stored in large silos''.

Another participant, SM2, from the bags factory stated:

''The factory manufactures various packing bags of different sizes to cater for the needs of the company's manufacturing factories… the factory has three lines of production. The manufacturing machinery and equipment are set-up according to the type of the required packing bag. Standard paper raw materials are used in the manufacturing process of the packing bags. Glues and inks are also used for printing the badges."

Discussion

From the responses of the participants in both companies, LCC & ACC, it was found that both companies manufacture different types of products packed in bags of different sizes. The raw materials used in the manufacturing are varied. Some of them are used only in the manufacture of certain types of products and others are used in the manufacture of more than one product. It was also discovered that every factory in both companies has a number of lines of production and that the manufacturing process of each product goes through many stages with varying degrees of manufacturing complexity from one product to another.

These results confirmed the findings of a number of previous studies (e.g., , Chongruksut, 2005; Brown et al., 2004; Alsaeed, 2003; Cheuelal and Cooper, 2001; Kaplan, 1988) that organisations that have diversity in their products, complexity in the manufacturing of these products and diversity in the lines of production, are more likely to adopt and use the ABC system.

5.4.8 Intensity of Competition

Some researchers such as Al-Omiri and Drury (2007), Guilding and Mcmanas (2002), Simons (1990), Cooper (1988b) and Bruns and Kaplan (1987) have noted that organisations that operate in highly competitive environments have a strong

need for sophisticated cost accounting systems such as the ABC system in order to enable them to accurately estimate the costs of the products they manufacture and the services they offer to customers, since mistakes committed by the use of the traditional system in such competitive environments can be disadvantageously exploited against the organisation by other competing organisations. Moreover, competition is considered to be one of the most important factors in the business environment that has led to both accounting professionals and researchers to look for a superior cost system to help organizations to deal with this competition. To this end, Cooper (1988) suggested that companies that face strong competition should consider the adoption of the ABC system as an alternative to the traditional cost accounting system which is normally used in less competitive environments.

To investigate the degree of competition encountered by the companies in the cement sector in Libya, participants from both companies were asked the following questions:

> *To what extent does your company encounter competition in the market?*
> *Does your company export all or part of what it produces?*

LCC Case

All the participants confirmed that their company faces a high degree of competition in the market from both locally manufactured and imported products. All the participants also confirmed that their company could not export its products due to the high costs of manufacturing and the competitive prices in the global market. Below are some examples of their answers.

A participant, TM1, said:

‘‘We are facing high competition in the local market from both locally manufactured and imported products, particularly after the free market policies were adopted by the Libyan government which led to an inundation of the market with similar products especially the products imported from neighbouring countries e.g. Egypt, Tunisia and Greece. This, in turn, has caused intense competition to our prices to such an extent that we were forced to lower them more than once until they reached the lowest level with a very simple profit

margin. This also caused a reduction in our sales..... As for exportation, the company used to export part of its products but now for years we have not exported anything due the high competition in the global market''.

Another participant, TM2, stated:

''The rise in the costs of the manufacturing raw materials combined with the rise in the prices of power and manpower led to a rise in the costs of manufacturing which, in turn, affected the sales price of our products. Our competitors in the market benefitted from this situation. We are, therefore, trying to reduce the costs and ensure the quality of our products so as to survive and continue our business activities. However, the competition is still intense…we are currently selling our products in the local markets only and we do not export due the intense competition in the global market''.

A participant, MM1, spoke similarly and said:

''For the time being, we are facing great difficulties in marketing our products due to the intense competition in the local market from both locally manufactured products and imported products. Previously, the competition to our products was only caused by the locally manufactured products and we used to export part of our products but we are currently exporting nothing.…..... in the last sales report we informed the company's top management about the situation in both the local and global market as well as the decrease in our sales over the latest recent period due to the inundation of the market with competing products especially the imported products. We therefore urge the company to review the pricing policies so as to be able to compete in the market''.

ACC Case

From the responses of the participants in this company, it was also found that all the participants confirmed that there is intense competition that their company faces in the local market from both locally manufactured and imported products. All participants also stated that the company has not exported and still does not export its products due to their high costs. Below are some samples for their responses.

A participant, TM1, stated:

‘‘The marketing of our products is not the same as it previously used to be. We are currently encountering difficulties in marketing our products due to the intense competition in the local market from both locally manufactured and imported products, especially after the Libyan market has opened up to receive imported products. In fact, all Libyan factories suffer from the same problem. We requested the Libyan government to regulate the importation of products to protect the locally manufactured products but we have not heard back from them yet’’.

Another participant, MM1, said:

‘‘The intense competition in the market has forced us to lower our prices to the minimum level. If we do not reduce the costs to compete with imported products in the market, we may be forced to stop production’’.

Yet another participant, MM2, further said:

‘‘Previously, we used to have only one competitor in the Libyan local market and the sale prices were almost similar due to the fact that the sources of the manufacturing raw materials and the costs of the manpower were from the same environment. The problem we are currently facing, however, is the external competitors in the local market. The local market is currently full of various and countless imported products coming from all over the world which has created intense competition to our products’’.

Discussion

From the responses of the participants in both companies, LCC & ACC, it was found that both companies face highly intense competition in the local market due to the competition between the two companies, on the one hand, and between them and the importers, on the other hand. The importers import similar products from abroad to the local market. These imported products have placed intense competition on the local products in terms of both prices and quality, and has caused one of the companies to stop exporting its products. This competition makes it vital for the company to reconsider and review the costing system in use and adopt an alternative system so that it can identify the distortion costs so as to

dispose of them and thus reduce the overall manufacturing costs. This would help the organisation to set the right prices for its products and assist in overcoming the competition in the market. Such findings agree with what has been recommended by a number of researchers (e.g., Al-Omiri and Drury, 2007; Guilding and Mcmanas, 2002; Simons, 1990; Cooper, 1988b and Bruns and Kaplan, 1987).

5.5 The General Discussion and Validation of the Empirical Findings

The results of the study have revealed that the cost accounting system in the LCI needs to be developed by adopting the ABC system particularly as the adoption factors required for the ABC system exist within the Libyan cement environment.

To validate the research findings, the analytical framework and the proposed strategic plan for the implementation of the ABC system, a brief summary of the empirical results was sent by e-mail to five Libyan cement industry policymakers (who are involved in financial decision-making from the LCC and ACC) and to three academics who are expert in accounting and have a good knowledge about the Libyan environment. Face-to-face interviews by Skype were conducted with these eight people. The interviews were conducted by Skype because of the unsafe conditions that Libya is currently going through which constitute a danger to the researcher. Table 5.1 illustrates the participant sample.

Table 5.1: Sample of the Research Finding Validation

	Policymakers (PM)	**Academics** (AC)	**Total**
No. of participants	3 from LCC 2 from ACC	3	8

The policymakers from the LCC and the ACC and the academics were interviewed over a period of three months (25 July 2014 to 27 October 2014) on

dates/times that were suitable for them. The following questions were asked during these interviews:

- Would you please explain what your impression is of the results of the study?
- Do the results of the research match the reality of your organization?
- Are the adoption factors for the ABC system (which has been given to you alongside the summary of the study) available in your organization's environment?
- From your point of view, are there any factors that need to be added or deleted from the list of the adoption factors for the ABC system?
- What is your impression of the proposed implementation plan? Does it need some additions or modifications?
- Do you have any further comments?

The discussions between the researcher and the respondents brought forward a number of comments from the respondents that were very helpful in modifying the list of the adoption factors for the ABC system in the LCI and fitting them into an analytical framework.

From the discussions undertaken, it was clear that all the respondents agreed that the empirical results matched the reality of the situation currently in place in both LCC and ACC. The participants also suggested adding another factor into the listing of adoption factors for the ABC system which was applicable in the case of the Libyan cement environment and this was ‘compatibility between state laws and organisational policy’.

PM1 explained that ‘The Libyan Law No.15 for the year 1981, which is known as the law of ‘Employees are Partners not Earners’, has been an obstacle to the implementation of the ABC system in our company. Now after the February Revolution in Libya such laws have been cancelled because they restricted the organisations working in the Libyan environment from implementing the policies that they wish to introduce’. Additionally, he added that ‘according to these laws,

the officials of a company cannot end the services of any worker, which causes an increase in the indirect costs of products'.

Furthermore, all the participants were satisfied with the proposed implementation plan for the ABC system and they suggested that dividing the strategic plan for implementation according to the topics or phases would be more convenient to use and understand. To assist in this it would be useful to have tables to illustrate the guidelines for the strategic plan for the implementation of the ABC system in the LCI. For more details on the summary of the empirical results, the proposed plan of implementation for the ABC system and examples of participants' answers, see Appendix M.

After taking all the comments of the policymakers into consideration, the researcher decided to divide the adoption factors for the ABC system (that are appropriate for the Libyan cement industry) into three main groups incorporating: organizational factors, technological factors and environmental factors. They were placed into an analytical framework (see figure 5.1).

By comparing the theoretical adoption factors for the ABC system (gathered from the literature review) with those factors that emerged from the two case study organisations, a substantial amount of consistency was found but, after analysing and deliberating on the data collected during the fieldwork, a new factor relating to the adoption factors for the ABC system was revealed which can be termed as the compatibility between state laws and organisational policy.

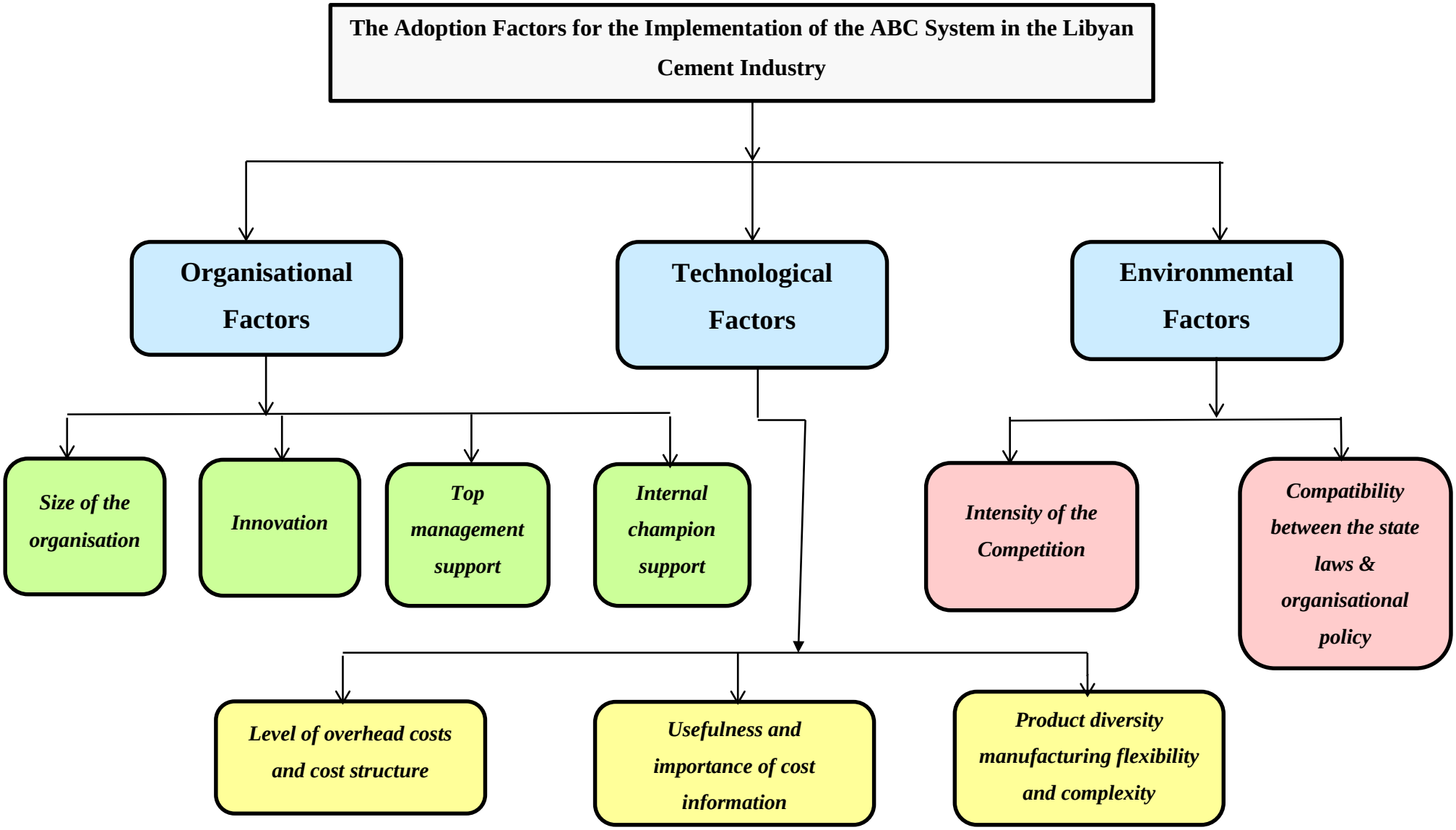


Figure 5.1: The analytical framework to the adoption factors for the implementation of the ABC system in the Libyan Cement Industry

All the adoption factors that emerged from the analysis and the deliberation of the data collected from the Libyan Cement Industry (the empirical study) can be summarised as follows**:**

5.5.1 Organizational Factors

5.5.1.1 Size of Organisation

The results of the study showed that the size of the organisation as a factor exists in both the cases under study for two reasons. The first one is the working assets which are 240 million USD for the LCC case and 361 million USD for the ACC case. The second reason is the number of employees which is 2,465 employees in the LCC case and 3,234 employees for the ACC case. This result is consistent with the results from a number of previous studies such as Naranjo-Gill (2009), Askarany and Smith (2008) Kalid (2003) and Line et al. (2001) which stated that organizations with more than 600 employees and more than 200 million USD working assets are considered large-sized organizations.

5.5.1.2 Innovation

The innovation factor exists in both cases under study due to the investment in innovations over the last three years that was undertaken in both cases to upgrade the factories and introduce new machineries and technology to improve the quality and to increase production. Moreover, there was also improvement undertaken in the management area in both cases but the cost accounting system was not included in this improvement in order to keep up with the development process that was taking place, as suggested (in cases like this) by a number of previous studies such as Askaray et al. (2008) and Baird and et al. (2004).

5.5.1.3 Top Management Support

The result showed that all levels of the management in both cases were willing to support the adoption of any new cost accounting system such as the ABC system because of:

- Recent modernisation and development of the company's factories and management departments, and

- The fierce competition the company experienced in the market which requires more details and information about products' costs in order to decrease manufacturing costs and thus decrease sale prices.

This result would help both companies if they decided to adopt the ABC. (Top management support as a factor in assisting in the implementation of ABC has been noted in previous studies by Majid and Sulaiman (2008), Liu (2007), Brown et al. (2004) and Conger (1995).

5.5.1.4 Internal Champion Support

The result of the study revealed that in the participants in both cases there were individuals among employees who had knowledge on the ABC system and expressed their readiness to support its use if the companies decided to adopt it. Such support would assist in the implementation of ABC for the following reasons:

- These employees are convinced that the system is useful for the companies.
- It will help bring the rest of the employees on board and convince them of the importance of the system in improving the cost accounting system.
- It would assist in overcoming the obstacles that might otherwise arise during the different stages of the system implementation.
- These findings corroborate the findings concerning overcoming resistance to change as reported in the literature (e.g. Baird et al., 2004; Premkumar and Potter, 1995).

5.5.2 Technological Factors

5.5.2.1 Overhead Cost and Cost Structure

The study results showed that the manufacturing process in both companies is semi-automated and the percentage of overhead costs is high compared to total costs. Moreover, both companies were also found using only two principles namely, the labour hours and the number of units produced to allocate the overhead costs to the products. From this result, it is recommended that both companies should adopt a more accurate and advanced cost accounting system such as the ABC system to avoid the costs of waste and because of its ability to

allocate overhead costs to products more accurately as recommended by Brown et al. (2004), Kaplan and Cooper (1998), Bijornena (1997), Nguyen and Books (1997) and Baker (1994).

5.5.2.2 Usefulness and Importance of Cost Information

The study results showed that most participants (92.5%) from both companies agreed that the existing cost accounting system does not provide adequate and detailed information about costs; particularly it does not provide adequate information about the increase in the overhead costs which have resulted from the innovations in the companies' factories. Two participants only (7.5%) disagreed with this finding. One of them thought that the adoption of any new cost accounting system would increase expense and the other one did not give a convincing answer.

This result confirmed the findings of a number of previous studies such as Ismail (2010), Al-Omiri, (2007), Thaher (2002) and Noreen (1991).

5.5.2.3 Product Diversity, Manufacturing Flexibility and Complexity

The study results from both cases showed that:

- Both companies manufacture a diverse range of products.
- Various raw materials are used.
- Both companies have more than one production line.
- Each product goes through many stages with varying degrees of manufacturing complexity.

According to these results, both companies should use a suitable cost accounting system, such as ABC, to determine an accurate estimation of the cost of each product as recommended by Kaplan (1988), Shield (1997), Cheuelal and Cooper (2001), Alsaeed (2003), Brown et al. (2004) and Chongruksut (2005).

5.5.3 Environmental factors

5.5.3.1 Intensity of Competition

The study results showed that intensity of competition exists due to the competition between the two companies, on the one hand, and between them and the importers, on the other hand. Importers import similar products from abroad to

the local market. This competition makes it vital for the companies to reconsider and review the costing system that they use and to adopt an alternative system such the ABC system. Such findings agree with what has been recommended by a number of researchers (e.g., Al-Omiri and Drury, 2007; Guilding and Mcmanas, 2002; Simons (1990); Cooper, 1988 and Bruns and Kaplan, 1987).

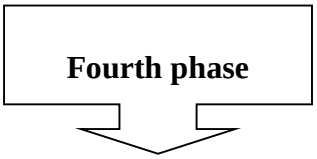
5.5.3.2 Compatibility between the state laws and organisational policy

The findings of the study revealed the existence of an important factor in the adoption of the ABC system in the Libyan cement environment, namely the compatibility between state laws and organisational policy. This factor is considered a unique factor in the adoption of the ABC system. To the knowledge of the researcher, this factor has not been referred to in any previous studies as one of the adoption factors of the ABC system.

Additionally, the study has proposed a strategic plan for the implementation of the ABC system which is represented in the six following phases:

Table 5.2: The proposed Strategic Plan for Implementation of the ABC system in the Libyan Cement Industry

The Phases	An Indication of What Each Phase Incorporates
First Phase **Establishing a Team**	The first phase represents the establishment a multi-faceted team which includes members from within different departments and activities of the LCC or ACC, such as from finance, ICT, marketing, manufacturing and from other important areas of the company. The multi-faceted team should primarily include three to six people and their main role is designing the preliminaries of the ABC system model.
Second phase **Determining Design Choices**	Before the multi-faceted team start to design the ABC system they need to take six major questions into account and answer them. These six questions are: • Is the ABC system going to be a single system or will it be assimilated with the prevailing system? • Is there a need to formally design and approve the design before it is implemented? • Which member of staff ought to take responsibility for the "proprietorship" of the ABC design? • What is the accuracy of the system going to be like? • Does the system amass chronological costs or imminent costs or both? • And, finally, should the design of the system be composite or simple?
Third phase	In order for the ABC model to work effectively, there needs to be three sets of training programmes carried out; programmes for the administration, the implementers and

Training	the users. For the ABC system to be successfully implemented in an organization, it firstly needs to be understood by the administration and, for this, effectual training needs to take place. The implementers comprise the multi-faceted team and, even though they represent their own heads of department, it is not likely that they will have complete knowledge of the ABC system prior to the team being assembled. Hence, they need to be taught about enterprise needs, software prototypes and project development. The entire workforce will use the ABC system output information and, for them to take efficient decisions, they firstly need to understand the system. Hence, training is a prerequisite for these people to make sure they understand the benefits of the system and comprehend them in their decision-making.
 ***Collecting Information***	To make sure that the ABC model is successfully implemented, the implementers primarily need to be confident about their collected information. The team should coordinate with management and collect vital, reliable and valid information to make sure that, before the ABC system is projected, the information used is actually correct.

Fifth phase **Constructing an ABC Model**	To create an accurate ABC model, the multi-faceted team needs to assess the organization's processes, resources, cost drivers, cost centres and activity centres. They then need to break them down and constitute them into flowcharts to comprehend the implication of cost distribution. The team should firstly identify the activities involved in the manufacturing processes and break them down into categories, adding whatever activities are related to the prime headings under each category. Once this is done, the resources and costs used by these actions need to be derived and it is preferable that the cost drivers that demonstrate a cause-and-effect connection should be chosen when determining both resources and cost drivers.
Sixth Phase **Post-Implementation Evaluation**	In this phase, the ABC system model needs to be evaluated after its implementation. Usually, hidden problems and interruptions occur and this stage helps in eliminating any problem that might surface and in making sure that the accumulated results are perfectly reliable.

From the outcomes ascertained by this research on the factors relating to the adoption of the ABC system in the Libya cement industry it is possible to suggest some recommendations to assist the administration of the Libyan cement companies in improving the accurate identification of the costs of production by adopting the ABC system (which will be reflected in the competitive price for the products). These recommendations will be presented in the concluding chapter which follows.

Based on the research results, it can be stated that the main contributions to knowledge by this research are presented:

- In the development of an analytical framework for the adoption factors of the ABC system in the LCI,
- By the detection of the compatibility between state laws and organisational policy as a unique factor in the adoption of the ABC system and the proposed strategic plan for implementation of ABC system in the LCI after this factor had been validated by conducting more face-to-face interviews with workers in the Libyan cement industry.

5.6 Chapter Summary

This chapter has presented the findings that have emerged from the data collected from the two case studies. Face-to-face interviews (as the main source) were supported by documentation and by the direct observations undertaken during the data-gathering exercise in order to enhance the validity of this research. Furthermore, this chapter discusses in detail the factors that should encourage the Libyan cement industry to adopt the activity-based costing system; these factors have emerged from the review of the literature and from the analysis of the findings from the two case studies.

Moreover, this chapter presents the validation of the analytical framework of the adoption factors of the ABC system in the LCI and the proposed strategic plan for the implementation of ABC system in the Libyan cement industry which was designed in the form of phases.

CHAPTER SIX
CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This chapter brings together the results, a discussion on the interviews, observations, and an analysis of the supporting documentation in order to draw conclusions on the methodology used and to identify the main results of the study.

Chapter six also covers the objectives of the research and the overall aim as stated. As a result, recommendations will be made for the future development of the Libyan cement industry.

6.1 The Success of the Research Method

This study has assessed the viability of the adoption and implementation of the ABC system as a modern cost system which measures the cost of the products accurately in the cement industry within Libya. Thus, the main aim of the study is to identify and assess the factors that would encourage the Libya cement companies (the LCC and the ACC) to adopt and implement the modern costing system which is the activity-based costing system (ABC).

In order to achieve the research aim and objectives, to answer the research questions and to maximize the quality of the case studies findings there was a need to choose the most appropriate methodology by which the research aim and objectives would be achieved. The selection of the appropriate methodology for this research came after a review of the literature on the research topic, the setting of the aims and objectives, along with an examination of the literature on research methodology.

Based on the nature of this research which needs to gather rich information from the points-of-view of the study participants (based on their experience) in order to assessed the viability of adopting ABC in the cement industry in Libya, the interpretivist philosophy was adopted as the research philosophy (see section 4.4). The case study was selected as the best strategy for this research having

considered the advice of Yin (2009) regarding the appropriateness of this strategy (see section 4.6).

In order to achieve the aim and objectives of the research, the required data was collected from two main sources: a secondary data collection method (an intensive literature review to understand the aspects of the ABC system and to gather the adoption factors for the ABC system), and a primary data collection method (semi-structured interviews, direct observation and documentation to identify the factors affecting the adoption of the ABC system in the Libyan cement companies).

Multiple sources of evidence were found to be useful because they helped to reduce uncertainty since the researcher could consult documents to verify the answers provided and then compare this information to other methods of data collection. The method of data analysis was based on the systematic analytical technique process.

6.2 Meeting the Aim and Objectives and Answering the Research Questions

The aim of this research was *"to identify and assess the viability of the adoption and implementation of ABC in the Libyan cement industry"* in order to help the Libyan cement companies strengthen their competitive position in the cement market.

The research questions were formulated as follows:

- Why does the cement industry in Libya need to adopt the ABC system?
- Are the factors that enable the adoption of the ABC system present in the cement industry in Libya?

The research questions were answered through the achievement of the objectives of the study. Additionally, the research aim was achieved effectively by addressing the research objectives as follows:

The first objective was **"**to review the literature in the area of ABC in order to have a deep understanding of the factors that help organizations to adopt the ABC system", and
The second objective was "to identify a list of these factors to use in field work in the cement industry in Libya".

To achieve these two objectives, a critical literature review was conducted and this review is discussed in Chapter Two. The following aspects were examined through the literature review: information on changes in the manufacturing environment and technological development; changes in market conditions and customer expectations and the cost accounting response to these changes. Moreover, Chapter Two presented an overview of traditional cost accounting, the deficiencies of this system and a general review of the ABC system, its design and how to implement it. Additionally, there was a review of the factors that assist in the adoption factors of the ABC system as identified in the literature published since 1987. These factors are: size of organization, innovation, top management support, internal champion support, overhead costs, cost structure, usefulness and importance of cost information, product diversity and manufacturing complexity, flexibility, and the intensity of the competition. These factors were used as a guide in collecting the relevant data for the study.

Chapter Two's discussion of the literature review addresses the first and second objectives of this research as well as providing for the enhancement and facilitation of the interpretation of the research findings. Chapter Three provided an overview of the Libyan environment where the research took place, including information on the Libyan political and economic background, the Libyan social structure and the cement companies in Libya.

The third objective was "to conduct an empirical study to examine the key factors that will help the management in the cement industry in Libya to decide to adopt or to not adopt the ABC system".

In order to achieve the third objective, multiple embedded case studies were chosen as the most appropriate research strategy (Chapter Four). Hence, 27 face-to-face semi-structured interviews were conducted with all managerial levels in the Libyan Cement Company and the Ahlia Cement Company and the data from the interviews were triangulated with other sources such as documentation and direct observation to gather relevant information on the factors that assist in the adoption of the ABC system. Then the qualitative data was analysed systematically by using thematic analysis (by coding the data, categorising the codes into themes and summarising the findings at various stages). The findings were discussed in Chapter Five under the themes: size of organization; innovation; top management support; internal champion support; overhead costs and cost structure; usefulness and importance of cost information; product diversity, manufacturing flexibility and complexity; and finally, the intensity of the competition.

The fourth objective was "to provide recommendations to the management of the cement industry in Libya to assist them in adopting the ABC system". This objective was achieved by analysis and discussion of the results in Chapter Five. The recommendations are provided later in this chapter in section 6.7.1.

Finally, by achieving the research objectives, the research aim was achieved and the two research questions were also answered.

6.3 The Main Research Outcomes

The research findings show that all the factors that assist in the adoption of the ABC system, that appeared in the analytical framework for the adoption of the ABC system (see figure 5.1), exist in both cases and thus signify that there is an infrastructure present for the implementation of the ABC system, for the following reasons:

1. Occurrence of the size of the organization adoption factor: whereby the results of the study showed that both companies have more than 200 million USD as

working capital and have more than 600 employees which means that each of them are large size companies.

2. The presence of innovation: both companies have adopted an innovation policy by installing new and high-technology equipment and machinery as well as maintaining and modernising other existing equipment and machinery to assure the quality and quantity of production as well reducing manufacturing defects and preserving the environment.
3. The existence of top management support in both companies that would encourage the adoption of any new cost accounting system such as the ABC system. This support from top management is one of the important factors in the successful adoption of ABC since the management needs more accurate and detailed information on manufacturing costs especially after innovations have taken place in both cases.
4. The existence of internal champion support from individuals amongst the employees who are familiar with the ABC system (qualified human resources). This is very important since these people could persuade other employees who have no knowledge of the ABC to accept it and to understand the importance of such a system for their organisation.
5. The increase in overhead costs which result from using new technology in the manufacturing causing distortion in the costs and thus making the existing cost system in use (a traditional cost system) ineffective and problematic for calculating the actual cost of products.
6. The urgent need for accurate product costs' information in order to make strategic decisions (e.g. pricing decisions, planning and costs controls) to overcome declines in sales and the intense competition in the market faced by both companies. The existing cost system fails to provide this kind of information; this means that it is necessary for both companies to adopt the ABC system.
7. There is diversity in the products and complexities in production as well as multiple production lines which are important reasons for both companies to adopt ABC.

8. The presence of the intense competition that faces both companies in the market has caused falling sales and is also considered as a strong motivation to adopt the ABC system.
9. The results also showed the presence of a new and essential factor for the adoption of the ABC system in the Libyan cement environment, compatibility between the state laws and company policy. Cement companies in Libya cannot adopt the ABC system due to the existence of the Law No.15 in 1981 known as the law of 'Employees are Partners not Earners' which is contrary to the policy of cement companies in the adoption of the ABC system. This law prevented companies operating in the industrial sector in Libya expelling Libyan workers because they have the right to own 10% of their company shares. However, this law was recently cancelled by the Libyan National Congress. Therefore, cement companies can now adopt the ABC system.

Moreover, the study has proposed a strategic plan for the implementation of the ABC system (in six phases) that has been extracted from the empirical works in light of the literature (see Table 5.2). The analytical framework for the adoption factors for the ABC system and the proposed strategic plan for the implementation of ABC were validated by conducting face-to-face interviews with five Libyan cement policymakers and three academics.

6.4 Originality

An original contribution to knowledge deriving from this research is the comprehensive identification of the factors that assist in the adoption of the ABC system in the Libyan cement industry. To the best of the researcher's knowledge, this study is the first to be carried out in Libya into the ABC system. It is also the first academic study of the ABC system within the cement industry.

No previous case study research examining this topic in Libya is mentioned in the literature. Therefore, this study provides a basis for the development of scientific research in this area.

Moreover, little attention has been paid to the ABC system in developing countries in general and in the Arab world in particular. Therefore, this research will add to the body of knowledge in this field because it is about the factors that assist in the adoption of the ABC system in the cement industry in Libya, an Arabic developing country.

Additionally, the few published studies available on the ABC system cover other industry sectors. This study identifies and assesses the factors that assist in the adoption of the ABC system in the Libyan cement industry and contributes to original knowledge in the field of ABC systems and thus enhances the totality of knowledge in this area.

This is the first empirical study that addresses and develops a framework of the adoption factors for ABC in the cement industry carried out in a Libyan context and thus undertaken in an Arabic country. This study has attempted to narrow the gap in knowledge within the cement industry by providing an empirical understanding of the factors that assist in the adoption of the ABC system within this environment.

6.5 Further Contributions to Knowledge

- One of the main contributions to knowledge is the identification and development of the analytical framework on the adoption factors of the ABC system that assist in the implementation of the ABC system. This framework had not existed previously in the literature. It is known that the process of implementation of the ABC system has big financial and time costs if there has been no previous evaluation on the possibility of adopting the ABC system. Therefore, the researcher believes that many organisations can benefit from the analytical framework particularly those wishing to adopt the ABC system.
- A unique factor has been identified as an adoption factor for the ABC system by this study and this factor is compatibility between state laws and company policy.

- The study also presented a proposed strategic plan for implementing the ABC system in Libyan cement companies after it has been validated.
- The lack of empirical studies on the adoption of the ABC system in Arabic countries is addressed. Moreover, to the best of this author's knowledge, none of the previous studies were carried out in a Libyan context. Therefore, this research provides additional research in this area.
- The study will aid the Libyan cement industry in identifying the changes required for implementing the ABC system in this industry.
- This research highlights the importance of ABC and will assist the Libyan cement sector in adopting and implementing ABC.
- This study will provide a useful resource for both researchers and practitioners who have an interest in understanding the design of, and the adoption factors for, the ABC system.

6.6 Limitations of the Research

Yin (2009) pointed out that every research is limited by the constraints placed upon the researcher. This research is no exception. However, in this research, every effort was made to ensure the gathering of highly reliable and valid data to achieve the research aim and objectives. Even with such a research effort, it was not possible to control all the influences that were likely to affect the quality of the research.

The limitations of this research are as follows:

- There is a dearth of documents within the cement companies and some of the case studies' documents were considered private. This has reduced the ability to confirm or refute the responses from the interviewees and clarification by triangulation of evidence was not always possible.
- Another limitation concerned the inability to tape record the interviews due to cultural constraints. This could have caused the possibility of missing some important information. However, the researcher tried to write as much as possible during the interview in order to tackle this limitation. Also, immediately after each interview the researcher spent

time writing down all the information and ideas, while they were still easy to remember.

- There is a lack of literature on the ABC system's usage within the cement industry context. This issue was considered as a limitation of the research. Moreover, there is also little literature on such studies generally conducted within Arab countries which have a similar culture and social structure, and also there are no such studies within the Libyan context.
- Some cultural and political barriers were in evidence during the interviews as a few participants seemed uncomfortable in giving certain information. In such cases the researcher used soft skills to try to make the interview sessions as relaxed as possible.

6.7 Recommendations

Based on the theoretical and the empirical results of this study, recommendations have emerged. These recommendations are presented below and have been divided into two sections: recommendations for the Libyan cement companies and recommendations for future studies.

6.7.1 Recommendations for the Libyan Cement Companies

- Both companies in the cement sector in Libya need to adopt and implement the ABC system because it will provide them with more accurate cost data for each product and will assist them in the areas of planning, control and decision making. Moreover, it will assist in confronting the intense competition that they face in the market.
- There is a need to provide the necessary financial resources for implementing the system.
- To implement the ABC system successfully, the Libyan cement policymakers could use the guidelines in this study that have been provided in the proposed strategic plan for the implementation of the ABC system. Additionally, the policy makers need to identify the main features and requirements of the ABC system before the process begins.

- Implementation of the ABC system should be gradual and undertaken in stages alongside the existing cost system, starting with one department and then moving to another until, finally, the whole company uses the system.
- It will be necessary to hold specialized training sessions for those who will use the ABC system (employees) before they start to use it in order to learn how to use it and be aware of its importance to the organization.

6.7.2 Recommendations for Future Studies

- The researcher recommends a study on the possibility of adopting the ABC system in other industrial sectors and services' sectors in Libya.
- The researcher recommends conducting an empirical study in the cement sector in Libya to compare the actual results according to both the traditional cost system and the ABC system in order to verify the accuracy of determining the cost and benefits by the ABC system.
- The researcher recommends undertaking a study to detect the difficulties and barriers that prevent the implementation of the ABC system in the Libyan environment.

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Appendix A

Academic Audit and Governance Committee

Research Ethics Panel
(REP)

MEMORANDUM

To	**Gebril Yahya Elagili**
cc:	**Dr Les Ruddock, Prof Mike Kagioglou**
From	**Jayne Hunter, Contracts Administrator**
Date	**11th March 2011**

Subject:	**Approval of your Project by REP**
Project Title:	**An investigation into the factors affecting the adoption of Activity-Based Costing systems (ABC) in the Libya cement industry**
REP Reference:	**REP11/008**

Following your responses to the Panel's queries, based on the information you provided, I can confirm that they have no objections on ethical grounds to your project on condition that the information sheet is amended to state what will happen to any data already collected should a participant choose to withdraw. Please forward a copy of the amended document to me at your earliest opportunity.

If there are any changes to the project and/or its methodology, please inform the Panel as soon as possible.

Regards,

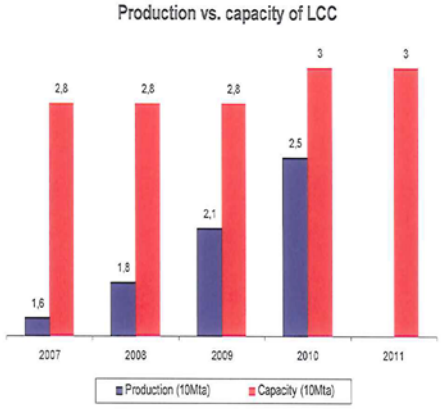
Jayne Hunter
Contracts Administrator

For enquiries please contact
Jayne Hunter
Contracts Administrator
Contracts Office
Enterprise Division
Faraday House
Telephone: 0161 295 3530 Facsimile: 0161 295 5494
E-mail: j.hunter@salford.ac.uk

Appendix B

Development of Output and Utilization

- **Focus on Increase of Output and Utilization**
  - Beside environmental improvements, productivity was the main focus of Asamer.
  - Prior to Asamer's involvement in the cement plants, production was operating at about 55% of capacity. Post take-over year (2008), production increased by 10% in the first year of the take-over.
  - Utilization was at a level of 80% by end of 2010.



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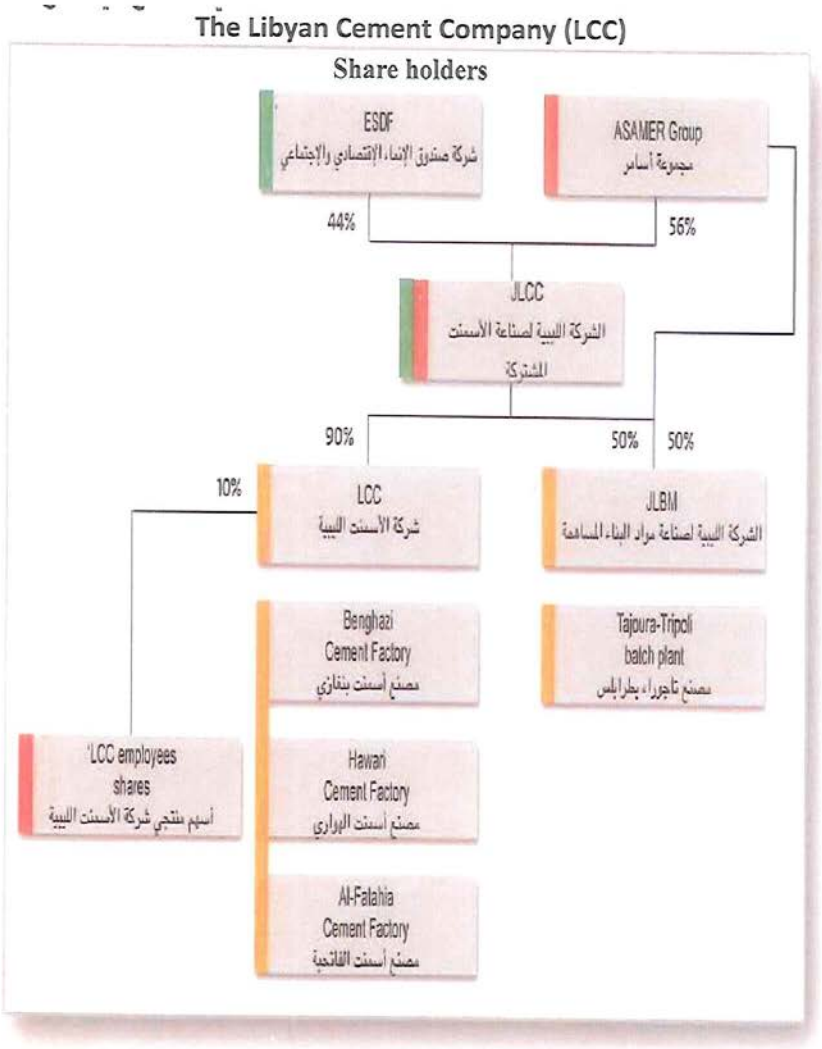
Appendix C


The Libyan Cement Company (LCC)
Share holders
ESDF
شركة صندوق الإنماء الإقتصادي والإجتماعي
ASAMER Group
مجموعة أسامر
44%
56%
JLCC
الشركة الليبية لصناعة الأسمنت
المشتركة
90%
50%
50%
10%
LCC
شركة الأسمنت الليبية
JLBM
الشركة الليبية لصناعة مواد البناء المساهمة
Benghazi
Cement Factory
مصنع أسمنت بنغازي
Tajoura-Tripoli
batch plant
مصنع تاجوراء بطرابلس
LCC employees
shares
أسهم منتجي شركة الأسمنت الليبية
Hawari
Cement Factory
مصنع أسمنت الهواري
Al-Fatahia
Cement Factory
مصنع أسمنت الفاتحية

Appendix D

The Ahlia Cement Company (ACC)

المساهمون بالشركة
Shares holders

شركة الاستثمار الوطني بنسبة (65.9%).
The National Investment Company

صندوق الإنماء الاقتصادي والاجتماعي بنسبة (32.8%).
The Economic and Social Development Fund (ESDF)

العاملون بالشركة بنسبة (1.7%).
The ACC employees

مواطنون بنسبة (0.6%).
Ordinary people

Appendix E

Interview Questions

1- *What is the value of the company's assets employed?*
2- *How many employees do you have in your company?*
3- *Has there any management and/or manufacturing innovation taken place in your company? If so,*
4- *Has there equally been a concomitant innovation in the company's cost accounting system?*
5- Are you willing to support the development of cost accounting systems in your company?
6- Do you think you company needs ABC system, if so why?
7- *Have you tried to introduce any cost accounting innovation into your company?*
8- *Do you know about the ABC system? If so, what do you think of it?*
9- *Would you support the adoption of the ABC system into your company?*
10- How would you describe the manufacturing process in your company? Is it automated, if so, to what extent?
11- What is the approximate overall percentage of the overhead costs?
12- On what basis do you allocate manufacturing overheads to products?
13- *Do you think the existing cost accounting system provides the accurate and adequate information about the costs of products? If so, why?*
14- *How many types of products does your company manufacture?*
15- *How many production lines do you have?*
16- *What is the degree of complexity of these products? (e.g., in terms of colour, grade, weight, etc*
17- *To what extent does your company encounter competition in the market?*
18- *Does your company export all or part of what it produce?*
19- *Has there any management and/or manufacturing innovation taken place in your company? If so,*
20- *Has there equally been a concomitant innovation in the company's cost accounting system?*

Appendix F

INFORMATION LETTER TO INTERVIEWEE

Dear Sir / Madam,

You are invited to participate in a PhD research conducted by Mr. Gebril Elagili at the School of the Built Environment at Salford University. Through this letter, the researcher would like to give you brief information about the research.

The research aim

The aim of this research is to investigate the factors that will encourage the cement industry in Libya to adopt the ABC and provide recommendation to the administration in this industry. Therefore, the title of the research is "An investigation into the factors affecting the adoption of Activity-Based Costing systems (ABC) in the Libya cement industry"

The target of data collection

Research will be conducted among leaderships of the top, middle management and shopfloor employees in the Libyan Cement Company and Al-ahlya Cement Company which represent the Libyan cement industry.

Confidentiality

The data collected will not be disclosed outside for any reason and those will only be used for the purposes of this research. All field notes and interview transcripts will be kept in files in a secured (locked) filing cabinet to ensure that data is kept private. Names within the field notes will be coded to protect anonymity with the de-coding information kept separately and in a secured cabinet. Further, all computer data files will be kept securely by the researcher in password protected files. All data will be destroyed as soon as practicable of the publicities of the thesis.

The benefits of the research to interviewee & organisation

The results of this study will be useful to the organisation as a whole, because ABC will expose the weakness of conventional cost allocation methods (allocate

overhead costs more accurately to products) and expand the role of accounting information; decrease the cost caused by errors in traditional costing systems; provide better cost information which required for strategic decisions.

Methods of data collection

The main method of data collection is interviews among leaderships of the top, middle management and shopfloor employees at the Libyan Cement Company and Al-ahlya Cement Company. The interview will take 20-30 minutes.

The other method of data collection is documentation that will be reviewed from the Financial Department at Libyan Cement Company and Al-ahlya Cement Company.

Finally, please note that your participation in this study is completely voluntary; you may withdraw your consent to participate at any time without explanation.

Please if you have any queries about this study, please do not hesitate to contact me by e-mail or on my address below.

Thank you in advance for your participation,

Researcher:
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University of Salford
Maxwell Building 4th Floor
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U.K

Supervisor:
Prof. Les Ruddock
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University of Salford
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Salford M5 4WT
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Appendix G

CONSENT FORM

Title of research: An investigation into the factors affecting the adoption of Activity-Based Costing systems (ABC) in the Libya cement industry.

Researcher Name: Gebril Elagili

Supervisor Name: Professor Les Ruddock

I am the below mentioned name and details and signature, I would like to give my full consent for the following:-

- I agree to take part in the interview;
- I agree to take part in the interview being tape recorded;
- I understand that the information that I am giving can be used as data for research, and the research may be used by other researchers, published and put into public domains such as the British Library, Universities' Libraries, Internet, etc;
- I understand that there are no hazards, risks or other dangers associated with this work;
- I understand that my participation is voluntary and I can withdraw at any time without giving any reason;
- I understand that I may refer to answer any particular question(s) and I am ready for that.

Name:

Position:

Organisation/Company:

Email:

Signature: .....

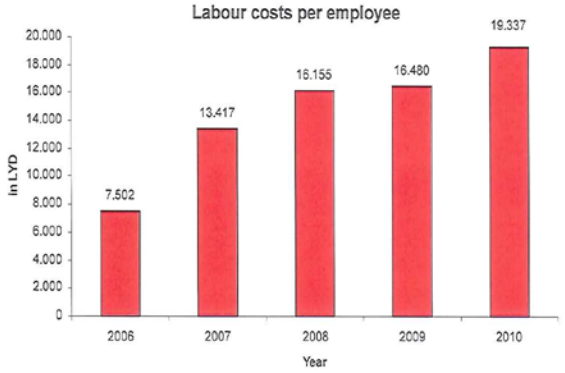
Date: .....

Appendix H

Development of SALARIES

- LCC labour costs from 2006 to 2010 - TOTAL

in LYD	TOTAL: El Fataiah, Benghazi and Hawari				
	2006	2007	2008	2009	2010
Total labour costs incl. bonus	17.158.215	31.462.054	38.982.213	42.237.459	47.491.778
Actual number of employees	2.287	2.345	2.413	2.563	2.456
Labour costs per employee	7.502	13.417	16.155	16.480	19.337



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Appendix I

الشركة الأهلية للإسمنت المساهمة
The Ahlia Cement Company (ACC)

نموذج [م.ت "9"]

الموازنة التقديرية للعمل عن السنة المالية 2011 ميلادي
Estimated working budget for the year 2011

القيمة بالألف الدينارات

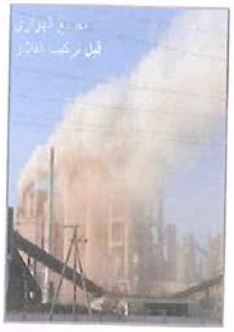
البيـــــان	عدد المنتجين	متوسط تكلفة العمل السنوية	تكلفة العمل التقديرية
تكاقة الإنتاج	Number of employees	Average annual cost of work	Estimated cost of work
مصانع الاسمنت Cement Factory	2 389	20.501	48 978
مصنع الجير Lime Factory	31	14.839	460
مصنع الجبس Gypsum Factory	84	18.904	1 588
مصنع الأكياس Bags Factory	120	22.525	2 703
الإدارة العامة General offices	261	23.892	6 236
المساعدة الفنية Technical assistances	349	44.395	15 494
إجمالي تكلفة العمل Total	3 234	23.333	75 459

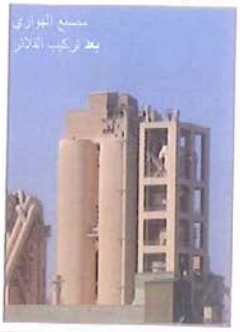
Appendix J

مشروع تخفيض الغبار في مصانع الأسمنت
Dust Reduction at LCC Plants

- تركيب فلاتر الأكياس في مصنع الأسمنت في بنغازي، هواري و الفتائح

- شركة الأسمنت الليبية استثمرت أكثر من 45 مليون يورو
- التركيز على التحسينات البيئية ← معدات تصفية وازالة الغبار مع تكنولوجية اكياس فلاتر حديثة
- النتيجة: انخفضت انبعاثات الغبار الى مستوى 10 mg/Nm³ أو أقل ←مشابه للمعايير التكنولوجية الأوروبية
- بدأ التنفيذ في عام 2008 و تم في عام 2010





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Appendix K

Return on investment

- الرئيسية
- نبذة عن الشركة
- المسجة والسلامة
- اعلانات
- البريد الإلكتروني
- اتصل بنا
- contacts

عائد نشاط الشركة

السنة Year	القيمة (Million LD) Amount
2003	12.452.521 دينار
2004	21.591.970 دينار
2005	21.597.505 دينار
2006	68.120.765 دينار
2007	50.578.480 دينار
2008	59.370.196 دينار
2009	43,719,919 دينار
2010	15.677.638 دينار
2011	(33.135.430 دينار)

مواقع تهمك

- الحكومة الليبية الإنتقالية
- شركة الاستثمار الوطني

مواقع ذات علاقة

- مدارة صناعة الإسمنت المستدامة

الرئيسية | حول الشركة | المسجة | البريد الكتروني | اتصل بنا

Appendix L

Production Volumes

- الرئيسية
- نبذة عن الشركة
- المهمة والرؤية
- إعلانات
- البريد الالكتروني
- اتصل بنا
- contacts

كميات الإنتاج

السنة Year	الكمية Volum Million Tonnes
2003	2.10 مليون طن
2004	2.47 مليون طن
2005	2.51 مليون طن
2006	2.43 مليون طن
2007	2.17 مليون طن
2008	2.5 مليون طن
2009	2.3 مليون طن
2010	1.7 مليون طن
2011	(502 الف طن)
2012	1.3 مليون طن

مواقع تهمك

- الحكومة الليبية الانتقالية
- شركة الاستثمار الوطني

مواقع ذات علاقة

- جمعية مساهمة الإسمنت السعودية

الرئيسية | حول الشركة | المساهم | البريد الالكتروني | اتصل بنا

Appendix M

(A brief summary of the current study to validate the research findings)

The title of the study is "The Adoption Factors of the Activity Based Costing (ABC) System in the Libyan Cement Industry"

Introduction

This study is an academic research. The researcher aims through it to obtain a PhD degree in cost accounting by displaying a realistic problem and finding a resolution, even a partial resolution.

Managerial, technical and financial problems that Libyan cement companies have suffered, and are still suffering, reflect on their productivity and competitiveness (Elmagri, 2013; Binsaoud, 2002). Therefore, this study has focused on finding a resolution from the financial aspect in order to reduce the problems of the cement companies in Libya. One reason for the interest in this area is that the academic specialisation of the researcher is accounting.

The literature relevant to the study has been deeply studied and it has been observed that the ABC system is relatively new because it commenced in the late 1980s. The implementation of the ABC system has achieved remarkable results in accurately assessing costs, which had an impact on sale prices and led to the improvement in profitability (Bisbe et al., 2007). The most important reason for the appearance of the ABC system is the intense competition that faces the contemporary industrial organizations (Roztocki, et al., 1999). Therefore, current organizations need to manufacture high-quality products with less cost in order to be able to compete and this is only possible when rational decisions are taken based on accurate information about the costs. The traditional costing system cannot provide accurate information about costs (Johnson, 1991), thus most industrial organisations have tended to adopt the ABC system after a confirmation of the possibility of its implementation (Ashour, 2007). Therefore, the main aim of the study is "to identify and assess the viability of the adoption and

implementation of ABC in the Libyan cement industry and to provide recommendations to the management about its implementation".

To achieve the aim of this study, the following objectives have been formulated:

- To review the literature in the area of ABC in order to have a deep understanding of the factors that will help organizations in the adoption of the ABC system;
- To identify a list of these factors to use in field work in the cement industry in Libya;
- To conduct an empirical study to examine the key factors that will help the management in the cement industry in Libya to adopt or to not adopt the ABC system;
- To provide recommendations to the management in the cement industry in Libya to help them to adopt the ABC system.

As the aim and objectives of this research need to be informed by a series of research questions, the following questions have been formulated to achieve these objectives:

- Why does the cement industry in Libya need to adopt an ABC system?
- Are the factors that enable the adoption of the ABC system present in the cement industry in Libya?

The adoption factors for the ABC system have been gathered from the literature published since 1987 for the purpose of assessing the possibility of implementing the ABC system in cement companies in Libya. Because the process of implementation of the ABC system is a complex process and takes a lot of time, money and efforts (Dorgham, 2007) most of the previous studies have preferred studying the possibility of adopting ABC system before starting the actual implementation of the system (Ashour, 2007).

According to the adoption factors for the ABC system that have been gathered from the literature, the interview questions have been established. Thus, data

provided by the field study have been collected by conducting interviews with a number of top, middle and shop floor management from the LCC and the ACC. Then the data have been analysed by using thematic analysis. Finally, a number of findings have been reached as follows and they need validation by you.

Research findings

The research findings show that all the factors that assist in the adoption of the ABC system exist in the Libyan Cement Company (LCC) and in the Ahlia Cement Company (ACC) and they have been assembled in an analytical framework as annexed below. Also, the results of the study have revealed that there is an infrastructure that assists in implementing the ABC system and the factors that make up this infrastructure are given below.

Organizational Factors

There are organizational factors that are required for the adoption of the ABC system and the four main ones are: size of organisation, innovation, top management support, and internal champion support.

Size of Organisation

The results of the study showed that the size of the organisation, as a factor, exists in both the cases under study for two reasons. The first one is the working assets which are 240 million USD for the LCC case and 361 million USD for the ACC case. The second reason is the number of employees which is 2,465 employees in the LCC case and 3,234 employees for the ACC case. This result is consistent with the results from a number of previous studies such as Naranjo-Gill (2009), Askarany and Smith (2008) Kalid (2003) and Line et al. (2001) which stated that organizations with more than 600 employees and more than 200 million USD working assets are considered large-sized organizations.

Innovation

The innovation factor exists in both cases under study due to the investment in innovation made over the last three years by both cases to order to upgrade the factories and to introduce new machinery and technology to improve quality and

to increase production. Moreover, there has also been improvement undertaken in the management area in both cases but the cost accounting system was not included in this improvement in order to keep up with the development process that was taking place (as suggested (in cases like this) by a number of previous studies such as Askaray et al. (2008) and Baird and et al. (2004)).

Top Management Support

The results showed that all levels of the management in both cases were willing to support the adoption of any new cost accounting system such as the ABC system because of:

- Recent modernisation and development of the company's factories and management departments, and
- The fierce competition the company has experienced in the market which requires more detail and information about products' costs in order to decrease manufacturing costs and thus decrease sale prices.

This result would be of help to both companies if they decided to adopt the ABC. (Top management support as a factor in assisting in the implementation of ABC has been noted in previous studies by Majid and Sulaiman (2008), Liu (2007), Brown et al. (2004) and Conger (1995).)

Internal Champion Support

The results of the study revealed that, within the participants in both cases, there were individuals amongst the employees who had knowledge of the ABC system and expressed their readiness to support its use if the companies decided to adopt it. Such support would assist in the implementation of ABC for the following reasons:

- These employees are convinced that the system is useful for the companies.
- It would help bring the rest of the employees on board and convince them of the importance of the system in improving the cost accounting system.

- It would assist in overcoming obstacles that might arise during the different stages of the system implementation.
- These findings corroborate the findings concerning overcoming resistance to change as reported in the literature (e.g. Baird et al., 2004; Premkumar and Potter, 1995).

Technological Factors

The technological factors for adopting the ABC system involve three factors: overhead cost and cost structure, usefulness and importance of cost information, and product diversity, manufacturing flexibility and complexity.

Overhead Cost and Cost Structure

The study results showed that the manufacturing process in both companies is semi-automated and the percentage of overhead costs is high compared to total costs. Moreover, both companies were also found to be using only two principles namely, the labour hours and the number of units produced, to allocate the overhead costs to the products. Stemming from this result, it is recommended that both companies should adopt a more accurate and advanced cost accounting system such as the ABC system to avoid the costs of waste and because of its ability to allocate overhead costs to products more accurately, as recommended by Brown et al. (2004), Kaplan and Cooper (1998), Bijornena (1997), Nguyen and Books (1997) and Baker (1994).

Usefulness and Importance of Cost Information

The study results showed that most participants (92.5%) from both companies agreed that the existing cost accounting system does not provide adequate and detailed information on costs. In particular, it does not provide adequate information about the increase(s) in the overhead costs which have resulted from the innovations in the companies' factories. Two participants only (7.5%) disagreed with this finding. One of them thought that the adoption of any new cost accounting system would increase expense and the other one did not give a convincing answer. This result confirmed the findings of a number of previous

studies such as those by Ismail (2010), Al-Omiri, (2007), Thaher (2002) and Noreen (1991).

Product Diversity, Manufacturing Flexibility and Complexity

The study results from both cases showed that:

- Both companies manufacture a diverse range of products.
- Various raw materials are used.
- Both companies have more than one production line.
- Each product goes through many stages with varying degrees of manufacturing complexity.

Because of these results, both companies should use a suitable cost accounting system, such as ABC, to determine an accurate estimation of the cost of each product as recommended by Kaplan (1988), Shield (1997), Cheuelal and Cooper (2001), Alsaeed (2003), Brown et al. (2004) and Chongruksut (2005).

Environmental factors

The adoption factors for the ABC system comprise two environmental factors: intensity of competition and compatibility between state laws and organisational policy.

Intensity of Competition

The study results showed that an intensity of competition exists due to the competition between the two companies, on the one hand, and between them and importers, on the other hand. Importers import similar products from abroad to the local market. This competition makes it vital for the companies to reconsider and review the costing system that they use and to adopt an alternative system such the ABC system. Such findings agree with what has been recommended by a number of researchers (e.g., Al-Omiri and Drury, 2007; Guilding and Mcmanas, 2002; Simons (1990); Cooper, 1988 and Bruns and Kaplan, 1987).

Compatibility between state laws and organisational policy

The findings of the study revealed the existence of an important factor in the adoption of the ABC system in the Libyan cement environment, this factor being the compatibility between state laws and organisational policy. This factor is considered as a unique factor in the adoption of the ABC system. To the best knowledge of the researcher, this factor has not yet been referred to in any previous studies as one of the adoption factors for the ABC system.

The proposed strategic plan for the implementation of the ABC system in the Libyan Cement Industry

The study has proposed a strategic plan for the implementation of the ABC system which is represented in the six following phases:

First Phase (Establishing a Team): This phase represents the establishment of a multi-faceted team which includes members from different departments and activities within the LCC or ACC, such as finance, ICT, marketing, manufacturing, and from other important areas of the company. The multi-faceted team should primarily include three to six people and their main role is designing the preliminaries for the ABC system model.

Second Phase (Determining Design Choices): Before the multi-faceted team starts to design the ABC system they need to take six major questions into account and answer them:

- Is the ABC system going to be a single system or will it be assimilated with the prevailing system?
- Is there a need to formally design and approve the design before it is implemented?
- Which member ought to take responsibility for the "proprietorship" of the ABC design?
- What is the accuracy of the system going to be like?
- Does the system amass chronological costs or imminent costs or both?
- And, finally, should the design of the system be composite or simple?

Third Phase (Training): In order for the ABC model to work effectively, there needs to be three sets of training programmes carried out for the administration, the implementers and the users. For the ABC to be successfully implemented in an organization, it firstly needs to be understood by the administration and, for this, effectual training needs to take place. The implementers comprise the multi-faceted team and even though they represent their own heads of department it is not likely that they will have complete knowledge about the ABC system prior to the team being assembled. Hence, they need to be taught about enterprise needs, software prototypes and project development. The entire workforce is associated with using the ABC

system output information and, for them to take efficient decisions they firstly need to understand the system. Hence, training is a prerequisite for these people to make sure they understand the benefits of the system and comprehend them in their decision-making.

Fourth Phase (Collecting Information): To make sure that the ABC model is successfully implemented, the implementers primarily need to be confident about their collected information. The team should coordinate with management and collect vital, reliable and valid information to make sure that, before the ABC system is projected, the information used is actually correct.

Fifth Phase (Constructing an ABC Model): To create an accurate ABC model, the multi-faceted team needs to assess the organization's processes, resources, cost drivers, cost centres and activity centres. They then need to break them down and constitute them into flowcharts to comprehend the implication of cost distribution. The team should firstly identify the activities involved in the manufacturing processes and break them down into categories, adding whatever activities are related to the prime headings under each category. Once this is done, the resources and costs used by these actions need to be derived and it is preferable that the cost drivers that demonstrate a cause-and-effect connection should be chosen when determining both resources and cost drivers.

Sixth Phase (Post-Implementation Evaluation): In this phase, the ABC system model needs to be evaluated after its implementation. Usually, hidden problems and interruptions occur and this stage helps in eliminating any problem that might surface and in making sure that the accumulated results are perfectly reliable.

Appendix N

(An example of the coding that used in the thematic analysis)

Themes	**Codes**
Size of the organization	Participants of case A (LCC) responded to this theme by providing relevant documents showing that the production working assets in the company were LYD 363 million (290 million USD) and the current number of employees at different levels of employment in the company was 2,465. This means, the company is a large-sized company. ACC participants responded to the questions of this theme by providing relevant documents which also showed that the company is a large-sized company as its working capital was LYD 408 million (326 million USD) and the number of employees was 3,234 at different levels of employment. Accordingly, the company is a large-sized company.
Innovation	*"We restructured and developed the company's different departments and we improved the means of communication between these departments. We also upgraded and modernised the factories to improve quality and to increase production and also to reduce manufacturing defects. The production level used to be 1.5 million tonnes per year but it has currently, following the modernisation process, reached 2.5 million tonnes per year and the plan is to reach 3 million by the end of 2011..... As for the company's cost accounting system, we have not yet upgraded it'' TM1-LCC.* *''We took over the management of the company back in 2008. Since then we have set up a multi-phase plan to upgrade and modernise the company's factories and to modernise the system of management in order to improve the quality and to increase production. We have so far*

	spent LYD 200 million in this respect. Among the developments we have made, was the replacement of the dust filters with up-to-date technology filters compliant to the European technological criteria which help preserve the environment by reducing the level of the emission of dust…… as for the company's cost accounting system, we have not yet upgraded it '' TM2-LCC. *''Indeed the company has upgraded the level of production which previously did not exceed 1.5 million tonnes per year and it has now exceeded this level and reached 2.5 million tonnes per year. The company has also organised intensive training sessions for all employees to familiarise them with the operation of the new and advanced machines in the factories" MM1-LCC.* *"The new management has set up a new organisational structure, in line with its new policy, to improve the performance and the means of communication between employees in different departments, levels of management and factories. The management has also modernised and upgraded the factories to assure the high quality of the products which are currently experiencing fierce competition in the market" MM2-LCC* *''The cement packaging factory has recently been fully modernised. Previously, we used to experience a lot of faults in the factory. There were also big losses in the quantity of the paper used for manufacturing. However, following the maintenance and modernisation process, the factory has now become semi-automated and there are almost no manufacturing defects anymore'' SM5-LCC.* *''The company has set up a plan over the last few years to innovate and renew its factories in order to improve the quality of the products and to increase the level of*

	production. However, due to the fierce competition that our products experience in the market and also due to the arrival of parallel competing imported products in the market following the lifting of the UN imposed economic embargo on Libya, prices went down and so did our sales which, in turn, led to a decrease in the company's profits from LYD 95 million in 2008 to LYD 15 million in 2010 and sales from 2.5 million tonnes in 2008 to 1.7 million tonnes in 2010 ... as for our financial system, no, we have not upgraded it'' TM1-ACC. *''The company has renewed and developed some of the factories and work is still underway to develop some more factories in order to improve the quality of the products and to increase the level of production" TM2- ACC.* *''In the past, we used to sell all our products and we used to have a long waiting list of orders for our products. Customers used to wait for many months for us to get their order ready for them. However, after the Libyan market was opened up to imports from abroad, following the lifting of the UN imposed economic embargo on Libya, foreign cement, imported from neighbouring and other countries, with cheaper prices than ours, has arrived in the market. This made us rethink the costs, how they accrue and we are reconsidering the cost accounting system''MM1-ACC.* *''The factory has been maintained and new high-tech equipment has been installed. Some environment-friendly dust filters have also been installed and they are now under test. Such equipment will help reduce the manufacturing defects as well as the number of the employees since the systems are now semi-automated'' SM1-ACC.*

	‘‘The newly installed equipment and machines will save much time in the production process since they are speedy. Moreover, since these machines are high-technology and flexible machines, the time spent on the set-up of the machines to manufacture various products will be significantly reduced compared to the past when more much time and efforts were spent on this process’’ SM2-ACC.