THE ADOPTION OF AN ENHANCED OVERHEAD COSTING SYSTEM IN A SOUTH AFRICAN STATE UNIVERSITY: THE CASE OF DURBAN UNIVERSITY OF TECHNOLOGY

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DECLARATION

I, Annah Kudanga, declare that this dissertation is a representation of my own work in conception and execution. This work has not been submitted in any form for another degree at any university or institution of higher learning. All information cited from published or unpublished works have been acknowledged.

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ABSTRACT

Budgetary constraints associated with freezing of fees and limited government funding have increased the pressure to reform cost management strategies in state-funded South African universities. The main concern is that the data being generated in the allocation of overheads in universities is distorted and inaccurate. Activity based costing (ABC) could help solve these problems. However, there is a lack of empirical studies regarding the adoption and implementation of the ABC system in South African state universities. The aim of this study was to determine and analyse the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in SA, using Durban University of Technology (DUT) as a case study.

A mixed methods approach was used which included a questionnaire and interviews. The study adopted the embedded mixed methods approach beginning with the quantitative method (questionnaires) that involved a detailed exploration of the current costing system used at DUT and the perceptions on the factors that facilitate or hinder the adoption and implementation of ABC. This was followed with the qualitative method that used semi-structured interviews conducted with employees from the finance and the selected academic departments. A detailed study was then carried out in the university library to determine activities, cost pools and cost drivers that could be used to develop an ABC model. The quantitative and qualitative data were analysed using the Statistical Package for Social Sciences (SPSS) (version 25®) and NVivo, respectively.

The study showed that DUT is using a traditional costing system. A uniform cost base (number of students) is being used to assign most of the overhead costs to respective programmes. The findings of this study indicated that ABC has not been adopted at DUT. There was little support on the adequacy, transparency and accuracy of the current overhead costing system. Despite these shortcomings of the current system, more than half of the respondents agreed that changing the overhead costing system is not a strategic priority in the university. Perceptions regarding ABC showed that five out of eight themes developed could assist in the adoption and implementation of the ABC system. Supportive factors that could positively influence the adoption and

implementation of ABC at DUT included the organisational strategy, information technology, decision usefulness of cost information, contextual/environmental factors and the organisational structure. However, system adaptability, which included adequacy of skills, top management involvement and consensus about and clarity on the objectives of the ABC system, was considered a barrier to the adoption and implementation of ABC. There were mixed views on the technical factors as well as some behavioural and organisational factors. The perceptions investigated in the in-depth interviews revealed resistance to change emanating mainly from perceived complexity, associated prohibitive cost of implementing the ABC system and uncertainty of the long-term benefits of the ABC system. The detailed study in the university library showed that the activities recorded could be grouped into cost pools and activity-related cost drivers could be used to apportion services to university programmes. The information that could potentially be used to initiate ABC was, therefore, available. Based on this information, an ABC model was developed.

Overall, the findings of the study help to understand the current overhead system at DUT as well as perceptions on the factors that influence the adoption and implementation of ABC. The information could inform strategic initiatives related to ABC and the model developed for the university library could be used as a template for a university-wide ABC implementation.

LIST OF ACRONYMS

ABC	Activity Based Costing
CIMA	Chartered Institute of Management Accountants
CHE	Council of Higher Education
DHET	Department of Higher Education and Training
DUT	Durban University of Technology
FMS	Flexible Manufacturing Systems
FTE	Full Time Equivalent
HE	Higher Education
HESA	Higher Education South Africa
IREC	Institutional Research Ethics Committee
IMA	Institute of Management Accountant
IT	Information Technology
JIT	Just In Time
JSE	Johannesburg Stock Exchange
KZN	KwaZulu-Natal
HOD	Head of Department
MAS	Management Accounting System
MIS	Management Information System
NFF	New Funding Framework
OAR	Overhead Allocation Rate
PCA	Principal Component Analysis
PESTLE	Political, Economic, Social, Technological, Legal and Ethics
SA	South Africa
SAPSE	South African Post-Secondary Education
SPSS	Statistical Package for Social Sciences
TDABC	Time-driven Activity Based Costing
TQM	Total Quality Management
TVETS	Technical and Vocational Education and Training
UoT	University of Technology
UK	United Kingdom

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CHAPTER ONE
INTRODUCTION

1.0 INTRODUCTION

This chapter introduces the study focusing mainly on the background of the study, the statement of the problem, aim and objectives, and justification for the investigation. In addition, the chapter provides a theoretical framework guiding the study, as well as the scope and the key methodology upon which the study was based. The chapter also provides an overview of the chapters highlighting how the rest of the thesis is structured.

1.1 BACKGROUND TO THE STUDY

In 2015, South Africa (SA) had the biggest student protest since apartheid ended in 1994. This was after universities proposed that they needed to increase fees by up to 11 per cent. At the time, tuition fees varied across different public universities in SA, but could be as high as R60 000 (US$3 660) per annum for medical students (Aislinn 2015). The fee increases were seen as negatively affecting the poorly resourced and poorly managed bursary system for underprivileged students. Consequently, in October 2015, the president ruled out any increases in university fees for the year 2016 (Milton 2015).

When the universities in SA proposed to raise fees, they cited reasons such as a 'shortfall in government funding along with growing wage bills, a weakening currency and a need to keep up academic standards' (Aislinn 2015). Universities in SA are now pressured to attract external third stream funding due to the increasing competition for limited government funding among institutions. In addition, proper management of escalating costs as well as being cost efficient is now more imperative in these state universities.

Historically, many universities across the globe were either government owned monopolies or operated in highly regulated, protected and non-competitive environments. Cost increases could merely be absorbed by increasing the tuition fees.

Little attention was therefore given to developing cost systems that precisely measured the costs and profitability of individual services or programmes (Drury 2011: 236). However, universities now operate in a complex and highly competitive environment where a wider product range or variety of programmes as well as broader and higher qualifications are being offered, as compared to previous years. Given this background, universities are now being forced to accept the real pressures of a competitive market place and may now have to follow similar patterns of costing as employed by other sectors. Furthermore, universities now generally face a similar challenge as manufacturing firms, in that a large proportion of their service costs are increasing overheads or indirect costs (Naidoo 2011: 109). Support costs, such as Information Technology (IT), financial aid, library, security, admissions, examinations and student services that were previously considered as fixed and irrelevant in decision making have become increasingly important areas of resource consumption. These changes demand more accurate cost allocation techniques.

In the late 1980s, most institutions were relying on cost and management systems that had been designed primarily for meeting external financial accounting requirements (Johnson and Kaplan 1987: 28). These systems were designed decades ago when information processing costs were high and precluded the use of more sophisticated methods of assigning indirect costs to products. Such systems are still widely used today in a number of universities (Papadeas 2013: 1439; Naidoo 2011: 110). The main challenge is that these traditional costing systems usually depend on a single, volume-based cost driver, i.e., an activity that causes costs to increase. These traditional cost and management systems rely extensively on arbitrary cost allocations, which may be sufficiently accurate for meeting external financial accounting requirements, but not for internal cost and management purposes. Johnson and Kaplan (1987: 28) concluded that management accounting practices have followed and become subservient to meeting external financial accounting requirements.

Studies have shown that universities usually apportion their costs based on responsibility centres, such as departments, schools or faculties (Krishnan 2006: 77). These departments allocate revenue from the central budget to carry out their operations. Certain costs can be traced to a service, but most costs have to be

allocated (Krishnan 2006: 77). This may lead to inaccurate cost information being used in decision making, planning and cost control. However, a number of cost management tools are now potentially available (Ellis-Newman 2003: 333) to help universities in controlling costs when dealing with reduced revenues. Course costing or activity based costing, such as; Activity Based Costing (ABC) could be a useful management device.

According to the Chartered Institute of Management Accountants (CIMA 2008: 4), The concept of ABC was first defined in the late 1980s by Robert Kaplan and William Burns and was proposed as an alternative to the traditional treatment of overhead costs. Lucey (2009: 19) defines ABC as a new approach to internal cost accounting that involves analysing, recording, controlling and reporting on the costs and wider performance of activities, rather than the traditional narrow emphasis on the costs of departments and cost centres. In essence, ABC focuses attention on the costs of various activities required to produce a product or service and assigns these indirect costs to cost objects, such as; products or services, based on activities performed for the cost objects (Baird, Harrison and Reeve 2004: 395).

The ABC system seeks to reduce the level of arbitrary cost allocations associated with traditional costing systems and consequently gives more accurate product costs (Baird *et al.* 2004: 395). It recognises that numerous indirect costs vary in proportion to changes in activities, rather than the measure of production volume utilised as the absorption base in the traditional system. As ABC identifies the activities that cause costs to change and thus assigns costs to products or services based on the cost driver usage, it is claimed it measures the resources consumed by products or programmes more accurately (Lucey 2009: 19). In addition, Drury (2011: 238) argues that ABC can be used for a range of cost management applications, such as business process management, value analysis, cost reduction, activity based budgeting, performance measurement, benchmarking of activities, business process re-engineering and customer profitability analysis. While traditional costing allocates overhead costs on a single activity base for an entire department or university, ABC assigns manufacturing overhead costs based on various departmental activities. This helps management to: 1. determine the cost of providing a service; 2. understand what

causes the costs to be incurred; 3. identify inefficient programmes, activities and departments; 4. allocate more resources on profitable degrees, departments and activities; 5. control the costs at an individual product or programme level; and 6. fix the price of activities or services scientifically (Lucey 2009: 106).

A costing system based on the ABC model could help state universities in SA to understand the cost and value of overheads and service activities that are essential to control, especially in an environment with escalating operational costs and stagnant revenues. However, the adoption and implementation of such a system is not always straightforward (Fei and Isa 2010: 144; Cropper and Cook 2000: 66). A number of factors influence the adoption and implementation of sophisticated costing methods, such as ABC (Baird *et al.* 2004; Cooper, 1990; Cooper and Kaplan 1992, Shields 1995; Shields and Young 1989).

1.2 RATIONALE FOR THE STUDY

Budgetary constraints associated with freezing of fees and limited government funding have increased the pressure to reform cost management strategies in state-funded South African universities (Naidoo 2011: 114). The revenues or funding of universities has remained low due to freezing of fees or government regulated fee increases (Aislinn 2015). Due to limited funding, in the form of government funding and tuition fees, it is now a challenge for universities to manage the cost side of their budgets (Naidoo 2011: 114, Trussel and Bitner 1998: 447). Universities need to have more timely, accurate and precise knowledge of all their costs (Naidoo 2011: 115; Ellis-Newman 2003: 334). It is now important for university costing systems to effectively and reliably determine the total costs of providing courses and related services, that is, both direct and indirect costs (Ellis-Newman 2003: 333). An enhanced costing system, such as, ABC could be a solution towards effective cost management (Naidoo: 2011: 110).

There is a lack of empirical studies regarding the adoption and implementation of the ABC system in South African state universities. Two studies have been carried out on ABC in the Higher Education sector in SA. One study investigated the implementation of ABC in Technical and Vocational Education and Training (TVET) colleges (Madwe

2017: 226) and another investigated the use of activity based costing to manage private universities in SA (Naidoo 2011: 110). There has been no empirical investigation indicating the impact of strategy, technical, organisational structure, environmental/contextual factors, decision usefulness of cost information, behavioural and organisational factors on the successful implementation of ABC in a state university. This study will explore how these factors influence the adoption and implementation of ABC systems in a South African state university, namely, Durban University of Technology (DUT).

Therefore, this study focuses on the analysis of the factors that influence the adoption and implementation of an enhanced overhead costing system, namely, ABC in a South African state university, using DUT as a case study. It seeks to determine the perceived benefits and barriers of ABC and the reasons why the ABC system has not yet been readily adopted and implemented in state universities. In addition, this study seeks to identify cost activities, cost pools as well as relevant cost drivers of a selected department in the university as these components form an outline of an ABC system (Lucey 2009: 18) and have largely been neglected in previous studies that focused on ABC in the higher education sector. Recommendations from this current research may help in the management of overhead costs within DUT as it deals with limited revenues associated with reduced government funding, freezing of fees and government regulated fee increases. Ultimately, this cost information may improve the future financial performance of DUT.

1.3 STATEMENT OF THE PROBLEM

A number of universities are still using traditional costing systems that usually depend on a single, volume–based cost driver, usually student numbers (Papadeas 2013: 1439; Naidoo 2011: 110). The use of traditional costing methods leads to distorted and inaccurate cost information being used in cost control, planning, performance evaluation and decision making (Cooper and Kaplan 1988: 22; Drury 2011: 50; Lucey 2009: 21). There is therefore a growing concern that the data being generated in the allocation of overheads in universities is distorted and inaccurate (Naidoo 2011: 115; Ellis-Newman 2003: 334). It also implies that a proper analysis of costs and their respective cost drivers is lacking. The distortion in costs often arises because an

existing costing system does not reflect the increasing complexities, advanced technology and different programmes and services that are now offered by universities (Papadeas 2013: 1431).

Traditional costing systems usually exclude support costs. Hence, support costs, such as library, admissions, financial aid, examinations student services and IT are usually considered fixed costs and are treated as fixed and irrelevant for most decisions (Pavlatos and Paggios 2009: 514). However, many support costs can be related directly to programmes and these costs have become a more significant proportion of total costs in universities. In addition, in the traditional costing systems, such costs are allocated on some arbitrary basis, usually based on the number of students instead of being allocated based on some reliable basis. This makes it difficult to identify modules or programmes, which are under-priced, loss making, self-sustaining or overpriced. Ultimately, the level of tuition or pricing is usually based on what the market will bear or on competitors' moves. Where costs are considered, it is often only the incremental or short-term costs, with little consideration given to long-term indirect costs which may be considerable expenditures (Ellis-Newman 2003: 334). In short, there is no proper tool that effectively measures the accuracy of the overhead or indirect costs consumed by cost objects (specific programmes).

Unlike traditional methods, ABC separates overhead costs into different cost categories or cost pools with homogeneous activities, and allocates them to cost objects based only on the activities performed for them (Baird *et al.* 2004: 395). ABC has high-level accuracy, low cost of errors (mitigates over-costing and under-costing) and offers an opportunity to eliminate non-value adding activities (Cooper and Kaplan 1988: 26). The ABC system is also more accurate in determining the services offered in universities compared to traditional costing (Ali 2012: 96; Manuel 2011: 10; Naidoo 2011: 4). Therefore, there is need to adopt ABC as an enhanced overhead costing system. Despite all these positives, ABC has not yet been widely implemented or adopted in South African universities (Papadeas 2013: 1439; Naidoo 2011: 110) and there is no indication of its adoption or implementation at DUT. While there is wealth of literature on ABC, (Madwe 2017: 226; Hashim 2015: 16; Aldukhil 2012: 130; Ali 2012: 96; Manuel 2011: 10; Naidoo 2011: 109; Krishnan 2006: 77) with some studies

concentrating on factors influencing ABC success especially at the implementation stage, no investigation has been conducted in this regard in South African state universities.

1.4 AIM AND OBJECTIVES OF THE STUDY

The study investigates the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in SA, using DUT as a case study. It seeks to determine the perceived benefits of and barriers to ABC adoption and implementation in DUT. In addition, the study seeks to identify cost activities, cost pools as well as relevant cost drivers of a selected department in the university as these are the requirements in designing an ABC model. Clarifying the conceptual distinction between cost activities, cost drivers and cost pools of an organisation is an essential stage in developing an ABC system (Cropper and Cook 2000: 66). These components that form an outline of an ABC system (Lucey 2009: 18) have largely been neglected in previous studies on ABC in the higher education sector in SA.

1.4.1 Aim of the study

The aim of the study is to determine and analyse the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in SA, using DUT as a case study.

1.4.2 Study objectives

To achieve the above aim, the following study objectives are set:

- to investigate the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA;
- to determine the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT; and
- to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected department at DUT.

1.4.3 Research questions

The following research questions follow from the objectives

1. What is the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA?
2. What are the barriers to and the factors that influence the adoption of ABC in a South African state university, using DUT as a case study?
3. What are the cost activities, cost drivers as well as relevant cost pools of a selected department in the university?

1.5 SIGNIFICANCE OF THE STUDY

Funding sources for state universities in SA are limited and this gives rise to competition amongst universities for extra funds both from the government and private sector. ABC gives universities a link to program inputs and outcomes, a platform to improve service delivery or establish business process re-engineering, an ability to comprehensively describe the use of funds, allow informed outsourcing and benchmarking (Ellis-Newman 2003: 334) and ultimately be able to attract funds both from government and the private sector. In addition, more accurate overhead cost information would provide higher education institutions, such as DUT, with a decision making tool for the following tasks: (i) improved allocation of national funds to university departments; (ii) more accurate financing of textbooks, food, and accommodation; and (iii) determining the optimum number of new enrolments for different programs (Papadeas 2013: 1431). The adoption and implementation of ABC may improve the financial wellbeing of state universities through optimal allocation of resources in the face of the current budgetary constraints.

This study investigates the factors that influence the adoption and implementation of ABC as a cost and management accounting tool in a state university in SA. It specifically focuses on factors that influence the adoption and implementation of ABC, as an indicator of the reasons why it has taken so long for ABC to be adopted in state universities, despite the numerous advantages of such a system. In addition, the study identifies cost activities, cost drivers as well as relevant cost pools of a selected

department in order to suggest an ABC model for a selected department in the South African state university. The model might be useful as a guideline for the adoption and implementation of ABC as an overhead, cost and management system in the university and possibly other state universities. By identifying cost activities, cost drivers and cost pools unique to a state university, the case study seeks to contribute to the knowledge that could be used in the analysis of structural cost drivers. It also seeks to highlight the changes taking place in the university environment concerning cost measurement methods, which ultimately may lead to better-informed cost information and better ways of generating output or services (Kaplan 2007: 2).

An ABC system could improve the quality of cost information and cost controls, particularly in a period when universities need to ameliorate budget pressures. The process of identifying cost activities, cost pools and cost drivers would not function at variance with or as a substitute for traditional accounting systems but in parallel or supplemental (Papadeas 2013: 1431). This would provide management with more comparative data and a clearer picture of the university's overhead cost operations, which would facilitate more effective, decision making, planning and overhead cost control.

A study carried out on the application of the ABC system in a hospital showed that it generates information that enables managers to identify opportunities for cost savings and provide them with an improved basis for budget constructions (Goldberg and Kosinski 2011: 948). Similarly, the costing system based on the ABC model would help state universities to understand the cost and value of service activities that are essential to control, in an environment with escalating operational costs and stagnant revenues.

Many indirect costs are relevant for decision making. An attention-directing cost information system is required that periodically identifies those potentially unprofitable programmes in universities that require more detailed attention. According to Granof, Platt and Vaysman (2000: 10), accurate cost information and proper computation are essential ingredients of cost control and containment. In addition, the study highlights specific factors that are negatively affecting the management of overhead costs,

which, by extension, adds to a host of other economic challenges such as university budget deficits, improved educational standards (quality of education) and university financial sustainability.

1.6 THEORETICAL FRAMEWORK

The theoretical framework on which this study is grounded is the contingency theory that is widely used to explain the characteristics of management accounting systems (MAS) as financial, strategy tools in organisations (Macy and Arunachalam 1995: 74). It has been widely adopted in research studies in the management accounting field (Fei and Isa 2010: 148; Sartorius, Eitzen and Kamala 2007: 3).

Contingency theory asserts that the effectiveness of design and application of a MAS in financial strategy is contingent or dependent on the environment of the organisational setting in which these controls operate and function (Figure 1) (Macy and Arunachalam 1995: 74). The situational factors faced by the organisation are contingencies that may have an impact on the adoption and implementation of the MAS. A management accounting system, such as ABC, in this theory, is defined as 'a system which supports managerial planning, evaluation, control activity and in a broader sense, facilitates financial strategy' (Macy and Arunachalam 1995: 65). However, its effectiveness in an organisation is considered to be dependent on a number of factors. The use of contingency theory would suggest that organisations should align their systems and processes with their environment (external factors) and strategy (internal factors). The assumption underlying contingency theory is that internal and external environmental factors affect organisations differently.
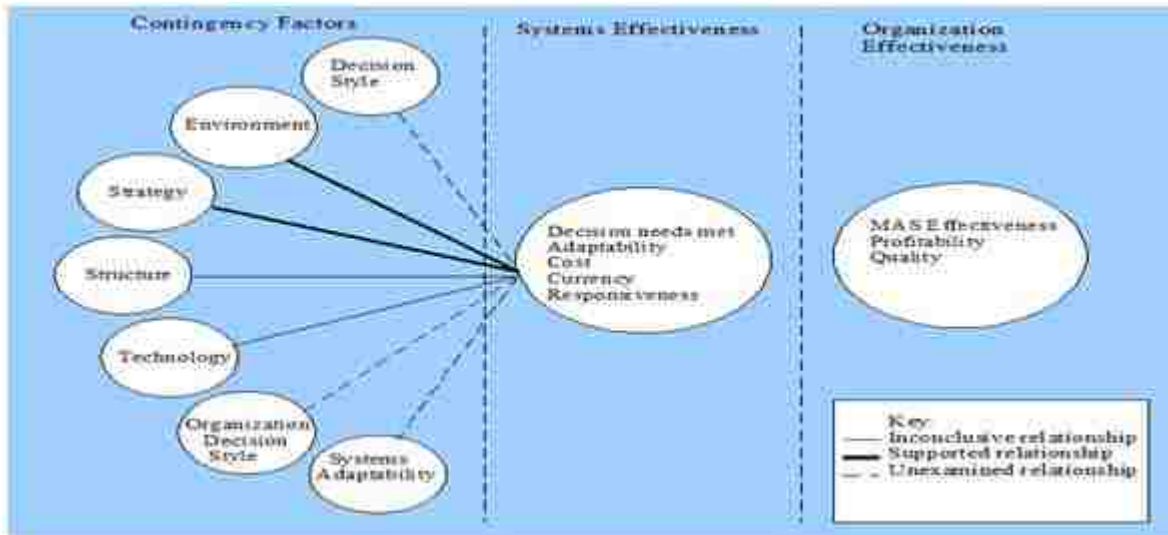
Figure 1.1: Contingency theory model (Source: Macy and Arunachalam 1995)

Consequently, the effectiveness of an accounting system, such as; ABC, is dependent on the fit or match between the type of technology, environmental volatility, the size of the organisation, the features of the organisational structure and the organisation's information system. Abusalama (2008: 158) argues that the adoption and success of the ABC system depends upon specific contingent factors such as product diversity, cost structure, firm size, competition and business culture. Drury (2011: 407) suggests that the effectiveness of a MAS depends on the extent to which the MAS's characteristics meet the requirements of the various contingencies faced by the organisation. In this current study, Macy and Arunachalam's (1995) contingency model (Figure 1) has been adopted in order to examine and investigate the factors that may influence the adoption and implementation of the ABC system at DUT. This contingency theory informs the objectives of this study as follows:

Organisational structure - objective one seeks to investigate the current cost management structure in relation to the assignment or allocation of overheads to cost objects within the DUT environment.

Contextual factors - objective two seeks to determine the barriers to and the factors that facilitate (cost, systems adaptability, technology, environment, structure) the adoption and implementation of ABC in a South African state university, using the DUT cost management system as a case study. An example of the contingency relationship

between the need to invest in a more enhanced costing system, such as ABC and organisational factors is increasing fixed costs that may demand more accurate cost allocation techniques such as ABC (Sartorius *et al.* 2007: 3). This is especially true for organisations that offer more than one product/service/programmes as each of these products/services/programmes uses different amounts of resources (Fei and Isa 2010: 148).

Management Accounting System - The third objective seeks to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected department as a way of modelling the appropriate implementation strategy in a South African state university, using the DUT cost management system as a case study.

1.7 RESEARCH METHODOLOGY

The research methodology is the framework used to achieve the aim of the research study (Kumar 2014: 19). It outlines a system of rules and procedures that include the research design; measurements, target population and sample; data collection method/instruments; the techniques used to analyse the data; ethical considerations; as well as the reliability and validity of the study.

1.7.1 Research Design

This study adopted the concurrent mixed methods approach commonly referred to as embedded or nested mixed methods design (Swain 2017: 204). The embedded design includes the collection of both quantitative (questionnaires) and qualitative data (in-depth interviews) that involves a detailed exploration of the research objectives with a few individuals (Creswell and Clark 2011: 38). This design is framed within the pragmatism research paradigm (Swain 2017: 205). Hence, the pragmatic approach that combines both the deductive and inductive approaches is adopted in the study (Creswell 2014: 19).

In this study the quantitative research approach was adopted to give numerical strength of the views and experiences of the respondents on the issues under study. The in-depth interviews were used in order to validate the results derived from the hand-delivered questionnaires. This qualitative data plays a supplemental or

supporting role within the overall design. The use of the embedded mixed methods sought to enhance the coverage, depth, reliability, validity as well as accuracy of the research findings (Best 2012: 271). Therefore, the embedded procedure of the mixed methods was adopted where both quantitative and qualitative data were analysed concurrently.

1.7.2 Target Population

This research was a case study of a state university, namely DUT, and focused on a bounded subject or unit that is representative or extremely atypical of state universities in SA. The main reasons for choosing a case study were that the approach allowed a much more detailed study that would not be possible with a larger sample (Creswell and Clark 2011: 174) and is characterised by a very flexible, open-ended technique of data collection and analysis (Best 2012: 271). In addition, a case study was selected also due to time and resource constraints.

A target population of 217 academic and administrative staff from the faculties of Accounting and Informatics, Management Sciences and the Finance Department, was purposively selected as it had the relevant background and knowledge about ABC or Cost and Management Accounting in general. Judgmental or purposive sampling which falls under the non-probability sampling method was seen as appropriate to select all textual units that would contribute to answering the given research questions, address the objectives of the study and ensure that accurate or reliable data is collected (Krippendorff 2013: 485). The target population was divided into three groups namely, finance and library, Heads of Departments (HODs), and academic staff from the Faculties of Accounting and Informatics as well as Management Sciences.

1.7.3 Data Collection

This study used predominantly Likert-scale, closed-ended questions and a couple of open-ended questions in its questionnaires. To improve the response rate, the researcher personally distributed and collected the questionnaires.

Structured and semi-structured face-to-face interviews with a self-selecting sub-sample, were also conducted according to a prepared interview guide (Kumar 2014:

28). In-depth interviews offered a versatile way of collecting data as they allowed the researcher to probe with a view to clearing up vague responses, and elaboration of incomplete answers (Creswell and Clark 2011: 177). It was estimated that 12 respondents would provide rich and detailed data which would help mitigate some of the bias and validity threats inherent in qualitative research (Creswell and Clark 2011: 174). To enhance the richness of the data, the study had a diverse sample or respondents from different departments for the interviews.

1.7.4 Data Analysis

The Statistical Package for Social Sciences (SPSS) version 24.0 and NVivo was used for quantitative and qualitative data analysis, respectively. In order to develop sound conclusions, SPSS version 24.0, released in 2016 was used for descriptive and inferential statistics data analysis, to test for the relationship between variables, frequencies, means, standard deviation, reliability, factor analysis and Chi square test.

The digitally recorded interviews with a self-selected sample from finance as well as library personnel, HODs and academic staff was transcribed verbatim. The Nvivo 10 (QSR International Pty Ltd 2014) was used to further organise, code and manage non-numerical and unstructured qualitative data (Creswell and Clark 2011: 128).

1.7.5 Ethical Considerations

The data for this study was collected after the informed consent had been obtained from DUT's institutional research structures, namely, the Faculty Research Committee (FRC), Institutional Research Ethics Committee (IREC) and Higher Degrees Committee. The researcher also respected the respondents' rights by obtaining permission letters from the Research Office. Staff participation was voluntary and the confidentiality and anonymity of staff was maintained.

1.8 OVERVIEW OF CHAPTERS

This dissertation is organised into five chapters as outlined below:

Chapter one: Introduction

Chapter one is the introduction and provides the rationale for the study; it presents the background of the study, identifies the research problem and provides the motivation of the study as well as the aim, objectives and the research methodology of the study.

Chapter two: Literature review

Chapter two focuses on a review of the existing literature regarding traditional costing methods and ABC, giving a theoretical overview of the adoption and implementation of ABC.

Chapter three: Research methodology

Chapter three discusses the research design and methodology used for the study by describing the development of a sampling plan, the choice of data collection instruments, data collection procedure, the design and distribution of the questionnaires, data collection procedure, data analysis and the reliability as well as validity of the instruments used in the study.

Chapter four: Presentation and discussion of results

Chapter four presents an analysis and discussion of the results.

Chapter five: Conclusions, recommendations and future research

Chapter five provides the conclusion and recommendations arising from the findings and provides a brief discussion on the limitations of the study along with suggestions for further research on the adoption or implementation of ABC in state universities in SA.

1.9 CONCLUSION

This introductory chapter provided a background to the study, a statement of the research problem, aims and objectives of the study; theoretical framework and justified the necessity for the study. In addition, the chapter described the scope of the study and briefly introduced the research methodology used. Finally, an overview of the chapters was provided as an insight into the organisation of the thesis. The next chapter provides the literature review on the factors that affect the adoption and implementation of ABC.

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CHAPTER TWO

LITERATURE REVIEW

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2.0 INTRODUCTION

The previous chapter presented the background and the aim and purpose of the study. This chapter reviews literature that is relevant to the objectives of the study. Firstly, it seeks to explain the main approaches to the absorption or allocation of overheads to products or services, as well as highlighting the fundamental components of Activity Based Costing (ABC) as an alternative costing system to conventional or traditional overhead costing methods. The chapter next discusses the factors that facilitate or inhibit the adoption and implementation of ABC as a cost management system and the different perceptions towards adopting ABC as an alternative method of assigning indirect costs to cost objects. The chapter then discusses the steps in the adoption and implementation of ABC, that is, the identification and evaluation of cost activities, cost drivers as well as relevant cost pools. Finally, a historical overview of the case study, which is a University of Technology (UoT), namely, the Durban University of Technology (DUT), based in KwaZulu-Natal (KZN) in South Africa (SA) is presented. The background or history of DUT as well as how cost effectiveness has always been a major objective not only at DUT but also in the entire Higher Education (HE) sector in SA is explained. The historical overview assists with an understanding of the emerging values and organisational culture as well as financial objectives that gave rise to the unique institutional climate associated with DUT. Relevant empirical studies are referred to where necessary in the appropriate sections. The chapter concludes with a summary of the literature reviewed.

2.1 APPROACHES TO OVERHEAD COSTING

Cost can be defined as a resource with a monetary measure that has been sacrificed or forgone to achieve a particular objective (Lucey 2009: 11). According to the Chartered Institute of Management Accountants (CIMA 2007: 3) cost can be used in two contexts, namely,

'As a noun: the amount of expenditure (actual or notional) incurred on, or attributable to, a specific thing or activity.'

Alternatively, cost is defined

'As a verb: to ascertain the cost of a specified thing or activity.'

For the purpose of this study, both definitions of cost as a noun and as a verb (CIMA 2007: 3) are used.

The determination of costs is essential in allocating costs between cost of goods sold and inventories for internal and external profit reporting. Cost information is essential for providing relevant information for planning, cost control, performance evaluation and decision making in order to distinguish between profitable and unprofitable activities.

Costs can be classified in a number of ways, but a fundamental and important method is that of cost classification by purpose, which divides costs into direct and indirect costs (Lucey 2009: 11). Direct costs are those which are identifiable with a cost object or a cost centre while indirect costs are not traceable to a cost object or cost centre. Horngren, Foster and Datar (1997: 94) define direct costs as costs that are related to a particular object and can be traced to it in an economically feasible (cost-effective) way.

On the other hand, indirect costs, which are also called overhead costs or shared costs are the total expenditure on materials, labour and expenses/services that is related to a particular cost object but cannot be economically identified in a cost-effective way with the specific saleable cost unit (Van Rensburg 2017: 20). They represent acquired resources whose consumption cannot be specifically attached to individual products because they are shared by more than one product and/or it is not feasible or worthwhile to establish a system to monitor their use (Innes and Mitchell 1998: 6). Examples of indirect costs are rent, insurance and depreciation.

Although indirect costs cannot be identified specifically and exclusively with a given cost object, there still is a need to trace indirect costs to products/services so that product costs and hence selling prices are determined accurately and appropriate strategic decisions can be made (Ambe *et al*. 2008: 330). In essence, indirect costs are incurred to enable production of goods and, consequently, each unit that is manufactured or that receives some benefit from them should be assigned a proportion of these total shared costs (Lucey 2009: 15).

According to the International Accounting Standard 2 (AC108) (IASB 2003), it is a requirement that manufacturing overheads are absorbed into the cost of a product, in order for inventory to be valued (Ambe *et al*. 2008: 330). This means that inventory valuations should include an element of fixed production overheads incurred in the normal course of business. The ultimate aim of overhead accounting is to share indirect costs as fairly and as accurately as possible.

Absorption of indirect costs/overheads means sharing out or charging each unit of a product with a fair and an equitable share of indirect expenses (Lucey 2009: 12). Hence, the more costs that can be classified as direct costs; the more accurate would be a cost assignment (Lucey 2009: 12). As a result, cost and management procedures have different methods of ensuring each unit of output is charged with some of the indirect costs or overhead costs. However, indirect costs still present a challenge in charging them to the products (Drury 2011: 221) and there still is a possibility of distortion of costs though the basis of allocation may appear quite logical.

2.2 AN OVERVIEW OF THE ABSORPTION OF OVERHEADS: TRADITIONAL COSTING METHODS VERSUS ACTIVITY BASED COSTING

In general, there are mainly two cost accounting methods of assigning, sharing or allocating indirect costs to products and services. These methods are (i) Traditional/Conventional costing methods and the more modern method namely, (ii) Activity Based Costing. These methods are discussed in detail below to provide the background to objective 1, which is to investigate the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA.

2.2.1 Traditional costing methods

Traditional costing methods, which are also known as conventional costing methods, were established in the 1900s (Jeyaraj 2015: 40). The traditional costing methods can be sub-divided into:

- a blanket or single plant-wide overhead rate, and
- separate departmental (sub-units) overhead rates.

The blanket or single plant-wide overhead rate is a conventional or traditional overhead allocation method that uses a single overhead rate in a firm (Naidoo 2011: 115). It uses a general or blanket format to measure the attributes of producing a unit product, for example, the number of direct labour hours spent making the product. It may also use the machine hours spent making the product or material costs consumed in making one unit (Ambe *et al.* 2008: 101). It then applies the cost of this one unit to all the various products the firm manufactures (Drury 2011: 226). Plant-wide overhead rates are based on the assumption that the amount of overheads consumed or allocated to a batch of products increase linearly with the volume produced, meaning, as more units are produced, more indirect costs are incurred (Naidoo 2011: 109).

Similarly, the separate departmental (sub-units) overhead rates are also volume-based overhead rates that use one or two drivers, such as, direct labour hours, direct labour costs and/or machine hours (Drury 2011: 226). These allocation bases are used to arbitrarily assign costs to products and assume that the amount of overheads consumed increase with the volume produced (Lucey 2009: 17).

Therefore, both the blanket/plant-wide and separate departmental overhead rates use allocation bases, such as, direct labour-hours, machine-hours, or direct labour-costs, for all products or services, even when an organisation has diverse products, differing manufacturing processes and varying volumes (Drury 2011: 226). They categorise costs into one or two cost pools, as fixed or variable, with a limited or an unrefined approach to cost behavior (variable factory overhead plus fixed factory overhead=total factory overhead). Consequently, all manufacturing costs are assigned to products, including those manufacturing costs that may not have been caused by a particular

product. Studies show that traditional overhead costing systems may only be justified when all the products in an organisation or department consume departmental overheads in approximately the same proportions (Lucey 2009: 123).

In the traditional costing systems, the choice of an overhead allocation rate (OAR) for a particular cost centre depends on the cost centre's characteristics. For example, a machine-intensive cost centre would use a machine hours OAR to allocate overheads while a labour-intensive production cost centre would use a direct labour hours OAR (Ambe *et al.* 2008: 101). These allocation bases used in traditional costing systems, such as machine hours, may not produce accurate product costs if a lot of a company's expenditure is incurred by activities that are not at the unit level (Lucey 2009: 123).

In organisations that produce diverse product mixes, traditional costing systems lead to distorted costs, since the different products use indirect resources in different amounts, which may not be volume related. As a result, traditional costing methods are usually associated with the following shortcomings:

- In the current business environment, traditional costing methods lack visibility or transparency of individual products/services and ultimately on increasingly important areas of resource consumption, such as support activities (Garrison, Noreen and Brewer 2015: 278). If management eliminates an activity (for example, inspection), these systems do not reveal the source of cost reduction because the savings are buried in a large overhead pool;
- Financial information is reported to management by functions or departments (for example, purchasing and marketing), and not by activities (for example, inspecting and material handling) essential in effective strategic decision making (Lucey 2009: 129). Consequently, traditional costing systems do not help managers identify opportunities for improvement or assess the consequences of improvement efforts (Martin 2009);
- Conventional or traditional costing methods lead to systematic distortion of product/service costs because of the use of convenient but inappropriate volume-based OARs (Jarrar, Smith and Dolley 2007: 80). It is not necessarily true that high-volume products consume more overhead resources than low-

volume products. For example, set-up costs do not change in proportion to the batch size (Garrison *et al.* 2015: 278);

- Expenses from support operations, marketing, distribution, engineering, and other overhead functions have increased significantly with increasing product lines and marketing channels. However, traditional costing methods lack a suitable means of measuring or unitising these non-manufacturing overheads (Cooper and Kaplan 1988: 96);

- Traditional costing systems do not give reliable, long-term variable cost information for strategic decision making (Seal, Rohde, Garrison and Noreen 2015: 276); and

- Traditional costing methods do not offer cost information at the pre-production stages in the product life cycle (Garrison *et al.* 2015: 278).

Some of the earliest published literature on ABC (Cooper and Kaplan 1988; Cooper 1992) argues that as overheads become an ever-larger component of product cost, it compounds the problematic distortion inherent in traditional based costing systems. In addition, greater product complexity and diversity increases the costing distortions arising from traditional cost systems. In sum, in an environment with greater investments in technology and automation, and consequently higher overhead costs, higher product diversity, higher global competition and more consumerism (Cooper and Kaplan 1988: 96), there is need for a system which delivers more accurate, reliable and relevant cost information upon which to base short and long-term decision making (Byrne, Stower and Torry 2009: 2).

2.2.2 Activity Based Costing

The second method to assign indirect and service department costs to products is ABC (Drury 2011: 50). ABC is a costing approach in which overhead costs are assigned to products, services or customers based on the number of activities consumed by the products (Blocher, Stout and Cokins 2010: 64). The concept of ABC was first defined in the late 1980s by Robert Kaplan and William Burns (CIMA 2008: 4). The underlying idea of ABC is that:

'*Certain activities are carried out in the manufacture of products. These activities consume a firm's resources, thereby creating costs. The products, in turn, consume activities. By determining the amount of resource (and the resulting cost) consumed by an activity and the amount of activity consumed in manufacturing a product, it is possible to directly trace manufacturing costs to products*' (Liggert 1992: 4).

Hence, ABC is defined as 'cost attribution to cost units on the basis of benefits received from indirect activities e.g., ordering, setting up, assuring quality etc.' (Arora 2013). Lucey (2009: 19) defines ABC as a new approach to internal cost accounting that involves analysing, recording, controlling and reporting on the costs and wider performance of activities, rather than the traditional narrow emphasis on merely the costs of departments and cost centres.

In essence, ABC focuses attention on the costs of various activities required to produce a product or service and assigns these indirect costs to cost objects, such as, products or services, based on activities performed for the cost objects (Baird *et al.* 2004: 395). According to Horngren *et al.* (1997: 106), ABC is not an alternative costing system to job costing or process costing but an approach that develops overhead cost numbers used in these major costing systems.

The main objective of ABC is to understand overheads as well as the profitability of individual products and customers for planning, cost control and decision making (Naidoo 2011: 113). On the other hand, the main objective of traditional cost accounting systems is to value stocks and the cost of goods sold for external financial reports (balance sheet, income statement, cash flow statement) (Seal *et al.* 2015: 276). For this reason, traditional costing is regarded as being driven by procedures and cycles of the organisation's inventory values for the financial reporting system (Martin 2009). These procedures are historical (too late), too aggregated, and too distorted to be relevant for internal or management planning, control and decision making (Seal *et al.* 2015: 276). On the other hand, ABC systems provide highly accurate product or customer costs that a firm can use for strategic decisions (Horngren, Datar and Rajan 2015). Some of the main differences between ABC and

the traditional costing system that have been mentioned above are illustrated in Figure 2.1.
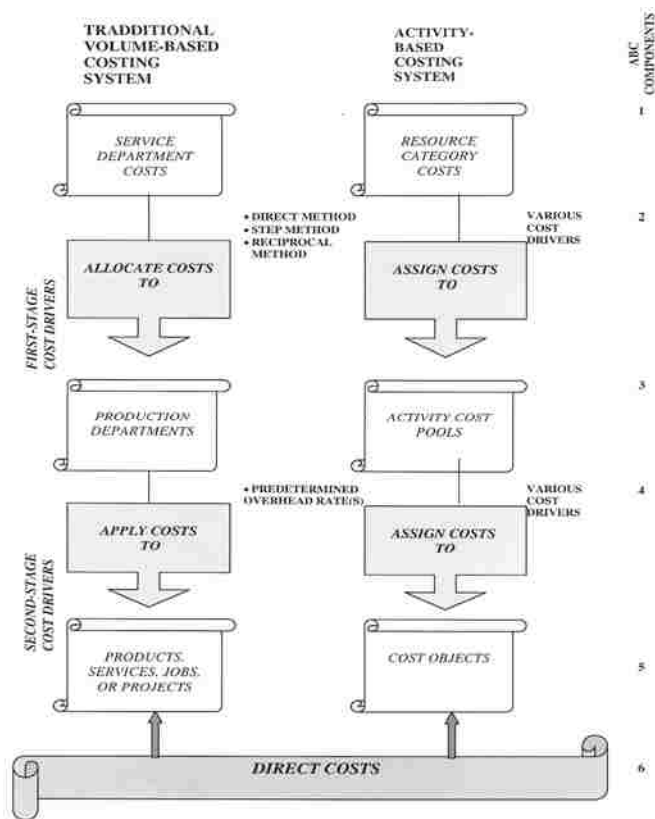
Fig 2.1: General models of the traditional volume-based costing system and the activity based costing system (Source: Abu-Tapanjeh 2009: 33)

2.3 FUNDAMENTALS OF ABC

The distinctive feature of ABC is that it focuses on activities or the tasks taken to deliver a product or service (Lucey 2009: 129). Consequently, ABC allows activities to be screened. This allows non-value adding activities to be identified and targeted for elimination (Gurses 1999: 8).

In product costing, ABC allows all overhead costs (manufacturing and non-manufacturing costs) to be apportioned to products by including all the actual activities and resources consumed in producing, marketing, selling, delivering and after sales services of the product (Martin 2009). Therefore, ABC focuses on the cost of all activities taken in delivering a product, rather than on the attributes of a product or service as in the traditional costing systems. It is this feature of ABC that, according to

Gurses (1999: 8), provides management with the necessary as well as detailed information to identify opportunities for process improvements and cost reductions. This means that by using information generated using ABC, managers can clearly see the cost of each major overhead activity performed for a product, separately, and hence make the right decisions about where to focus efforts to reduce costs (Martin 2009).

In this manner, ABC focuses attention on cost drivers, i.e., the activities that cause costs to increase (Lucey 2009: 124). Traditional absorption costing tends to focus on volume-related drivers, such as labour hours, while ABC also uses transaction-based drivers, such as number of orders received. In this way, long-term variable overheads, traditionally considered fixed costs, can be traced to products (Mansor *et al.* 2012: 21).

Therefore, ABC aims to determine an accurate cost trail between resources and the relevant cost objects. The accounting procedure or cost trail involves: 1. breaking down of general ledger costs into activity costs; and 2. transforming activity costs into product costs (Mansor *et al.* 2012: 21). Essentially, ABC techniques are used to further process the data from a traditional costing system into more useful information for management's decision making (Cokins 2001: 13). In other words, ABC may complement traditional costing systems and should not be seen as a substitute for traditional costing systems.

2.3.1 The two stage allocation process of ABC and traditional costing methods

Direct costs under both ABC and traditional costing methods are treated in a similar manner by allocating (tracing) them directly to the products or services (Martin 2009). However, the allocation methods of the indirect costs or overheads differ under the two methods. The two systems use a two stage overhead costing system that involves firstly, tracing costs to activities in the case of an ABC system and to resource centers in the case of the traditional costing systems (Gurses 1999: 9).

In the first stage of cost allocation, a significant difference in the two systems is noticed in that traditional costing systems do not recognise that activities are performed on different levels of cost behaviour. At this stage (stage one), ABC classifies activities

along a cost hierarchy consisting of unit level, batch level, product sustaining and facility sustaining activities (Drury 2011: 239). This is done by using a cost hierarchy technique that reflects the different types of cost behaviour (Abusalama 2008: 30). Cost modelling is utilised to segregate the indirect costs into four levels. The four levels in the hierarchy are:

- Unit level activities – At this level cost is influenced by each additional unit of output and costs are assigned to activities that act on each individual unit of product or service, such as direct labour or materials;
- Batch level activities - Costs are assigned to activities associated with a group of units of products, such as set-up costs, material movements or purchase orders batch level costs. At this level, an additional batch is required to alter cost;
- Product/process-sustaining activities - Costs are allocated to activities that are performed to support a specific product or service, such as process engineering, product specifications or engineering changes. At this level, the cost is determined by the existence of a product or product group; and
- Facility/organisation-sustaining activities – Costs, viewed as period costs, are assigned to activities underpinning the organisation as a whole. Most of these activities are administrative, and include transactions as diverse as plant management, security, taxes, building and grounds maintenance, heating and lighting. These facility-sustaining activities are not based on product-related characteristics (quality, product complexity, product flexibility or volume) and are dependent upon the provision of productivity capacity in the form of a production plant or premises (Horngren *et al.* 1997: 151-152).

Figure 2.2 shows the four manufacturing cost categories.
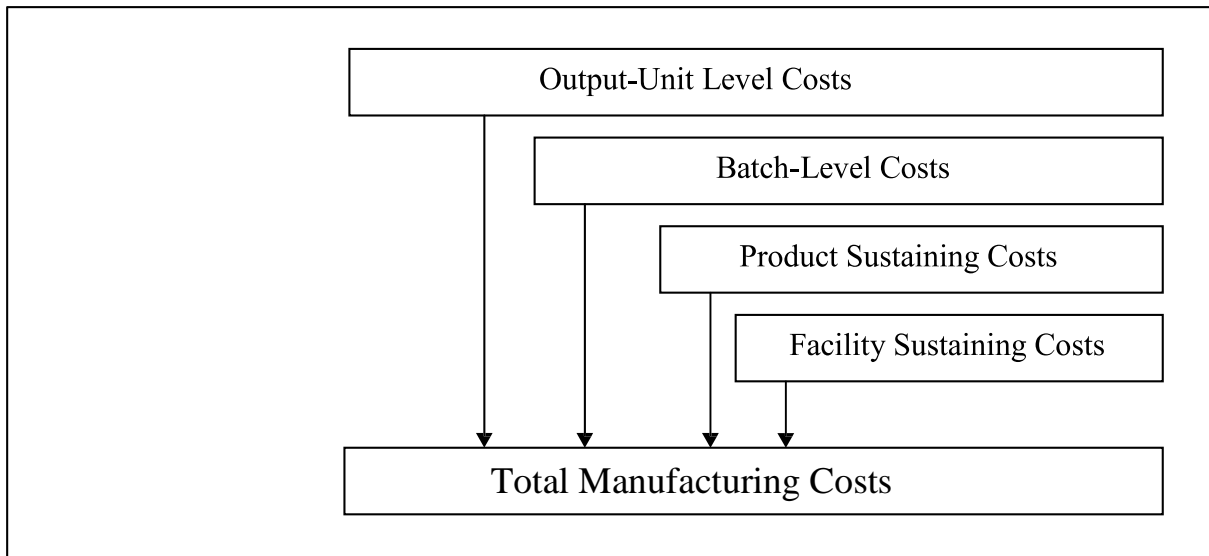
Fig 2.2: Manufacturing cost hierarchy (Source: Horngren *et al.* 1997: 151)

The second stage in both systems involves the final allocation of costs to products or services. Within the two-stage allocation process, ABC systems differ from the traditional systems by having a greater number and a variety of cause–and-effect, allocation bases termed cost drivers (Lucey 2009: 124). In the second stage of overhead absorption, the costs assigned to the cost pools using ABC are assigned to the products based on the product's consumption of each activity and the level of the identified activity in the ABC hierarchy (Gurses 1999: 9).

Where a traditional system may use a maximum of up to three, second-stage allocation bases (the most common being direct labour hours, machine hours and materials used), ABC makes use of many more allocation bases (Lucey 2009: 123). ABC recognises the complexity and diversity of modern production by using multiple drivers, many of which are transaction-based rather than based solely on production volume (Martin 2009). The allocation bases used to assign costs in the second stage of allocation may include set-ups, items ordered, number of times moved, number of parts, number of times ordered and number of engineering charge orders amongst others (Garrison *et al.* 2015: 278). Some of these bases are used to trace input whose consumption varies directly with the number of items produced, while others are used to trace inputs whose consumption does not vary with quantity (Lucey 2009: 125).

Traditional systems normally assign service or support costs by reallocating their costs to production cost centres so that they are assigned to products within the production centre cost driver rates. In contrast, ABC systems tend to establish separate cost driver rates for support centres, and assign the cost of support activities directly to cost objects without any reallocation to production centres (Lucey 2009: 123). Since these non-manufacturing costs may differ substantially from product to product and from customer to customer, ABC traces these costs to products and customers using additional cost pools and activity measures (Martin 2009). Thus, the ABC approach provides the potential for more accurate product costs for management decisions concerning product planning, product design and introduction, product design changes, product pricing, make versus buy, product distribution, product service and product discontinuance (Garrison *et al.* 2015: 278).

2.3.2 Activity management

The adoption of ABC has been described as only one of three hierarchical levels of activity management in an organisational context (Gosselin 1997: 106).

Activity analysis ──────▶ Activity cost analysis ──────▶ Activity based costing

ABC is the highest level of the activity management innovation. The two preceding levels that are pre-requisites to ABC include some form of activity analysis and activity cost analysis (Gosselin 1997: 106). ABC is the final level of activity based management that progresses further to trace overhead costs to products and services through identifying overhead costs with homogeneous activity cost pools and applying pooled costs to products and services based on measures of the activities consumed by those products and services (Baird *et al.* 2004: 395). This stage links product and service costs to activities. Studies (Gosselin 1997: 107) suggest that when mechanistic, strategic business units decide to adopt ABC, they carry through the overall process without stopping at an earlier level such as activity analysis or activity cost analysis. Figure 2.3 shows how activity based costing can be used to estimate the cost of products in activity based management.
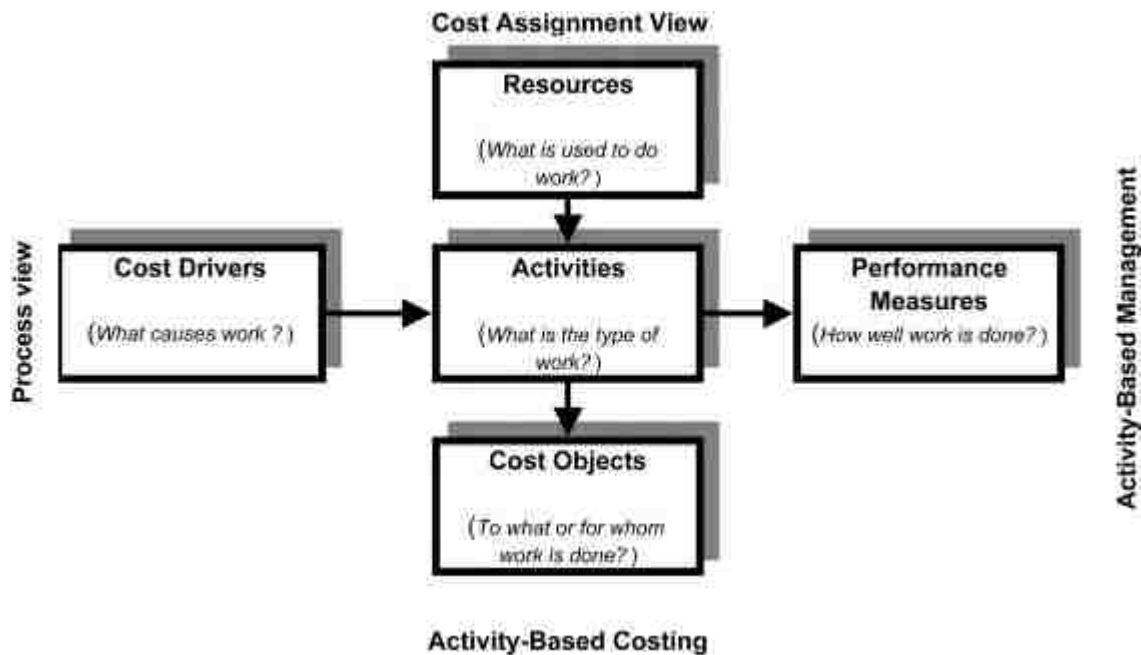
Fig 2.3: Activity based costing/management model (Source: Gupta and Galloway 2003: 134)

2.4 ADVANTAGES OF ABC

The main of benefits of ABC have been summarised as follows (Tatikonda 2003: 5); Blocher *et al.* 2010: 133).

1. Better cost estimation as more overheads can be traced to the product - ABC provides more accurate cost information in an environment where support overheads are increasingly becoming a significant proportion of total costs.

2. Better identification of resource needs and better cost of unused capacity - ABC assigns costs to objects more accurately and reliably, thus assisting users in understanding and evaluating how resources are used across a firm's value chain. It assigns resource costs to products more accurately, reducing the potential for cost distortions.

3. Better decision making, as ABC provides a reliable indication of long-run variable product cost that is relevant to strategic decision making - ABC enables more grounded decision making by providing the information that helps identify the components of overheads more precisely. These components include product design,

development, production, distribution (Lucey 2009: 129) and, as a result, ABC acts as a decision support tool for organisations.

4. Better budgets and performance evaluation - A further reason for adopting ABC is connected to more effective budgeting and performance evaluation for management purposes (Sartorius *et al.* 2007: 5). Activity based budgeting recognises the difference between resources required to conduct activities at different levels of cost behaviour, for example, budgets can be prepared for batches and orders, whereas in a traditional budget the focus remains on unit level activities.

5. Better cost control as ABC focuses attention on the real nature of cost behaviour and helps in identifying activities that do not add value to the product - ABC provides more detailed and reliable cost information for cost control (Innes and Mitchell 1998: 98) through a more refined approach to cost behaviour. Without knowledge of resource consumption, cost reduction efforts to improve profitability, inevitably rely on broad-brush cuts, which impede rather than promote long-term success and profitability (Blumberg, Cooper and Schindler 2011: 53).

6. Process improvement – ABC is flexible enough to trace costs to processes, customers, areas of managerial responsibility, as well as product costs (Lucey 2009: 129). It supports other management initiatives, such as business process re-engineering, Total Quality Management (TQM) and Just In Time (JIT) (Sartorius *et al.* 2007: 5), the creation of cost consciousness and the improvement of product and process design.

7. Better distribution of scarce resources and better product mix - ABC is long-term oriented. It traces all the costs of resources used in production to the relevant product or service. The need for long-term variable cost information as a basis for taking decisions on such matters as product range, output and component subcontracting has been an important attraction of ABC.

8. Better profitability measures - ABC provides more accurate cost information to support both strategic and tactical decisions, for improved cost management capability

and to understand the profitability of products and customers better. By identifying the causal relationship between costs and activities, ABC can be used to reliably link an organisation's operational performance to its actual financial performance. As a result, ABC responds to higher levels of competition.

9. Better public relations tool - In the United Kingdom (UK), ABC has been used in the identification and management of increasing overheads which was a response to increased pressure from regulators (Broad and Crowther 2001: 58). For state universities or the government sector, the ability to attract additional funds, goodwill and creation of new budget resources has become an incentive to implement ABC. Therefore, ABC allows organisations to provide external sectors with more timely (Cokins 2001: 13), transparent and more accessible overhead cost information.

2.5 LIMITATIONS OF ABC

The limitations of ABC can be summarised as follows:

1. Aggregation of activities - The major limitation that has been identified with ABC is the difficult process of aggregating activities as well as choosing cost drivers. In addition, it has been highlighted that it is a simplistic assumption that a chosen cost driver is an adequate summary measure of complex activities (Lucey 2009: 129). The number of actions performed in an organisation is typically so vast that it is economically unfeasible to use a different cost driver for each action. As more and more actions are aggregated into an activity, the ability of a cost driver to trace accurately the resources consumed by products decreases. Therefore, it becomes an assumption that there is a direct, linear relationship between the usage of a cost driver and the amount of overheads.

2. Assumption that all costs are variable - ABC assumes that almost all of the costs are variable and change according to the output level. Very few costs indeed are truly variable in this sense whether in the short- and long-term. In the short-run, there are many fixed costs such as the cost of labour, rent, equipment, etc. A firm will incur these kinds of costs whether the product is produced or not. As a result, ABC may give wrong information about short-term decisions because of not focusing on the actual costs the

company will incur in the short-run (Kaplan 1988: 32). However, in contrast to conventional cost accounting systems, ABC is designed to provide managers with cost information for strategic and other decisions that potentially affect capacity and these fixed costs (Seal *et al.* 2015: 276).

3. Failure to involve constraints of a system - ABC does not involve the constraints of a system into the analysis. In the short-run, the capacities of all the activities are fixed. Nevertheless, ABC omits this fact, and, as a result, does not take into account the opportunity cost of using the bottlenecks to increase profits (Broad and Crowther 2001: 58) as elaborated in the Theory of Constraints, a management concept, developed by Dr. Eliyahu Goldratt.

4. Cost - A full ABC system has numerous cost pools and cost drivers that make it more complex (Krumwiede 1998: 239) and, consequently, more expensive to operate (Krishnan 2006: 76). However, this need not be a challenge if the benefits outweigh the costs (Gurses 1999: 12). Hence, the objective of an ABC system would be to provide the most benefit possible at the lowest overall cost.

The following section provides the background to objective 2, which is to determine the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT.

2.6 FACTORS THAT INFLUENCE THE ADOPTION AND IMPLEMENTATION OF ABC

Previous ABC studies suggest various factors that may affect the success of the adoption and implementation of ABC. This study aimed to find out factors influencing the adoption and implementation of ABC at DUT using mostly factors found to be associated with ABC success (Garrison *et al.* 2015: 278) in prior studies, namely, strategy (Gosselin 1997; Anderson 1995; Michela and Irvine 2005), decision usefulness of cost information (Krumwiede 1998; Baird *et al.* 2004; Anderson and Young 1999), environmental or contextual factors (Anderson and Young 1999; Cagwin and Bouwman 2002; Krumwiede 1998; Malmi 1997; Anderson 1995, Hesford and Young 2002), behavioural and organisational factors (Shields 1995; Shields and

McEwen 1996; Foster and Swenson 1997; McGowan and Klammer 1997), organisational structure (Gosselin 1997); technical factors (Fei and Isa 2010; Anderson and Young 1999; Innes and Mitchel 1998), information technology (Cagwin and Bowman 2002; Krumweide 1998) and system adaptability (Argyris and Kaplan 1994; Drake, Haka and Ravenscroft 1999; James 2013). This study investigates how these factors influence the adoption and implementation stages of the ABC at DUT.

2.6.1 Organisational strategy

Choice of strategy

Studies show (Gosselin 1997; Michela and Irvine 2005: 63) that an organisational strategy can influence the successful adoption of ABC. Gosselin (1997: 118-119) found that companies that adopted a prospector strategy would be more likely to adopt ABC than companies that followed a defender, analyser or reaction strategy. He found that the reason for this is that companies adopting a prospector strategy are more innovative in nature and are willing to adopt new management techniques (Gosselin 1997: 108). Similarly, subsequent research noted that a business culture which includes innovation, outcome orientation and tight versus loose control has a positive relationship with the level of ABC adoption (Baird *et al.* 2004: 394). Hence, an organisation's strategy plays a key role in the diffusion of the innovation process in the form of ABC.

2.6.2 Environmental or contextual factors

The second set of factors that influence the adoption and implementation of ABC are collectively termed contextual or environmental factors. Studies (Krumweide 1998: 251; Anderson 1995: 39) suggest that implementation failures of ABC are related more to exogenous contextual factors than to the actual process of implementation. These contextual variables include the values, culture and climate that uniquely identify with an organisation. Anderson and Young (1999: 526) postulate 'that even good implementation processes fail on barren ground'. Some of the identified contextual variables are as follows.

2.6.2.1 Cost distortions

A survey conducted by the Institute of Management Accountants (IMA) affirms that firms that have a cost environment that has a higher potential of having cost distortions are more likely to adopt ABC (Krumwiede 1998: 33). Cost distortions are usually a result of the environment or context in which the organisation operates. ABC has the fundamental characteristic to seek to reduce distortions caused by the arbitrary allocation of indirect costs in traditional systems. However, when there is a lower potential for cost distortions, Krumwiede (1998: 33) argues that the benefits of ABC are limited. For instance, in universities, when departments or students use common resources, such as, libraries, laboratories and computer facilities differently, some sort of weighting is needed in the cost allocation process. Otherwise, programmes/services that do not need all the activities in the department will be overcharged and, hence, overpriced. On the contrary, programmes/services that need all the activities in the department will be undercharged and hence, underpriced. Examples of the causes of cost distortions are service or product volume, size, complexity, material requirements or machine setups. These errors may lead to loss in competitiveness and losses in revenue due to overpricing or underpricing. Table 2.1 summarises some cost distortions that tend to occur in traditional costing systems.

Table 2.1: Summary of cost distortions that tend to occur in traditional costing systems		
Type of diversity	**Product type or characteristic**	**Type of cost distortion that tends to occur in traditional cost systems**
Production volume	Low Volume specialty	Undercost, i.e., too little overhead is allocated to these products.
	High Volume main line	Overcost, i.e., too much overhead is allocated to these products.
Product size	Small	Undercost
	Large	Overcost
Product complexity	Complex design	Undercost
	Simple design	Overcost
Product materials requirements	Requires many, or unique parts, i.e., only used on a single product	Undercost
	Requires few, or common parts, i.e., same part used on many products	Overcost
Product machine setup requirements	Requires many, long or complex machine setups	Undercost
	Requires few, short or simple machine setups	Overcost

Source: Martin (2009)

2.6.2.2 Size of company

Studies have suggested that there is a link between the size of an organisation and the adoption of modern management accounting practices, such as activity management or ABC (Drury 2011: 238). The arguments for this link include that:

(a) Larger organisations have a high demand for activity management information for planning, control and coordination of activities (Drury 2011: 238);

(b) Larger organisations have a larger communication network and the necessary infrastructure or resources for the development and implementation of activity management practices. Abusalama (2008: 139) suggests that large firms are more likely to have greater access to individuals with the knowledge to design and implement ABC systems;

(c) As ABC implementation is costly, larger firms are more likely to obtain economies of scale, with the cost spread across several products or services (Krumwiede 1998:

34). The more resources are available for activity management practices, the better those practices are likely to be and the higher their perceived benefits; and

d) Larger companies have more resources, such as personnel, computing facilities and time, both for management and for the development of a complex cost system, such as the ABC system (Elagili 2015: 50).

The finding regarding the size of a firm is widely supported in other surveys by Baird *et al.* (2004: 394) as well as Innes, Mitchel and Sinclair (2000: 352). In the same vein, the IMA observed that firms that adopted ABC had average sales of $101-$500 million. However, a survey conducted by Cohen, Venieris and Kaimenaki (2005: 997) found that the size of a firm had no relationship with whether ABC is adopted or not. Similarly, Abusalama (2008: 140) examined firm size in terms of number of employees and observed that the firm's size did not significantly relate to ABC adoption.

2.6.2.3 Information technology sophistication

Prior literature on the impact of IT on ABC implementation is conflicting (Krumwiede 1998: 251). For some organisations adopting ABC, high-quality information systems are considered a key factor in reaching the highest implementation stage where ABC is used extensively and integrated with the primary financial system. Krumwiede (1998: 251) suggests that ABC becomes more beneficial as the cost of data collection and processing is reduced, which requires prior, higher levels of IT. The availability of high-level information is an important factor in getting to the usage stage as information system provides detailed historical data and an easy access to users that may provide much of the driver information needed by ABC (Gurses 1999: 12). In addition, management with higher quality IT may feel better able to implement ABC than companies with less sophisticated IT systems because the costs of measurement are lower Cooper (1988), cited by Krumweide (1998: 251). Hence, organisations that have a high level of IT are regarded as being more likely to successfully adopt ABC.

On the contrary, Anderson (1995: 36) argues that when management is generally satisfied with the information provided by an existing IT system, it may be reluctant to invest the necessary resources in ABC. In a study on the relationship between organisational as well as contextual variables with the successful implementation of

ABC, Anderson and Young (1999: 550) found evidence that the quality of the information system or IT is negatively related to management's evaluation of ABC's overall value. Similarly, Krumwiede (1998: 240) suggests that firms that reject ABC after considering its adoption tend to have higher quality existing IT than other non-adopters, presumably because the system in place would be generally meeting management's needs. Thus, firms that abandon ABC after implementing it also tend to have relatively strong existing information systems (Krumwiede 1998: 267). Therefore, higher levels of IT quality may either encourage or discourage the adoption and implementation of ABC.

2.6.2.4 Lack of system initiatives

Studies have shown that there is a positive association between ABC and an improvement in return on investment (ROI) when it is used concurrently with other strategic initiatives (Nasser and Al-khadash 2013: 140). However, other system initiatives may impede the adoption of ABC because they, too, need considerable time and effort. If the focus is on other important system enhancements, fewer resources will be available for the ABC project. For example, when an organisation does not have a proper information system and is restructuring or upgrading its system, it may have difficulties adopting ABC (Krumwiede 1998: 240). The implementation of ABC requires considerable time and effort that it would not receive if an organisation's attention is focused elsewhere. Secondly, ABC needs extremely detailed information that it may not be able to receive because of an organisation lacking an information system. Therefore, in order to successfully adopt and implement ABC, organisations would need to first complete the process of implementing or upgrading the information system or other system initiatives (Gurses 1999: 14).

2.6.3 Organisational structure

Studies show that the conventional organisational structure along hierarchical lines impedes effective communication on ABC between departments and other areas of the organisation (Naidoo 2011: 110). This organisational structure mainly encourages departmental managers to take actions at the department level. One department may take action at the expense of other departments. For example, 'the production department may reduce direct labour or machine hours by redesigning a product but,

in turn, cause quality problems in the quality control department or even increase overhead costs in the production department' (Madwe 2017: 12). Malmi (1997: 475) highlights the importance of organisational structure in the implementation and adoption of ABC. In a case study in Finland, on the origins of the resistance to ABC, Malmi (1997: 475) suggests that the major sources of resistance to ABC may fundamentally be linked to the organisational structure and are unlikely to be eliminated by implementation-based strategies, such as participant involvement.

A study by Gosselin (1997: 117) regarding the effect of organisational structure and strategy on the adoption of ABC found that a formal organisation would be more likely to adopt ABC than a decentralised and less formal one. Organisations with high vertical differentiation that are more centralised and more formal are often more associated with the implementation of ABC. However, decentralised and less formal organisations are less associated with the adoption of ABC (Gosselin 1997: 117). Both of these traits (formal and centralised) are considered characteristics of a mechanistic organisational structure. Research (Gosselin 1997: 118) shows that less mechanistic, vertically differentiated firms tend to implement stand-alone, personal computer-based systems for use as needed, while more mechanistic, multi-levelled firms implement highly integrated systems as part of a well-organised implementation plan.

2.6.4 Behavioural and Organisational Factors

Success or failure of ABC has been found to be heavily influenced by a number of behavioural and organisational factors (Garrison *et al.* 2015: 278). The degree of importance of these behavioural and organisational factors to the success of ABC is different at different stages of ABC implementation. Shields (1995: 150) identified seven behavioural and organisational variables that are important in the implementation of ABC. These factors are: (1) top management support; (2) linkage to competitive strategies, particularly quality and speed strategies; (3) linkage to performance evaluation and compensation; (4) sufficient internal resources; (5) training in designing, implementing and using the system; (6) non-accounting ownership; and (7) consensus about and clarity of the objectives of the cost management systems. According to Shields (1995: 150), the reason that these factors are important is that they determine what is important to employees and their

preparedness to accept and work with innovation. ABC success will be increased when these behavioural and organisational factors are used in concert, as part of an integrated implementation strategy.

2.6.4.1 Top management involvement and support

Studies show that lack of management interest and support is one of the reasons for the non-adoption of the ABC system (Cohen *et al.* 2005; Elagili 2015; Garrison *et al.* 2015). Top management involvement and support has been identified as an essential characteristic in the successful implementation of ABC as it is difficult to implement changes in organisations unless those changes have the full support of those who are affected and manage it (Aldukhil 2012: 77). In addition, top management support for ABC has been identified as being crucial in the implementation of ABC (Garrison *et al.* 2015: 278) as management is responsible for channeling resources (e.g., money, time, talent) to match goals and strategies on initiatives they deem worthwhile. Top management may not adequately support the implementation of ABC when other priorities in the firm are considered more important as well as more strategic than the ABC project.

According to Elagili (2015: 51), the involvement and support extends to assistance in the solutions to any challenges and obstacles that might arise throughout the different phases of the system's adoption and implementation. In addition, top management may also provide the political help needed to motivate or push aside individuals and coalitions who resist the innovation.

Top management involvement and support is not exclusive to the preliminary stages of ABC implementation; rather, it is a continuous process to maintain the ABC system (Aldukhil 2012: 77). Surveys carried out in New Zealand (Cotton *et al.* 2003) and the UK (Innes and Mitchel 1998: 103) showed that the most significant variable related to the success of ABC was top management. Based on the above, the balance of research evidence appears to be supportive of the impact of top management on ABC adoption.

2.6.4.2 Consensus about and clarity of objectives of the cost management system

On-going two-directional feedback between top management and lower level employees, ABC designers and users is necessary on the progress of the adoption and implementation of ABC (Gurses 1999: 17). ABC systems have shown to be implemented efficiently and effectively when there is related consensus about and clarity of the objectives on the cost management system among the designers and users. The clarity of objectives means that they are accurate and easily understandable to all employees. One effective way to create consensus has been shown to be the cross sectional involvement of all users in developing the ABC model (Oseifuah 2013: 46).

2.6.4.3 Linkages to competitive strategies and continuous improvement programme

Research shows that in order for ABC to be successfully implemented it should be well aligned with an organisation's competitive strategy, continuous improvement programmes and the organisational culture (Jarrar *et al.* 2006: 80). Organisations whose strategic activities are already managed, measured as well as controlled provide an environment that allows for continuous performance improvement (Bloomberg 1993: 45) and a successful ABC system. Studies have also found that positive synergies are obtained from concurrent use of other strategic business initiatives (particularly quality and speed) with ABC (Krumwiede 1998: 252). Concepts, such as JIT, Flexible Manufacturing Systems (FMS) and TQM, are all efforts on the part of management to improve the activities of the business process. When ABC is used concurrently with these concepts, firms have a net improvement in financial performance greater than that obtained from the use of those strategic business initiatives without ABC (Gurses 1999: 27). For instance, companies that implement TQM may have already performed much of the process analysis needed for ABC. As a result, ABC positively supports other management innovations (Cooper and Kaplan 1992: 2).

On the other hand, competitive innovations such as; TQM, lean manufacturing, JIT and balanced scorecard are often prioritised over ABC (Sartorius *et al.* 2007: 14). For instance, in a perfect JIT environment, the need for complex, activity accounting systems could be considered as unnecessary as distortions would tend to be generally low (Bloomberg 1993: 195). In addition, these initiatives compete with ABC for resources within an organisation. However, to a large extent, the success of ABC depends on the presence of other major initiatives that have been or are implemented concurrently with ABC (Gurses 1999: 18).

2.6.4.4 Non-accounting ownership

The successful implementation of ABC has also been associated with both accountants and non-accountants taking ownership of the new system and in their belief that ABC is of practical use throughout the organisation (Krumwiede 1998: 251). The degree of ownership and commitment by non-accountants from operating departments, such as; marketing, engineering and manufacturing should be high as well as their involvement in the initial decisions to invest, design and implement ABC in order to minimise organisational resistance (Gurses 1999: 19). Non-accounting ownership of ABC can be achieved by means of using cross-functional teams with intimate knowledge of many parts of the organisation's overall operations (Sartorius *et al.* 2007: 15) in the implementation of the project.

A change in the accounting system affects resource allocation, organisational transactions, organisational power as well as organisational politics and may, therefore, attract a lot of resistance from those affected by the change (Madwe 2017: 39). Hence, the involvement of a cross-functional team would enable sharing of power among those who design, use and get affected by the use of the ABC system and thus reduce resistance.

2.6.4.5 Linkage to performance evaluation and compensation

ABC is a total quality management tool for cost and performance measurement of activities, resource, and cost objects (i.e., products and services). Studies have demonstrated that it is essential to motivate and reward employees to appropriately focus on and effectively implement ABC information in order to improve their firm's

competitive position and profits (Shields 1995: 150). Hence, the ability of the company to link performance evaluation and ABC is crucial for its successful implementation. If employees continue to be evaluated and rewarded using traditional cost systems, they perceive ABC as not being important and may abandon it (Garrison *et al.* 2015: 278). The effective management reporting system offered by ABC also allows organisations to evaluate performance and identify opportunities for improvement.

In contrast to the findings of Baird *et al.* (2004: 394), the results of a survey by Sartorius *et al.* (2007: 16) on companies registered on the Johannesburg Stock Exchange (JSE) in SA indicated that ABC's linkage to performance evaluation and compensation was not a critical success factor in its implementation.

2.6.4.6 Sufficient internal resources

Scholars have alluded to the fact that organisations require sufficient internal resources in order to successfully adopt and implement ABC (Nassar 2013: 18). The necessary resources primarily include the time and commitment of accountants, a qualified workforce, top management, operating employees, software and external consultants. Companies that implemented ABC, reported that, on average, three years was the time period needed for the implementation phase before ABC could be used (Gurses 1999: 19). According to Nassar (2013: 18), the greatest barrier to a system adapting ABC was its high cost of implementation, followed by the high cost of ABC consultancy and computer staff time.

2.6.4.7 Training in designing, implementing and cost management systems

ABC often takes more time and effort than expected and employees need the opportunity to learn about ABC, experiment with alternative designs and follow the design methods. An ABC training investment would include a project team with broad representation, good internal communication and analytical skills and with a good understanding of production and support functions in the organisation to facilitate successful implementation of ABC (Garrison *et al.* 2015: 278). Training in designing, implementing and using ABC is also an important way to interrelate ABC among strategy, performance evaluation and compensation as well as ABC objectives. It also provides a mechanism for both non-accounting and accounting employees to foster

full ownership of the costing system. Training would usually include readings, lectures, hands-on projects and on-the-job training (Gurses 1999: 19).

2.6.5 Technical factors

Technical factors involve practical knowledge of applying the conceptual design of an ABC system within an organisational context, which mainly includes the identification of a suitable number of cost drivers and activities, selection of activities that relates to products, linkage between ABC and organisational strategic objectives and an understanding of the capability of existing computer systems to support ABC systems (Fei and Isa 2010: 145). Hence, technical problems are those that are specific to the technique of activity-based costing.

There are practical problems in choosing cost drivers (Lucey 2009: 124). Difficulty in gathering data on cost drivers and difficulty in designing system drivers are often cited as barriers to the implementation and use of ABC (Anderson and Young 1999: 525). In addition, measuring these attributes can be expensive. Lana and Fei (2007: 253) reviewed past empirical research about factors influencing ABC success and summarised technical factors as key considerations in the successful implementation of ABC.

2.6.6 Other factors affecting the adoption and implementation of ABC

2.6.6.1 Decision usefulness of cost information

Baird *et al.* (2004: 394) examined the association between the extent of adoption of ABC with organisational factors, such as size, decision usefulness of cost information, business unit culture dimensions of innovation, outcome orientation and tight versus loose control. In particular, decision usefulness, cultural dimensions of outcome orientation and tight versus loose control were associated with the successful adoption of ABC. Similarly, the survey by IMA also found that firms would most likely adopt ABC depending on the decision usefulness of cost information (Krumwiede 1998: 33).

The decision usefulness of cost information to a system is shown by the information's relevance to managers and its compatibility with the firm's strategy (Anderson and

Young 1999: 550). For instance, when prices are dictated by the market there is no need for a highly reliable product cost system. ABC can be an extremely useful tool in decision making for a company selling multiple products within a highly competitive pricing industry. According to Fei and Isa (2010: 144) ABC provides partial solutions during product costing, customer costing, channel profitability, process improvements, product mix and volume decisions. Hence, firms can use the information generated through ABC in negotiations with suppliers for cost reduction efforts (Copper and Kaplan 1992: 2).

Contrary to the findings of a number of studies (Baird *et al.* 2004: 394; Krumwiede 1998: 33), Drury and Tayles (2005: 75) found a different set of factors linked to the successful adoption and implementation of ABC. These were the level of product diversity, size, extent of standardisation/customisation of the product range, and the sector in which the company operates. Factors that had no relationship with the adoption of ABC were the level of competitiveness, cost structure and the importance of cost information for decision making (Drury and Tayles 2005: 75). Similarly, Cohen *et al.*'s (2005: 997) research supported the findings of Drury and Tayles (2005: 75) that the intensity of competition and the company cost structure have no impact on whether ABC is adopted or not. According to Wessels (1999: 2), fierce competition usually increases the need for accurate costing and could, therefore, lead to the adoption of ABC by an organisation. However, companies that have implemented ABC do not necessarily face higher competition than companies that have not implemented it. Thus, Wessel (1999: 2) suggests that this could indicate that ABC is used for other purposes than pure costing.

2.6.6.2 User's perceptions

McGowan and Klammer (1997: 234-235) found a positive relationship between user involvement and user perception of the quality of information produced in relation with the successful implementation of ABC. The influences on user perceptions of ABC appear to be based on whether the information is more useful and more reliable than information that was generated previously. For end-users, perceptions of usefulness are based on the visual presentation of the information, relevance to the decisions being made and whether the information can easily be understood. Some end-users

are content to be told by 'the experts' that the information is reliable, while some are satisfied from the instruction given as well as reading reports, that show its reliability. Others will seek much more detail with regard to the derivation of the costings before reservations are removed, especially if the costings do not agree with preconceptions (McGowan and Klammer 1997: 235).

A number of organisations have not adopted ABC because of the perception that ABC is no more accurate than traditional systems or that ABC is a passing fad not worth investing in or that it's only suited to the manufacturing sector (Sartorius *et al.* 2007: 7). Moreover, the adoption and implementation of ABC has generally been associated with the perception that it poses a number of technical problems (Lana and Fei 2007: 253). As a result, researchers have observed that traditional costing systems are still the most widespread costing systems in a number of sectors that include universities (Naidoo 2011: 110).

The following section provides the background to objective 3, which is to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected department at DUT.

2.7 DESIGN OF AN ABC COST ACCOUNTING SYSTEM

There are six steps involved in the in the development of an ABC system (Seal 2015: 280). The steps presented below are adapted from Horngren, Sundem, Burgstahler, and Schatzberg (2014) and Garrison *et al.* (2015).

Step 1: Identifying and defining main activities as well as activity pools

The first step in designing an ABC system is to conduct an activity analysis to identify the key activities, resources, related cost drivers and the cost objects of an organisation (Baird *et al.* 2004: 386). According to Horngren *et al.* (2014: 16), these components, together with the purpose of the new system, determine the scope of the ABC system. Studies describe this stage as the lowest level or initial step in activity management (Gosselin 1997: 106). This phase analyses the processes (activities) a firm follows to produce a good or service, and often uncovers many non-value-adding

steps, which can be eliminated. It may also highlight previously indirect or even unallocated costs (Horngren *et al.* 2014: 165).

Staff are asked to identify the main tasks in which they are mainly involved. The most prevalent methods used in collecting data for setting up ABC systems have been interviews (Granof *et al.* 2000: 14; Ellis-Newman 2003: 338), electronic surveys (Reich and Abraham 2006: 12; Krishnan 2006: 80) , timesheets, staff activity data analysis from documents, such as university annual reports, departmental budgets as well as an organisation's general ledger (Ellis-Newman 2003: 338), systematic observations (Papadeas 2013: 1437), mail questionnaire surveys (Toompuu and Põlajeva 2014: 1017; Naidoo 2011: 109) and revolving door workshops (Reich and Abraham 2006: 12). Research carried out at the University of Wollongong in Australia by Reich and Abraham (2006: 12) demonstrated that the revolving door workshops are an effective method of the critical process of staff activity data collection for setting up university cost drivers as part of the broader topic of activity-based management in universities.

Activity analysis includes gathering data from existing documents and records, as well as collecting additional data using questionnaires (Gosselin 1997: 106), observations (Ellis-Newman 2003: 338) or interviews (Reich and Abraham 2006: 12) of key personnel. An activity analysis begins with a broad description of activities required to complete a product or service (Bloomberg 1993: 223). This involves clearly identifying the processes, which support a product, and avoiding some of the systemic inaccuracies of traditional costing.

Through activity analyses, firms identify the work or tasks they perform to carry out their operations. The purpose of activity analysis is to identify the relationships among key activities and the resources consumed. The analysis describes what activities are carried out, how they are done, the time spent in doing them and what resources are used in doing them (Bloomberg 1993: 223). Hence, activity analysis is a breakdown of activities that involves splitting activities of the business process.

Kaplan and Anderson (2007) brought out a new book that tried to make activity-based costing easier called TDABC (time-driven activity-based costing). It attempted to relate

the measurement of cost to time. As Kaplan and Anderson (2007: 7) put it, only two questions need to be answered in TDABC:

- How much does it cost per time unit to supply resources for each business process?
- How much time is required to perform the work needed for a company's products, transactions and customers?

With the help of industrial engineers and management accountants, an ABC project team can also collect activity data by observing the work performed and making a list of all the activities involved. Activities are analysed or classified by cost behaviour, into categories that reflect the different ways in which different activities consume resources. The activities are then grouped together at the appropriate level, that is, unit-level costs, batch-level costs, product-level costs and facility-level costs. Hence, setting up an ABC system involves a hierarchical cost driver analysis. Activities are set into this activity hierarchy planning as shown in Table 2.2.

Table 2.2: Levels of costs in ABC		
Classification Levels	**Definition**	**Types of costs**
Unit-level costs	This is a type of activity performed for each individual unit of product or service of the firm	Direct material Direct labour Inspecting every unit
Batch-level costs	A type of activity performed for each batch or group of units of products or services	Purchase orders Machine set-ups Material handling Inspection Movement Scrap if related to batch Scheduling production
Product/Process-level cost	A type of activity that supports the production of a specific product or service	Designing products Purchasing parts Engaging in engineering changes to modify products
Organisational/ Facility-costs	Supports operations in general. These are business or infrastructure-sustaining activities. Products do not cause these activities or customer service needs and such activities or costs cannot be traced to individual units, batches or products	Factory property taxes and insurance Building depreciation Plant and division Manager's salary Organisational advertising Rent Maintenance of general purpose machines Managing the plant

Adapted from Cooper (1990: 36)

A cost driver is a measure related to how activities consume resources. The cost drivers used in an ABC system require the measurement of some unique attributes of each product. The best approach is to identify the resources that constitute a

significant proportion of the products and determine their cost behaviour (Lucey 2009: 131).

According to Lucey (2009: 124) there are no simple rules that pertain to the selection of cost drivers. If several are long-term variable costs, a transaction-based system may be considered. For example, using raw material invoices as a cost driver requires measuring the number of raw material invoices consumed by each product.

Step 2: Determining the relationships among cost objects, activities and resources

This phase of the activity based analysis entails identifying the relationship among key activities and the resources consumed. At this stage, activities are identified and grouped together in activity pools. The pools or buckets may include fractionally assigned costs of supporting activities to individual products as appropriate (Martin 2009). Typical resource consumption cost drivers that include human resources costs are subsequently assigned to indirect administrative or indirect management costs.

As activities drive the cost of resources used in operations, a firm would then choose resource consumption cost drivers based on cause-and-effect relationships. Examples of these cost drivers are labour hours for labour-intensive activities, employees for payroll-related activities, set-ups for batch-related activities, moves for material handling activities, machine hours for machine repairs and maintenance, square feet for general maintenance and cleaning activities (Lucey 2009: 126-128).

Step 3: Collecting relevant data concerning costs and the physical flow of the cost driver units among resources and activities

In general, predetermined rates for allocating indirect costs to products are computed as follows:

Predetermined rate = Estimated indirect cost / Estimated volume of allocation base

Therefore, costs are allocated to a product by multiplying each activity's predetermined rate by the volume of activity used in making it.

In the two-stage of the activity based costing system, the first stage consists of activities and not departments. Instead of a department rate, activity-based costing computes a cost driver rate for each activity center. This means that each activity has an associated cost pool. If the cost driver for material handling is the number of production runs, (illustrated as Step 1 and 2 in Fig 2.4) for example, the company must be able to estimate the costs of material handling for the period and, ideally, track the actual cost of material handling as it is incurred during the period.

Hence, this stage progresses to compute activity rates for each cost pool. The activity rates are computed by dividing the total cost for each activity by its total cost. Activity rates are determined as:

Activity rates = Budgeted Activity/ Total activity base usage (Cost driver)

For example, $320 000 total annual cost for customer orders cost pool is divided by the total of 1000 customer orders per year to arrive at the cost driver rate or activity rate of $320 per customer order. In Fig 2.4, for example, activity rates are illustrated as $ per set hour, $ per production run and $ per machine hour. The calculated activity or cost driver rates are used to trace the appropriate amount of overheads to the product or cost object.

Step 4: Calculating and interpreting the new activity based cost information

The fourth step in the implementation of ABC is called second stage allocation. The second-stage allocation involves assigning cost of activities or activity cost pools to cost objects based on the appropriate activity consumption cost drivers (Lucey 2009: 18). The activity rates are then used for assigning overhead costs to products and customers.

Assigning activity costs to products involves multiplying the cost driver rate for each activity by the number of units of the cost driver in each product or the level of cost driver activity used by the product. Figure 2.2 summarises the four stages or steps of developing activity based costs.
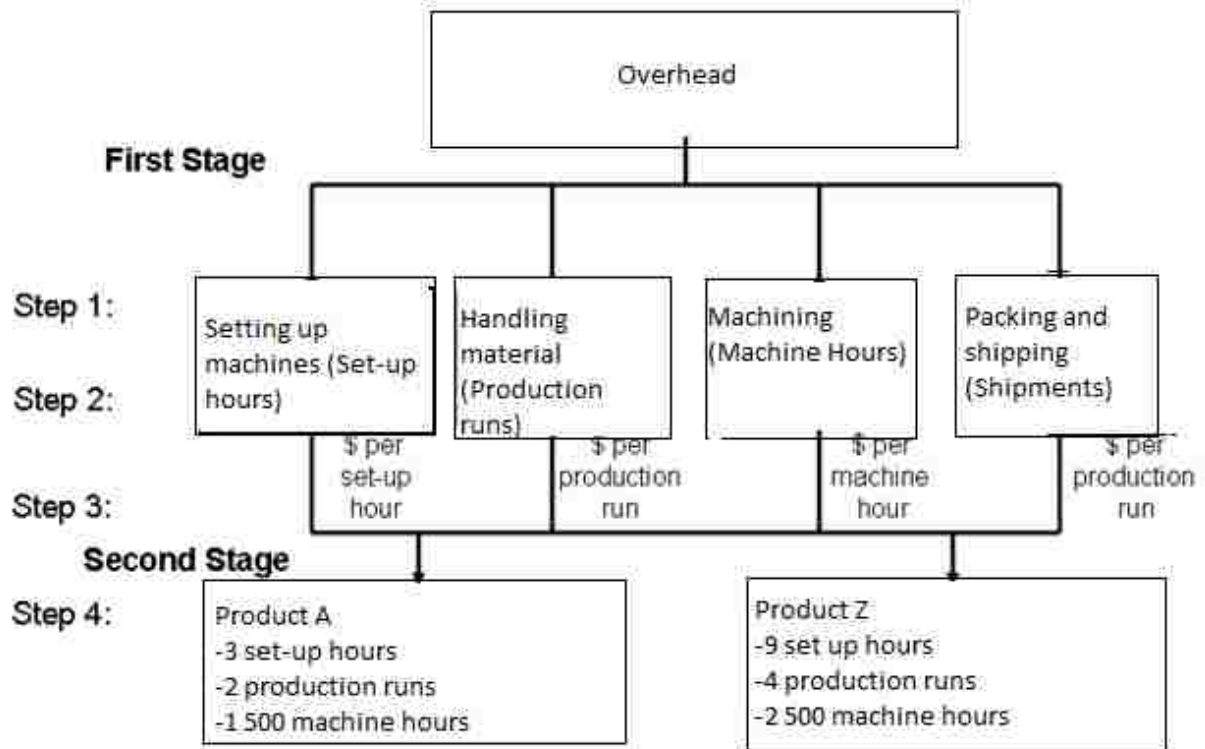
Fig 2.4 Stages of developing activity based costs (Source: Salinas 2017)

Step 5: Preparing management reports

Once the ABC costing analysis is complete, the cost data is compiled into a concise and coherent manner for cost object and process owners. This communication of the costing analysis is critical to justify the cost of the analysis.

To curb some of the difficulties associated with ABC implementation, Lana and Fei (2007: 253) suggest the following:

(i) Participation of external consultants
Technical problems are significantly reduced when outside consultants are employed. The amount of assistance from external consultants influences the success of the

implementation of ABC as outside consultants have specialised knowledge on ABC that can be used to the benefit of their clients.

(ii) Software packages

Studies suggest that the selection of a suitable ABC model and correct software is essential in the successful implementation of ABC (Sartorius *et al.* 2007: 15). The architectural and software design of ABC systems involves the extent to which commercial ABC software is used or the extent to which customised ABC software is used. However, a study carried out by Shields and McEwen (1996), cited by Fei and Isa (2010: 145) shows that the emphasis on the availability and use of commercial software versus customised software did not prove important to the success of ABC in the end.

(iii) Stand-alone versus integrated system

The difficulties associated with the adoption and implementation of ABC can be minimised when the ABC software is compatible with an existing IT system. According to Anderson and Young (1999: 544) whether the ABC system is integrated with other accounting systems or stands alone, compatibility with an existing IT system is an essential factor in the successful implementation of ABC.

2.8 SUMMARY

Studies have shown that there is a positive association between ABC and an improvement in return on investment (ROI) when it is used concurrently with other strategic initiatives in complex as well as diverse firms and in environments where costs are relatively important. In summary, there is widespread agreement (Garrison *et al.* 2015; Cagwin and Bouwman 2002; Shields 1995; Malmi 1997; Anderson *et al.* 1999; Gosselin 1997; Shields 1995; Anderson 1995; Cooper and Kaplan 1992; Argyris and Kaplan 1994; Shields 1995; Foster and Swenson 1997; McGowan and Klammer 1997; Krumwiede 1998; Anderson and Young 1999; Anderson *et al.* 2002) in the literature on the factors that affect the successful adoption and implementation of ABC. Therefore, this current study investigates how important these factors are in the adoption and possible implementation of ABC in a state university in SA. However, as

with any course of action, the implementation of ABC is justified if the costs of installing and operating the system are more than offset by the long-term benefits.

2.9 ABC CONTEXTUALISED IN THE HIGHER EDUCATION SECTOR IN SOUTH AFRICA

For the purpose of this study, the concepts discussed previously are further explored and contextualised in a South African Higher Education's (HE), University of Technology (UoT), more specifically in the DUT context. According to the Department of Education (DE) (Republic of South Africa 1997) in SA, financial feasibility and sustainability are crucial in the HE sector. For instance, the former South African Education Minister, Professor Kader Asmal, proposed the merger of HE institutions to address the financial challenges of institutions by improving financial stability and viability (Jansen 2002: 158). The subject of this study, DUT, was a result of a HE merger of Technikon Natal and M. L. Sultan Technikon, that also points to financial and operational aspects as being the key focus areas (Daweti 2015: 9) in the sector. According to Jansen (2002: 10), the merger of these two institutions took place to increase cost effectiveness and reduce duplication in the HE sector.

2.9.1 Overview of the Higher Education Sector in South Africa

HE in SA has a rich history that is associated with changes in the political, economic and social systems in the society. Changes in HE continue to take place against a background of an educational revolution in curriculum reform and restructuring, amendments to the HE legislation, mergers in the HE sector, as well as enhanced national and international competition (Du Pré 2010: 13). In the post-apartheid era, the DE in SA set a number of initiatives that were mainly aimed at promoting financial stability, accessing learners and improving institutional operations (Jansen 2002: 8).

Studies show that institutions previously had varied capacities for providing higher education that were based on government support (Jansen 2002: 157). Therefore, in the post-apartheid era, the government argued that institutional mergers and transformation were necessary (Davids and Waghid 2016) to address these limited capacities. Institutional mergers would facilitate equitable student access to higher education. In addition, by merging higher institutions of learning, the government

aimed at eliminating what was then regarded as unnecessary duplication in academic and administrative service provisions. As a result, the South African democratic government proposed the creation of fewer, larger, more cost effective and more efficient HE institutions (Davids and Waghid 2016).

The National Commission on HE and the subsequent Education White paper 3 (Republic of South Africa 1997), both addressed the need for a rationalisation of the sector towards greater effectiveness (Hay and Fourie 2002: 101). Consequently, Section 23 of the HE Act (No 101 of 1997), as amended, gives the Minister of Education the authority, after consulting with the Council for HE, to merge two or more public higher education institutions into a single public higher education institution. Eventually, institutions of higher learning in SA underwent a restructuring process that was aligned with the national HE strategic goals. Table 2.3 shows the 23 state-funded or public HE universities (Higher Education South Africa 2014: 3) which were established after the reduction of public universities from 36 to 23 in the year 2002 (Daweti 2015: 27).

Table 2.3: Merged South African higher education institutions and name changes	
Merged institutions	**Name changes**
University of Natal and University of Durban Westville	University of KwaZulu-Natal
University of North West and Potchefsroom University	North West University
Technikon Pretoria, Technikon North West and Technikon Northern Gauteng	Tshwane University of Technology
University of Fort Hare and Rhodes University East London Campus only	Fort Hare University
University of Port Elizabeth, Port Elizabeth Technikon and Vista Campus in Port Elizabeth	Nelson Mandela Metropolitan University
University of the North and Medical University of South Africa	University of Limpopo
Rand Afrikaans University and Wits Technikon	University of Johannesburg
Cape Technikon and Peninsula Technikon	Cape University of Technology
University of Pretoria and Vista University Mamelodi Branch Only	Pretoria University
M. L. Sultan Technikon and Technikon Natal	Durban University of Technology
University of South Africa and Technikon South Africa	University of South Africa

Source: Daweti 2015: 26

Eleven of these HE institutions are generally regarded as traditional universities, six as UoTs (formerly known as Technikons) and six as comprehensive universities (established as a result of mergers between traditional universities and former Technikons). In addition, two new public universities, Sol Plaatje University in the Northern Cape Province and the University of Mpumalanga in the Mpumalanga Province were established as legal entities in 2013 (DOHET 2014: 5).

In the year 2012, a total of 953 373 students were registered in these public universities. The universities are heavily dependent on student tuition income and are also funded by the state. They generally have a low base of private income. This is contrary to private universities that are not funded by the state but depend largely on students' tuition fees as well as the private sector investment (Teferra and Knight 2008: 389).

The advantages of the mergers that took place in state funded universities included increased 'cost effectiveness, a wider skills pool, increased effective resource allocation for providing a better education service and a wider curriculum scope for increasing the depth of the education service provided by merged institutions' (Daweti 2015: 49). The voluntary merger between Technikon Natal and M. L. Sultan Technikon that was initiated in 1989 and came to an end in 2004 was also aimed at taking advantage of these potential benefits. It remains the only voluntary merger in South African higher institutions of learning as the rest were the outcome of state intervention (Chetty 2010: 202). Therefore, in essence, one of the perceived benefits expected after the merger process in public universities was cost saving due to reduced institutional operating costs.

2.9.2 The background of the merger between Technikon Natal and M. L. Sultan Technikon

Technikon Natal was founded in the early 1900's. The founder was, Dr Samuel George Campbell, a physicist, who was committed to building a HE institution to advance and develop the white ruling class in the Natal province. Technikon Natal was one of the oldest tertiary institutions in the KZN province. As the institution's academic programmes changed with time, the institution underwent a number of name changes that included Technical Institute, Technical College and, in later years, Technikon Natal (Daweti 2015: 47). Over the years, Technikon Natal grew its student numbers to a point where in addition to the Berea campus, two more campuses in the Midlands, namely Indumiso campus and Riverside campus, were established. Together the three campuses offered a variety of study programmes in different faculties that included the Arts, Commerce and Engineering (Chetty 2010: 184).

In close proximity to Technikon Natal was M. L. Sultan Technikon College. It was founded by Hajee Malukmohammed Lappa (shortened to M. L.) Sultan. In 1927, M. L. Sultan acquired additional funds to secure the establishment of a HE institution through an advocate by the name of Albert Christopher. This was shortly after the drafting of the Cape Town Agreement under which the Indian population, that had arrived in the 1860s to work on sugar plantations, faced reparations if they did not possess a formal educational qualification in SA. The M. L. Sultan Technikon College

remained, as a result of apartheid, exclusively Indian (Chetty 2010: 91). Similar to Technikon Natal, M. L. Sultan Technikon also had a number of name changes, such as the Indian Technical Institute, Advanced Technical College and later in the 1970s, M. L. Sultan Technikon. The institution also had branches in Tongaat and Umkomaas in an attempt to be close to its students (Daweti 2015: 47).

Generally, M. L. Sultan was regarded as a historically disadvantaged Technikon. Although M. L. Sultans' accounting records had a surplus whilst Technikon Natal had a deficit (PricewaterhouseCoopers 2000), the similarities between the two institutions outweighed their differences. M. L. Sultan and Technikon Natal provided various study options for students as well as community engagement, with research being of high priority in both institutions. Both technikons offered similar engineering and technology programmes. Technikon Natal offered 67 different study programmes, whilst M. L. Sultan Technikon provided 46 study offerings, and 31 of these study programmes were substantially similar (Chetty 2010: 97). The institutions shared many synergies and similar visions, such as that they both strived for technological leadership in Africa. Historically, the sizes of the two institutions were almost the same which minimised a potential takeover of one institution by the other (Chetty 2010: 89). According to Hunt (2003: 23), the relative size prior to the merger is essential in achieving synergy between the merging institutions. Hence, from a purely practical point of view, in addition to cost effectiveness, the merger of these technikons that were already in close proximity made sense. The merger was declared official on 1 April 2002, and the Durban Institute of Technology (now known as Durban University of Technology) became a single public HE institution.

2.9.3 The transition from Durban Institute of Technology (DIT) to Durban University of Technology (DUT)

For a long time, technical colleges in the apartheid era in SA were not regarded as part of the HE sector (Ngibe 2015: 10). They offered career-oriented certificates and diplomas in the first three years of the tertiary level. In 1979, these Colleges of Advanced Technical Education (CATEs) (Du Pre 2009: vi) were redesignated 'technikons' and recognised as post-secondary HE institutions. After the promulgation

of the Technikon Act 125 of 1993, they were also licensed to offer degrees up to doctoral level (Hunt 2003: 68) in addition to the certificates and diplomas.

Technikon Natal and M. L. Sultan were among these six technikons and the two eventually became a single UoT on 1 January 2004 (Daweti 2015: 46). Five other technikons were also granted the University of Technology status, namely, the Cape Peninsula University of Technology, the Vaal UoT, the Tswane University of Technology, the Mangosuthu UoT and the Central University of Technology. The Durban Institute of Technology (DIT) was formed in 2002 and, subsequently became the Durban University of Technology (DUT) in 2004. Hence, DUT evolved from two similar CATEs to a Technikon and eventually to a UoT.

2.9.4 The Durban University of Technology

DUT has branches in the urban setting of Durban as well as Pietermaritzburg and, in 2016 enrolled approximately 27 023 students. It is one of the highly recognised HE institutions in SA, most notably known for its leadership in technology, productive citizenship and for providing state of the art IT (Lourens 2016: 343) amongst other functions. Notably, DUT is considered an industry leader in the HE sector in KZN (Lourens 2016: 343). Strategically, DUT has embraced the concept of knowledge and aims to 'prepare new generations with the skills, cultural and scientific literacy, flexibility, and capacity for critical inquiry and moral choice necessary to make their own contribution to society' (DUT Strategic Plan 2013: 8).

A UoT, such as DUT is described by Du Pré (2006: 2) as a multi-facetted institution focusing on career-focused education as well as training and offering organisations skilled employees with workplace related experience. DUT plays a crucial role in addressing the skill shortages in SA and HESA describes it as 'the organ of that fine adjustment between real life and the growing knowledge of life, an adjustment which forms the secret of civilisation and allows previously disadvantaged population groups access to higher education.' (Lourens 2016: 61) Hence, DUT offers a combination of experiential and academic learning that makes knowledge practical as well as functional while contributing meaningfully to technological transfer, competitiveness and the enhancement of technologically advanced innovation (Du Pré 2010: 2).

The large, technologically advanced, fomal and competitive environment in which DUT operates enables accurate costing information crucial for all kinds of transactions (Fei and Isa 2010: 144) and makes DUT an ideal candidate for the adoption and implementation of an enhanced overhead costing system, such as ABC.

2.10 Challenges at DUT

M.L Sultan Technikon and Technikon Natal shared a strong history of community contribution and philanthropic investment. However, there were significant differences in their resources, cultures and racial profiles (Jansen 2002: 129). Hence, the resultant merger of the two institutions continues to face a number of challenges and some of them are not only akin to DUT but to the entire HE system in SA.

2.10.1 Overview of academic challenges

Over the years, DUT has had to thrive amidst a rapidly changing HE environment and increased expectations from stakeholders to deliver quality educational programmes. As transformation in the post-apartheid era proceeded in SA, DUT had to make substantial changes to ensure that there was an appropriate balance between its academic priorities and the demands placed on it by the expectations of policy makers (Jansen 2003: 37). It also had to address the social, economic and intellectual development of the society in which it now found itself operating (DUT 2014: 10). Therefore, DUT continued to play the role of pursuing the national agenda on the transformation and restructuring of some major sectors in the society (DUT 2007: 138). DUT has not only had to change in the context of SA, but to embrace the challenges of the African continent and mirror structures, processes as well as practices of international HE best practices (Marshall and Case 2010: 503).

The restructuring or voluntary merging of DUT is one of the areas that posed some challenges in the governance, leadership and management of the university. According to Crous (2004: 391), these areas are often a challenge with multi-campus institutional mergers that are characterised by different academic cultures and institutional traditions. After the transition to a UoT, research became so critical that some staff members not only had to publish but also upgrade their qualifications

(Ngibe 2015: 24). The transformation from a Technikon to a UoT also meant that staff members had to adopt to the needs of balancing lecturing and research (Fourie 1999: 287). The other challenges that are still akin not only to DUT but to the entire HE system in SA are:

- low throughput;
- decreasing government subsidies;
- inadequate research capacity;
- poor preparation/grooming of students for postgraduate programmes;
- inconsistent postgraduate research guidelines and services;
- statutory research permit requirements;
- bureaucracy in the admission process; slow thesis examination processes; poor supervision;
- balancing occupations (employment) and academic work for most postgraduate students; and
- inadequate facilities; and heavy teaching loads for staff (Mutula 2009: 1).

Despite all these setbacks, the role of a UoT, such as DUT, has evolved significantly since SA's democracy in 1994 and is regarded to be a key driver in ensuring the success of the Department of Science and Technology's Ten-Year Innovation Plan (DST 2007: 11) that can assist organisations, industries and the government to identify, achieve and monitor strategic decisions, hence allowing SA to convert ideas into economic growth (Fourie 1999: 287).

2.10.2 Overview of revenue challenges

The Higher Education Institutions (HEI) in SA use the fund accounting system whereby the costs are allocated at the cost centres (Amir *et al.* 2012: 40). These cost centres consist of faculties (campuses), administration and service offices (Amir *et al.* 2012: 39). From 1987 through to 2003, government subsidies to HE institutions were based on the South African Post-Secondary Education (SAPSE) subsidy formula (Singh 2009: 1192). The formula was largely fulltime equivalent (FTE) enrolment driven, and, as a result, funding was heavily weighted by FTE levels (Jansen 2002). Hence, DUT would receive a subsidy from the government on the basis of the number of subsidy

students multiplied by various unit costs. However, the SAPSE formula proved to be problematic as it contributed to institutional inequities by treating all HE institutions as equal (Jansen 2002:157). The White Paper on HE transformation rejected this formula and proposed its replacement with a new model aimed at bringing greater equity and efficiency into the HE system (Daweti 2015: 50).

In the Education White Paper: A Programme for the Transformation of HE it was stated that a new funding framework was required to facilitate the transformation of the HE system (Ministry of Education 2003). The New Funding Framework (NFF) was then introduced and gazetted in 2003 and according to the Council on Higher Education (CHE) (2007: 31), the NFF is goal-orientated and performance-related, thus enabling the distribution of government grants to institutions in line with national goals, priorities and approved institutional plans.

The DHET now allocates funds to universities by means of a government funding formula that focuses largely on the two key outputs of student throughput and research productivity (Ngibe 2015: 15). The government funding formula for universities in SA is now the same for all public universities (based on publications and throughput). HE institutions are assessed by expressing their weighted research output as a percentage of their normed research output and the actual subsidy earned by an institution is equal to the institution's weighted research output (Singh 2009: 1192). As a result, each of the universities in SA has developed strategies to improve the delivery of the research outputs to optimise funding. This has resulted in universities striving to attract respected research oriented academics and formulating structures to boost research outputs in order to generate government subsidy and address the challenges of meeting their research output targets (Ngibe 2015: 15).

However, critics have described the funding formula as detrimental to some institutions, particularly UoTs, such as DUT, that relatively do not have large research output yet (Singh 2009: 1192). According to Singh (2009: 1192), UoTs, that historically have had a lower research output may continue to underperform because they will only be receiving small amounts of funding proportionate to their output. This view has

been illustrated through the government incentives offered for research outputs that are clearly more easily obtained by traditional research-focused universities.

HE UoT institutions, such as, DUT, have, therefore been encouraged to develop links with individual and business partners in a series of new venture partnerships with the private sector in order to create a third stream of income (Du Pré, 2009: 15-17). Du Pré (2010: 4-5) further notes that the value perceived by society of a UoT, such as DUT, depends either on the cost information it generates, or on the transparency of its costs, along with the usefulness of the technology as well as research it develops. Consequently, Lourens (2016: 32) argues that UoTs are now increasingly exposed to marketplace pressures in a similar way to other businesses.

2.10.3 The value of overhead cost management in the Higher Education UoT sector

Like many state universities globally, DUT has operated in a highly regulated, protected and non-competitive environment. Cost increases could be absorbed by increasing the tuition. However, in October 2015, after widespread student protests, the president ruled out any increases in university fees for the year 2016 (Milton 2015). Due to the freezing of fees, reduced government subsidies and limited third stream funding, keeping costs low and being cost efficient became imperative in state-funded institutions.

The HEI costing system is designed for 'compliance and reporting purposes rather than for providing the information needed for effective management' (Madwe 2017: 19). Universities allocate revenue from the central budget to carry out their operations (Naidoo 2011: 109). Although accounting systems are set up to broadly categorise costs, tertiary education institutions rarely assign costs to the activities that comprise the functions. Hence, there is no break down of the functions into smaller units within the institution to allow internal decision makers to easily see how resources are used. The university cost structure is usually divided into responsibility centres, such as departments, schools and faculties, department or school. Under this system, the cost per student is usually calculated by taking into account the responsibility centres or faculty costs only. Furthermore, universities, according to Ellis-Newman (2003: 333),

now have more support costs, product ranges or offer higher qualifications and more varied programmes than before. This leads to a number of cost distortions and problems that indicate that the costing system is outdated, as shown in Table 2.4.

Table 2.4: Indicators of an outdated costing system in universities	
Indicator	Probable cause
Faculties want to drop programmes or services that the costing system claims are profitable.	These programmes or services use more resources than is indicated by their programme or service cost.
Profit margins on individual programmes or services are difficult to explain. For example, a programme or service has a higher than expected cost, and lower margin.	The programme or service cost system is distorting the service or programme's cost.
Programmes or services that are difficult to deliver have high profit margins.	The costing system understates the cost of these products.
Management develops its own 'private' systems for estimating support or service and programme costs.	Management have lost faith in the official costing system.
The management accountant spends a lot of time on special programme or service costing systems.	The costing system does not provide reliable information for programme or service related decisions.
There are no competitors for programmes or services that the costing system claims are profitable.	The costing system is understating the costs of these programmes or services.
Competitors prices appear unrealistically low.	The costing system is overstating the costs of these programmes or services.
Students or customers are not deterred by programme or service increases.	The costing system is understating the costs of these programmes or services. Competitors already charge higher prices.
At year end, actual overhead far exceeds overhead applied to programmes or services.	Applying overheads to programmes or services using the overhead application rate understates the overhead resources consumed. Programmes or services are understated.
The university consistently wins bids for services that are difficult to deliver and loses bids for simple services.	The costing system is understating the costs of complex services and overstating the costs of simple services.

Adapted from Cooper (1989)

Cost management allows universities to respond to market challenges and provide them with the competitive edge. Godin (2002: 39) reinforces the view that cost management should be embedded in the objectives and values of UoTs. The observation by Godin (2002: 39) is entrenched in DUT's strategic objectives (DUT 2013: 9). However, Daniels, Lauder and Porter (2009: 121-122) caution that there is an important difference between merely including cost management in the objectives of a HE UoT institution and actually managing overhead costs effectively.

Drury (2011: 225) alludes to the fact that, over the years, little attention was given to developing cost systems that accurately measured the costs and profitability of individual services or specific programmes. At the same time, a number of cost management tools, such as ABC, are now potentially available to help universities in controlling costs when dealing with reduced revenues. Argued to be superior to the traditional volume-based costing system, ABC has increasingly attracted the attention of practitioners and researchers alike as one of the strategic tools to aid universities in better decision making, planning and cost control. Ellis-Newman (2003: 334) suggests that universities are ideal candidates of ABC.

The goal of ABC is to accurately identify and measure the relationship between resources and activities and between output and activities. By identifying the causal relationship between costs and activities, ABC can be used to link a university's operational performance to its actual financial performance. This link is vital for public sector organisations such as state universities because they usually determine future costs based on budgeted volume of activities. In addition, ABC can reveal how well an organisation's activities align with its strategic goals and objectives (Oseifuah 2013: 39).

Studies carried out on the relevance of ABC in the Greek public sector revealed that, when combined with new technologies and new methods of management, ABC could resolve the deficiencies of the public sector and help produce service at minimal cost (Vazakidis *et al.* 2010). Oseifuah (2013: 42) identifies that, under appropriate enabling conditions, ABC can provide organisations with improved cost information for improved decision making and improved performance. The enabling conditions for the

adoption and implementation of ABC include top management support, linkage of the cost management system to competitive strategies; linkage of the cost management system to performance evaluation and compensation; sufficient internal resources; training in designing, implementing and using cost management systems; non-accounting ownership; and consensus about and clarity of the objectives of the cost management system (Oseifuah 2013: 46).

2.10.4 Summary of ABC Contextualised to the South African HE sector

The HE landscape in SA has undergone significant changes and transformation in recent decades that now requires all state-funded institutions to be more competitive and to provide high quality services to attract and retain top students. It could be argued that the task of UoTs, such as DUT, is now to find the necessary synergy between the required economic growth and postgraduate research output. Cost management continues to be a crucial factor in the financial management of state universities to achieve economic growth particularly in a time period characterised by limited government funding. Universities are arguably in an especially good position to achieve this provided they can develop their cost and management systems to manage their costs more effectively. ABC is designed to provide more accurate information about academic programmes, support activities and specific student type costs so that management can focus its attention on the issues and processes with the most leverage for increasing profits. Hence, armed with more modern and more effective cost and management tools, universities can continue to protect the existing customer loyalty towards DUT as a student centred institution offering high quality education (Lourens 2016: 343) by adapting to the challenges of cost management and ensuring that the institution meets the expectations of its customers, stakeholders and the external environment.

2.11 SUMMARY OF CHAPTER

Costs can be classified in a number of ways, but a fundamental and important method is that of cost classification by purpose, which divides costs into direct and indirect or overhead costs. The shift from labour-intensive to capital-intensive production, coupled with the movement to multi-product manufacturing, may have resulted in a significant increase in indirect costs. However, indirect costs, pose some challenges

when an attempt is made to trace them to cost objects (Mushonga 2015: 16). ABC uses relatively more cost drivers in allocating overheads compared to the one or two volume-based cost drivers used in traditional costing systems. ABC provides information on time spent on activities as well as the labour and non-labour expenses associated with them and not just what the activities 'should' cost.

Based on the literature reviewed in this chapter, it is possible to identify the enabling or success factors, which potentially influence the adoption and implementation of ABC at DUT. Literature suggests that there are a number of enabling conditions or incentive structures that can allow organisations to successfully adopt and implement ABC. At the same time, there is evidence of ABC implementation failures which suggest that there are also barriers to ABC implementation. The success factors and barriers to ABC implementation have been discussed and as far as possible, contextualised to the higher education sector. The key factors identified include strategy, environmental/contextual factors, information technology, behavioural and organisational factors, technical factors, decision usefulness of cost information and system adaptability factors. These factors can be success factors or barriers to ABC implementation depending on the organisation's environmental (internal and external) context.

There is a general concern about the ineffectiveness of HEIs in managing their financial resources as a result of using the traditional volume-based costing system (Madwe 2017: 20). It has been argued that the lack of a profit motivation in the public sector, has resulted in a lag of adoption and implementation of enhanced cost management systems compared to the private sector, yet the introduction of an enhanced cost accounting system in a public sector can enhance organisational performance (Fountaine 2011: 36). A number of studies (Oseifuah 2013; Ellis-Newman 2003; Granhof *et al.* 2000) advocate for the use of ABC within a university environment in order to allocate overhead costs more accurately and effectively. According to a study by Madwe (2017: 26) in TVETS, ABC can help state-funded institutions determine the best way to meet their goals by monitoring the use of resources in particular activities. However, successful implementation of the ABC system depends on a number of contingent factors investigated in this study within the

context of a state-funded university, i.e., DUT. Arising from the theoretical exposition depicted in this chapter, the factors that may influence the adoption and implementation of an enhanced overhead costing system in a South African state university such as DUT were identified. The next chapter highlights the research methodology used in this study.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 INTRODUCTION

The preceding chapter reviewed the relevant literature on ABC, the factors that influence the adoption and implementation of ABC and provided a background on DUT. The purpose of this chapter is to describe the methodology used to address the research aim which is to determine and analyse the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in SA, using DUT as a case study. The research methodology focuses mainly on the research design, the sampling frame or units of analysis, the research methods as well as research instruments that were used in data collection for the purposes of solving the problem statement. The chapter begins by outlining the overall research design adopted, together with a justification of the selected research design. The subsequent sections outline the procedures followed and the research instruments used. This includes aspects, such as validity and reliability of the research instrument as well as pre-testing of the survey instrument. Finally, the limitations and ethical issues are considered.

3.1 RESEARCH DESIGN

A research design addresses questions that guide or determine the path followed in the research process to systematically or scientifically answer research questions (Kumar 2014: 19). This study followed the stages suggested by the research onion (Saunders *et al.* 2012: 160) to inform the choice of research methods. The entire research process is presented as an 'onion' (Figure 3.1); this entails going through a series of essential steps to achieve the research aim (Saunders *et al.* 2012: 85). The research 'onion' was developed by Saunders *et al.* (2012: 160) to describe an effective progression through which a research methodology can be designed. According to the research 'onion', a methodical study starts with the research philosophy and is followed by the research approach, research strategy, time horizon as well as the data collection methodology (Saunders *et al.* 2012: 160) for achieving the research aim.

The research onion's usefulness lies in its clarity as well as adaptability for almost any type of research methodology and it can be used in a variety of contexts (Saunders *et al.* 2009: 106). Therefore, this study adopts the 'onion' model, as illustrated in Figure 3.1. in order to realise a holistic and systemic approach.
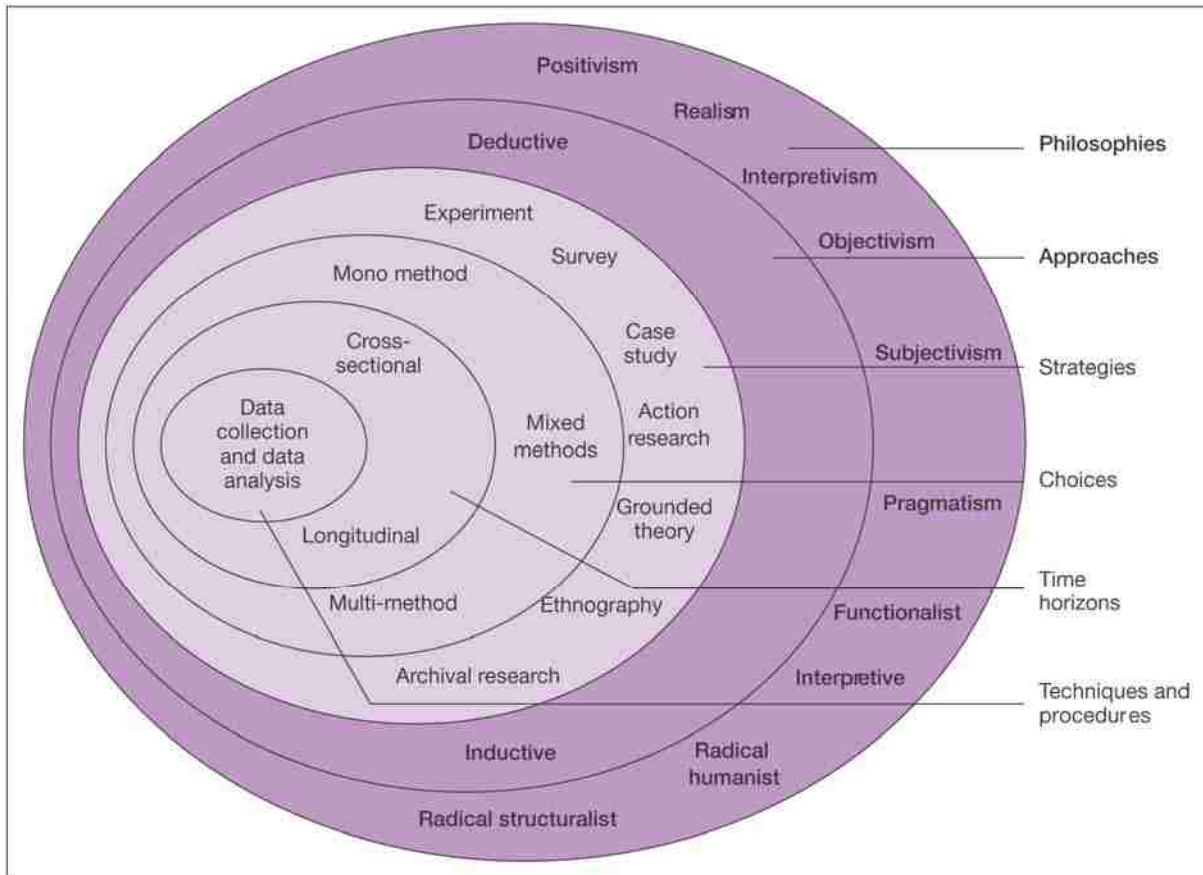
Figure 3.1: The research 'onion' (Source: Saunders *et al.* 2012: 85)

The subsequent sections describe the different layers of the research 'onion' as contextualised in this study.

3.1.1 Research Philosophy/Paradigms

All research is based on some underlying philosophical assumptions that constitute what 'valid' research and research methods are appropriate for the development of knowledge in a given study. The different types of research philosophies and approaches allow the researcher to understand the best way to conduct research (Sekaran and Bougie 2016: 28). The term 'research paradigm' refers to 'the broad philosophical orientation to knowledge and the world, for the organised study of the

world that informs research design' (Coe, Waring, Hedges and Arthur 2017: 6). Examples of research paradigms include the positivism, realism, objectivism, subjectivism, functionalist, radical humanist, radical structuralism, interpretivist, naturalistic, critical feminist and post-modernist paradigms. The most common of these philosophical assumptions are the positivism, interpretivism and pragmatic paradigms. These are discussed in the sections below as this study uses the concurrent, embedded mixed methods that is framed within the pragmatism paradigm (Swain 2017: 205). The pragmatism paradigm combines both positivism and interpretivism paradigms.

3.1.1.1 Positivism

There are two extreme as well as mutually exclusive paradigms on the nature and sources of knowledge, namely, positivism and interpretivism (Antwi and Hamza 2015: 222). Science is recognised as the cornerstone of the positivism paradigm (Sekaran and Bougie 2016: 28). In other words, the positivism research philosophy depends on quantifiable observations that lead to statistical analysis. Swain (2017: 57) explains that the purpose of positivism is to seek generalisable theories or explanations that are grounded in the natural science laws. Positivism often involves the use of existing theory (explanation) to develop a hypothesis that is tested during the research process.

In positivism studies, the researcher is independent from the study and there are no provisions for human interests within the study. At the ontological level (the nature of reality), positivists assume that the reality is objectively given and is measurable using properties that are independent of the researcher's instruments. This entails that knowledge is objective and quantifiable (Swain 2017: 57). A positivist researcher, therefore, uses deductive reasoning to generate theory from which specific hypotheses evolve and are tested. Inference from experiments is then used in constructing theory to generate laws governing nature (Myers 2013: 38).

3.1.1.2 Interpretivism

Interpretivism is 'associated with the philosophical position of idealism, that rejects the objectivist view that meaning resides within the world independently of consciousness' (Collins 2010: 143). The interpretive paradigm suggests that reality consists of people's subjective experiences of the external world; thus, they may adopt an inter-subjective epistemology and the ontological belief that reality is socially constructed (Myers 2013: 39). According to Burrell and Morgan (1979), cited by Swain (2017: 38), interpretivism is not a single paradigm but a large family of diverse paradigms that contend that reality is constructed and has no universal truth. Interpretivism asserts that the truth is best understood by the closeness of participants in their natural settings and through critical subjective and inductive reasoning (Saunders *et al.* 2009: 116). This implies that meanings are created or constructed by people and are, therefore, subjective, rather than from a pre-existing and objective source (Swain 2017: 38). It also affirms the assertion of the existence of multiple truths based on the researcher's view of the world. Interpretive research, thus, illuminates the researcher's view and experiences through such processes. The interpretivist approach is based on a naturalistic approach of data collection, such as interviews and observations. Secondary data research is also popular with the interpretivism philosophy. In this type of study, meanings emerge usually towards the end of the research process.

3.1.1.3 Pragmatism

Pragmatism combines both the positivist and interpretivism positions within the scope of a single research according to the nature of the research question (Creswell 2014: 19). Pragmatic research recognises that there are many different ways of interpreting the world and undertaking research. It asserts that no single point of view can ever give the entire picture and that there may be multiple realities (Saunders *et al.* 2009: 109). The pragmatism view suggests that research may be conducted for particular reasons, for example, to find answers to certain questions (Coe *et al.* 2017: 8). Therefore, according to the pragmatism research philosophy, research questions are the most important determinant of the research philosophy. In order to analyse a unique phenomenon fully, it is necessary to complement the inductive approach with

deductive thinking in order to solve a real-world problem. This is the approach adopted in this study.

The pragmatic approach provides for the adoption of mixed methods of data collection, which opens opportunities for an objective and subjective analysis of the views of participants (Coe *et al.* 2017: 8). Therefore, the philosophical perspective adopted in this study, as shown in Figure 3.1. is that of the pragmatic research philosophy. The study used qualitative and quantitative data collection instruments, namely a questionnaire and in-depth interviews. Therefore, this study draws heavily on the pragmatism paradigm.

Table 3.1 shows a summary of the research philosophies that guide the selected research approaches and methods, the nature of reality (ontology) and the different values (axiology) (Wilson 2010).

Table 3.1: Positivism, interpretivism and associated epistemologies				
Research Paradigm	Research approach	Ontology	Axiology	Research strategy
Positivism	Deductive	Objective	Value free	Quantitative
Interpretivism	Inductive	Subjective	Biased	Qualitative
Pragmatism	Deductive/Inductive	Objective or Subjective	Value free/biased	Qualitative and/or quantitative

Source: Wilson (2010)

3.1.2 Research Approach

According to Swain (2017: 38), there are two major types of research approaches, namely, deductive (fixed and collects quantitative data) and inductive (flexible and associated with qualitative data). These two broad and contrasting methods of reasoning involve two fundamentally different philosophical and research 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. It is the approach to research that is typically associated

with a scientific, positivist design that seeks to establish a new theory. Therefore, the deductive approach is used more with the positivism research philosophy that was discussed above. The inductive approach is a theory-building process, starting with direct observations of specific instances and seeking to establish generalisations about the phenomenon under investigation. It is more suited to a phenomenological research philosophy (Krippendorff 2013: 485) and seeks to confirm or reject an existing theory.

Creswell (2014: 24) states that one of the key differences between deductive and inductive approaches lies in how existing literature and theory are used to guide the research. The deductive approach is designed to test a theory. Thus, literature is used to identify questions, themes and interrelationships before data is collected. On the other hand, the inductive approach builds a theory as the research progresses. The deductive reasoning is more focused while inductive reasoning, by its very nature, is more open-ended and exploratory, especially at the beginning of the process (Swain 2017: 38).

Although these research designs seem quite different, both designs can actually be complementary and research often moves between an inductive and a deductive approach. Creswell (2014: 68) refers to this multi-strategy movement as the mixed methods approach. It has been 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 (Saunders *et al.* 2009: 127).

This study used a questionnaire to generalise the results and then used interviews to help explain the results of the questionnaire. This concurrent explanatory design in this embedded mixed methods research consists of two distinct phases of data collection before integrating the findings. In this embedded mixed methods design, a small amount of either qualitative data is included within a larger quantitative study. This qualitative data plays a supplemental or supporting role within the overall design. No data source has any greater weight over the other as both are seen as being of equal status in trying to answer the research questions (Swain 2017: 200). The factors that influence the adoption and implementation of ABC were derived from literature and

then investigated (deductive). Accordingly, in this current study, the deductive and inductive approaches were combined as follows:

1. Deductive approach

A population of 52 HODs as well as 33 members of staff in finance were chosen to provide their opinions on the current overhead costing system and the reasons for the non-adoption/adoption and implementation of ABC at DUT; and the questionnaire was also administered to a sample of 132 academic staff from the Faculties of Management Sciences as well as Accounting and Informatics and members of staff in the finance department in order to establish their perceptions of the factors that constitute barriers in ABC adoption at DUT.

2. Inductive approach

12 staff members at DUT were interviewed. The staff members have extensive experience about the current costing systems and work in different departments at different managerial levels in each case, namely: top management (finance executive and HOD); middle management (cost accountants in the budget section); and staff members (library staff members, finance officer and an academic).

- In-depth interviews were held with 12 staff members to confirm the findings from the questionnaires.

Both approaches yielded valuable data on the factors influencing the adoption and implementation of ABC at DUT.

3.1.3 Research Strategy

There are various strategies with distinctive characteristics available in research such as case study, experiment, survey, action research, grounded theory, cross sectional studies, longitudinal studies, ethnography, archival research and participative enquiry (Collis and Hussey 2003: 60). The research strategy used in this study is a case study. This research strategy is an empirical investigation of a 'bounded system' (bounded by time, context and/or place), or a single or multiple case, over a period through

detailed, in-depth data collection involving multiple sources of information (Coe *et al.* 2017: 114). Collis and Hussey (2003: 68) describe the primary defining feature of a case study as being the 'on understanding the dynamics present within a single setting'. Robson (2011: 136) defines a case study as an empirical enquiry that investigates a contemporary phenomenon (the case), in depth and within its real world context using multiple sources of evidence.

This case study on a South African state university, namely DUT, provides an opportunity to identify the factors that influence the adoption and implementation of ABC that were identified in the literature under the following themes; strategy, organisational structure, environmental/contextual factors, behavioural and organisational factors, information technology, decision usefulness of cost information, technical and internal systems/systems adaptability (as identified in the contingency theory) which affect the adoption and implementation of ABC. A case study allows the study to generate rich data in a way that reduces subjectivity and increases construct validity as it relies on multiple methods and sources of data (Coe *et al.* 2017: 116).

The study seeks to investigate the factors that influence the adoption and implementation of ABC, in a South African state university. It seeks to determine the perceived benefits and barriers of ABC and the reasons why the ABC system has not yet been adopted in the state university. It tests those factors which literature suggests as likely to influence the adoption and implementation of ABC. Through the exploratory and explanatory strategy, the case study offers in-depth details and an understanding of various impacts of the independent variable on the dependent variable. A case study is identified by Kumar (2011: 8), as the most suitable strategy for answering "how" or "why" questions. It helps to understand what the problem is, how it came to be, why it occurred and how it can be solved. A case study allows a very flexible and open-ended technique of data collection (Kumar 2011: 302) and data analysis (Best 2012: 271). Nevertheless, the corresponding disadvantage is that it is much more difficult and often impossible to generalise the findings of a case study.

In order to fully address the research questions in this case study or bounded system, the survey research strategy/method is used. Survey research is defined as 'the

collection of information from a sample of individuals through their responses to questions' (Check and Schutt 2012: 160). It involves asking a number of respondents' identical questions through a systematic questionnaire or interview to describe the attitudes, opinions, behaviours or characteristics of the population. The data is collected in a standardised form. A survey is designed to provide 'a snapshot of how things are at a specific time.'

This rigorous approach to research allows the use of multiple valid and reliable instruments. Survey research can use quantitative research strategies (e.g., using questionnaires with numerically rated items), qualitative research strategies (e.g., using open-ended questions), or both strategies (i.e., mixed methods). This type of research allows for a variety of methods to recruit participants, collect data, and utilise various methods of instrumentation. Therefore, surveys offer the opportunity to execute studies with various designs, each of which is suitable for addressing particular research questions.

A survey was also chosen for its reliability. Furthermore, using fixed responses' (Likert scale) questions reduces variability in the results and the research produces data based on real-world observations (empirical data). The breadth of coverage of many people or events means that it is more likely than some other approaches to obtain data based on a representative sample and can, therefore, be generalisable to a population. A research survey simplifies coding, analysis and interpretation of data. However, securing a high responses rate to a survey can be hard to control, particularly when it is carried out by post. To curb this shortcoming, the questionnaires were hand-delivered to the respondents.

Therefore, this study adopted an exploratory and explanatory case study as it seeks to identify the relationship between contingent factors and ABC adoption and implementation (explanatory) and there is very little literature on reasons behind the non-adoption and implementation of ABC in state-funded universities in SA (exploratory).

3.1.4 Research Methods

According to Cherry (2000: 40), a research methodology is a detailed plan outlining the concepts and techniques used in research with the purpose of coming up with an approach that allows for answering the research problem in the best possible way and within the given constraints. It, therefore, provides a framework or blueprint for conducting the research project by specifying the procedures necessary for obtaining the required information needed to solve the research problem (Kumar 2014: 19). Although there are a number of distinguishing research modes, the most common classification of research methods is into qualitative, quantitative and mixed methods.

3.1.4.1 Quantitative method

Quantitative research makes use of questionnaires, surveys and experiments to gather data that is tabulated in numbers, which allows the data to be statistically analysed (Hittleman and Simon 1997: 31). The main goal of quantitative research is to provide facts that could be used by researchers to make predictions and verify or validate existing relationships White and McBurney (2012: 429), Quantitative research is supported by the positivist school of thought and involves measuring items in a quantitative way (Collis and Hussey 2003: 47). The quantitative research method was used in this research in collecting, analysing and integrating data from the questionnaires. Table 3.2 summarises the advantages and disadvantages of the quantitative method.

Table 3.2: Advantages and disadvantages of quantitative research	
Advantages of quantitative research method	Disadvantages of quantitative research method
Can be used to test hypothesis in experiments because of its ability to measure data using statistics. Therefore it is statistics driven and can provide a lot of information.	The results are limited to a larger amount of numerical tables and figures rather than detailed narrative analysis.
Easy to compare and analyse the data collected.	Time-consuming and can be difficult for non-statistical researchers.
Research can be conducted on a large scale and cover a range of topics thus giving a lot of information.	Lacks in-depth information on topic or subject particularly on contemporary phenomenon within its social and cultural context.
Provides objective data on knowledge and skills of participants.	In order to gain a level of control, research is usually carried out away from a real world over which the researcher has little control, which probably results in unnatural outcomes.

Adapted from White and McBurney (2012: 429)

An alternative to the quantitative method is the qualitative method.

3.1.4.2 Qualitative method

The qualitative approach relates to understanding some aspect of social life, and in general, generates words, rather than numbers, as data for analysis. Qualitative data sources include observation and participant observation (fieldwork), interviews and questionnaires, documents and texts, and the researcher's impressions and reactions (Myers 2013: 8). The qualitative method aims to answer questions about the 'how' 'what' or 'why' of the phenomenon rather than 'how many' and 'how much' which are answered by quantitative methods. It is most suited to a study that requires an in-depth exploration or investigation into a contemporary phenomenon that involves human actions and beliefs within social and cultural contexts (Krippendorff 2013: 485).

In this study, the qualitative approach was used to provide an in-depth understanding into the problem and allowed for triangulation of data through the use of interviews. Furthermore, qualitative research was selected as it is typically used to answer

questions about the complex nature of phenomena with the purpose of describing and understanding the phenomena from the participants' point of view (Myers 2013: 8). In qualitative research, researchers usually use open-ended questions to allow for an in-depth probing of the respondent's response (Missa 2013: 100). Like the quantitative method, the qualitative method also has its advantages and disadvantages (Table 3.3).

Table 3.3: Advantages and disadvantages of qualitative research	
Advantages of the qualitative research method	Disadvantages of qualitative research method
Good for exploratory research and hypothesis generation	Lacks generalisabilty as data is usually gathered from few individuals or cases therefore findings and outcomes cannot be spread to larger populations
Provides objective information on knowledge and skills of participants and hence external validity is greatly enhanced	The researcher is not detached from study; therefore quality of research is heavily dependent on the skills of the researcher and can be easily influenced by personal idiosyncrasies and biases of researchers
Data collected allows in-depth insights into a smaller number of cases in-depth and conduct cross-case analysis degree	Not easily replicable by subsequent researchers
The direction and framework of research can be revised quickly as soon as fresh information and findings emerge.	
Gives a holistic view of the phenomenon under exploration and investigation, and aims at finding knowledge rather than testing hypothesis	

Adapted from Swain (2017: 195)

While quantitative research presents statistical results represented by numerical or statistical data, qualitative research presents data as a descriptive narration with words

and attempts to understand phenomena in 'natural settings'. In order to counteract the disadvantages of the quantitative and qualitative research methods, the two methods can be combined in a mixed method approach. Therefore, the mixed methods approach was used in this study. The reasons for using the mixed methods are elaborated further in the section below.

3.1.4.3 Mixed methods

The mixed methods approach is a methodology that involves collecting, analysing and integrating (or mixing) quantitative and qualitative research (and data) in a single study (Best 2012: 271). The quantitative and qualitative approaches are combined to generate a more accurate and adequate understanding of a social phenomenon that would not be possible by using only one of these methods (Coe *et al.* 2017: 159). According to Creswell (2014: 201), sometimes, no single strategy can solve a particular research problem, hence a combination of strategies is recommended resulting in the use of mixed methods. The mixed methods approach follows a pragmatic approach whose design and methods are driven by the aims, objectives and research questions and not by the priori choice of a particular research paradigm (Coe *et al.* 2017: 159).

This research was based on the mixed methods approach, which combines the strengths of both research models of quantitative and qualitative research to best achieve the objectives of the research. The study used qualitative and quantitative data assembling instruments that included a questionnaire and interviews. Table 3.4 shows some of the characteristics of the qualitative and quantitative approaches (Sugunro 2002: 4) which, when combined, make up the mixed methods.

Concurrent mixed method data collection strategies have been employed to validate one form of data with the other form, to transform the data for comparison, or to address different types of research objectives (Creswell and Plano Clark 2007: 118). In many cases the same individuals provided both qualitative and quantitative data so that the data could be more easily compared.

In this study a type of concurrent mixed method design commonly referred to as an embedded or nested design was used. 'The embedded design is a mixed methods design in which one data set provides a supportive, secondary role in a study based primarily on the other data type' (Creswell and Plano Clark 2007: 67). In an embedded mixed methods design, a small amount of either qualitative data or quantitative data are included within a larger qualitative or quantitative study. The premises of this design are that a single data set is not sufficient, that different research questions need to be answered, and that each type of question requires different types of date. In addition, the embedded design includes the collection of both quantitative and qualitative data, but the qualitative data plays a supplemental or supporting role within the overall design. Hence this design seeks to embed a qualitative component within a quantitative design, as in the case of an experimental or correlational design (Creswell and Plano Clark 2007: 67) data to answer research questions within a largely quantitative study.

This study adopted the embedded mixed methods approach beginning with the quantitative method (questionnaires) and followed by a qualitative method (structured and semi-structured interviews) that involved a detailed exploratory of research objectives with a few individuals (Creswell and Clark 2011: 38). The mixed methods approach sought to enrich the data collected through the combination of a quantitative and qualitative research in a single study. This combination of techniques provides a better understanding of a research problem or issue than either of these two approaches used separately (Best 2012: 271). The use of a combination of methods offsets the weakness inherent in either one of the individual methods (Creamer 2018: 5) including reducing bias (Collis and Hussey 2003: 78). The use of complementary methods enabled the study to enhance the coverage, depth, reliability, validity as well as accuracy of the research findings (Best 2012: 271) through the corroboration as well as convergence (triangulation) of evidence stemming from two different methods. A summary of the differences between quantitative and qualitative research approaches are presented in Table 3.4.

Table 3.4: Differences between quantitative and qualitative research approaches		
Factor	Qualitative	Quantitative
Data Collected	Soft Data – data is rich	Hard Data – data is highly specific and precise
Data collection techniques	Active interaction with sample population	Passive interaction through questionnaire and/or experiment design
Sample population	Uses small population	Uses large population
Research variables	Large number	Small number
Data collection	On-going observation and Interview	Before and after training or experiment
Relationship	Intense and long term with subjects	Distance and short term
Research context	Uncontrolled	Controlled
Data analysis	Context/ interpretive	Statistical analysis
Research findings	Inductive though creativity and criteria reflection	Deductive through inferences from data
Research instruments	Researcher as an instrument	Questionnaires
Tools	Interview guide, tape recorder, transcriber, computer, typewriter, etc.	Computer, calculator
Interpretation of Information/Results	Subjective Nature of enquiry	Objective Interpretivism Positivism
Research Tradition	Ethnography, hermeneutics Phenomenography Case studies, etc.	Descriptive, correlational, experimental, casual comparative, etc.
Focus	Concerned with generating theories	Concerned with hypothesis testing
Reliability	Reliability is low	Reliability is high
Validity	Validity is high	Validity is low
Generality	Generalises from one setting to another	Generalises from sample to population

Source: Sugunro (2002: 5)

The qualitative research model was chosen because of the basic philosophical assumption that people, their behaviour, and their experience play a significant factor

in a study, whereas, the quantitative research model was chosen because of the significant amount of feedback it provides and the greater access it allows to respondents (Repko 2012: 129). In addition, the corroboration of multiple types of data, that is, triangulation enhances the validity of the research findings (Cherry 2000: 45) due to convergence of the different methods of research. Kumar (2014: 19) affirms that multiple data enhances the accuracy and meaningfulness of a research conclusion, that is, it helps to get a complete picture of the situation. The use of multiple sources of data enhances the researcher's ability to assess the accuracy of the findings (Creswell 2014: 201).

In this study, the use of multiple methods offers a way to answer all the research questions. The data collection phase on the adoption and implementation of ABC is usually done through surveys and conducting interviews with relevant employees (Ellis-Newman 2003: 338). Therefore, the research was a mixed research that made use of both qualitative and quantitative research methods to help gain an in-depth understanding of the factors that influence the adoption and implementation of ABC in a South African state university, using DUT as a case study. During the first phase, a questionnaire was administered to a sample of 33 members of staff in finance as well as the library, 52 Heads of Departments who are involved in the institution's budgeting process as well as 132 academic staff from the Facuities of Accounting and Informatics and Management Sciences, in order to get their views and experiences on factors that facilitate or constitute barriers in ABC adoption and implementation. The second phase involved in-depth interviews with a self-selecting sample of 12 staff members in order to delve deeper into issues of ABC adoption and implementation as well as to confirm the findings of the quantitative method. Hence, the 12 members of staff were part of both the quantitative and qualitative samples. The same sample from the quantitative sample was used for the interviews in order to develop a deeper understanding of the study/research problem.

3.2 THE TARGET POPULATION

A population is a complete group of objects or elements relevant to the research project; it possesses the information the research project is designed to collect (Hair Jr *et al.* 2011: 165). It also refers to the group of individuals to whom the results of the

research may apply (Whitley Jr. and Kite 2013: 485). A target population includes the entire collection of cases or units on which the study wishes to make conclusions on (Welman, Kuger and Mitchell 2007: 18) and is ideally the population to which the research would like to generalise its findings.

Although the entire population of DUT could have been used, the study focused on respondents with some knowledge of ABC and, therefore, the target population in this study comprised all academic and administrative staff members at DUT with some knowledge of ABC. The target population of HODs and staff from finance played a pivotal role in assisting the researcher to understand the structure of the cost system at DUT. The academic staff as well as finance staff mainly enabled the researcher to get the theoretical and practical perceptions on the benefits and shortcomings of ABC as a cost management system. However, as only academics with some knowledge of ABC would be able to answer the questionnaire, the target population for academics were those academics in the Faculties of Management Sciences and Accounting and Informatics. This is explained in the following sections.

3.3 SAMPLING TECHNIQUE

Sampling is the process of selecting a portion of the population according to accepted standards to represent the entire population of interest, that is, the target population (Cherry 2000: 43). Sampling techniques provide a scope of methods that enable a reduction in the data needed by collecting only data from a sub-group, instead of from the entire population.

There are two major categories of sampling methods, namely, probability sampling and non-probability sampling. Probability sampling or random sampling refers to a procedure whereby each element has an equal chance of being selected (Krippendorff 2013: 485). The most commonly used probability sampling methods are simple random sampling, systematic sampling, stratified random and cluster sampling methods.

The second method of sampling is non-probability sampling. In non-probability sampling, the probability that a particular unit will be included in the sample cannot be

specified (Creswell and Clark 2011: 174). Kumar (2014: 45) suggests that, in some instances, certain members of the population may have no chance at all of being included in such a sample. Examples of non-probability sampling methods include convenience sampling, consecutive sampling, judgmental sampling or purposive sampling, quota sampling and snowball sampling.

This study adopted a non-probability sampling technique. In this study, judgmental or purposive sampling was seen as appropriate to select all textual units that contribute to answering the given research questions, address the objectives of the study and ensure that accurate or reliable data is collected (Krippendorff 2013: 485). Judgmental or purposive sampling depends on the researcher's subjective judgment to choose sample units (Maholtra 2010: 376). According to Kumar (2014: 45), a purposive sample is a sampling method in which elements are chosen based on the intent or purpose of the study. Researchers rely on their experience, ingenuity and/or previous research findings to deliberately obtain units of analysis in such a manner that the sample they obtain may be regarded as being representative of the relevant population (Welman and Kruger 2007: 61). The judgmental sampling method was seen as appropriate to address the objectives of the study as it ensured that sufficient data was collected from a selected population with a relevant background and knowledge on ABC.

3.4 SAMPLE OF THE STUDY

A sample in this study is a smaller group drawn through the purposive procedure from the population. The elements making up this sample are those that are actually studied. The goal was to obtain a sample representative of the target population. A sample of 217 members of staff from DUT was used (Table 3.5). The sample of 217 members of staff was seen as appropriate to answering the given research questions and address the objectives of the study.

The study sample in this study comprised staff members at DUT with a relevant background and knowledge on cost and management accounting or control systems in the university. The sample population was stratified into three groups: finance and library, HODs, and academic staff from the Faculties of Accounting and Informatics as

well as Management Sciences. The HODs of various departments were purposefully selected because of their involvement in decision making, in budget allocation and in cost allocation in their respective departments. The targeted population from the finance department is most likely the group that would make use of the proposed cost management strategies from the study. Staff from the finance department are most knowledgeable about control systems and could valuably contribute to the study. Academic staff in the Faculties of Management Sciences and Accounting and Informatics were considered to have at least a basic knowledge on cost and management systems. Therefore, the study sample used in this study can be summarised as follows:

- The finance department, comprising a team of cost accountants, cost accounting officers and faculty officers for Support departments, Applied Science, Health, Arts, Accounting and Management Science as well as the library. These administer and handle cost information and services to the university;
- The HODs (52) in all departments at DUT who handle budgets for the different departments at DUT; and
- The academic staff from the Faculties of Management Sciences as well as Accounting and Informatics who have a relevant background and knowledge on cost and management accounting or control systems in the university.

A summary of the study sample is shown in Table 3.5

Table 3.5: Sample population	
Categories	Number
Finance and library	33
Heads of Departments at DUT	52
Academic staff in two faculties	132
Total	217

3.4.1 The sample size for structured interviews

The qualitative data was obtained from interviewing 12 staff members working in different departments and at different managerial levels in each case, namely:

- Top management: finance executive and HOD (Coded as AI)

- Middle management: Budgets section - cost accountants (Coded as A2) and

- Library staff members, finance officer and an academic (Coded as A3).

Different departments as well as two managerial levels in finance were included in order to gain in-depth information and a clear perception on the factors that facilitated or constituted barriers to the adoption and implementation of ABC at DUT. Interviews were held with respondents from the finance department as this is the department with the most information on the institution's cost system as well as the department that will be most affected if ABC is adopted.

From the academic staff in the Faculty of Accounting and Informatics, an HOD and one academic staff member in the Cost and Management Department were interviewed. This department is most knowledgeable about management accounting control systems. The academic staff member was interviewed for their knowledge on the theoretical and practical usefulness of the current management accounting system in decision making, planning and cost control in the various departments at DUT.

In order to identify and evaluate the cost activities, cost drivers and the relevant cost pools of a selected department, staff from the DUT library and finance were interviewed. This staff was already part of the purposively selected, quantitative sample, with four of them being finance staff stationed and handling the financial aspects of the library. The interviews were semi-structured and exploratory. The sample size was restricted to a smaller number of people to reduce the volume of data collected (Cherry 2000: 54). Thus, for the qualitative aspects of the study, six members of the finance department, one HOD, four library staff members and one member of the academic staff were interviewed (Table 3.6).

Table 3.6: Population – interviews	
Population categories	Number
Finance department	6
Head of Department	1
Academic staff	1
Library staff	4
Total	12

3.5 NATURE OF THE STUDY

The nature of this study is descriptive as well as cross-sectional. This type of study is based on the survey results of a population or its representative subset at one specific time point. This differs from longitudinal analysis that traces individuals or objects over time. In this study, a cross-sectional study was useful in obtaining an overall 'picture' as it was at the time of the study (Kumar 2014: 19).

3.6 DATA COLLECTION

Data collection is the process of systematically, gathering and measuring information on targeted variables to answer the research problem (Swain 2017: 141). It enables the study to convincingly and credibly answer the research questions. There are mainly two types of data, namely primary and secondary data. Primary data means original data that has been collected in the field under the control and supervision of an investigator. According to Srivastava and Rego (2011: 5), primary data collection involves collecting data directly from study participants through in-person or telephone interviews, mail surveys or questionnaires to address a specific question or hypothesis. On the other hand, secondary data collection is an empirical exercise carried out on data that has already been gathered or compiled in some way (Coe *et al.* 2017: 122). Examples of secondary data are administrative data, census data, and government surveys. Secondary data also broadly refers to the interpretation of data presented in literature in the form of journals, records, newspapers and other publications. The second broader definition also refers to as archival research is applicable to this study. Secondary data is presented mainly as the literature review (Chapter 2) and has been used to a lesser extent in other chapters. For example, it

has been used in Chapter 1 to justify this study; in Chapter 3 to justify and better understand the research methodology and in Chapter 4 to discuss findings of this study.

3.6.1 The measuring instruments

Measurement instruments refer to various tools or methods designed to obtain data from respondents. Measurement instruments are used to collect reliable data and include questionnaires, interviews, observations, focus group discussion and experiments (Sekeran 2006: 223). The next section discusses the measuring instruments used in this study, namely, the questionnaire and interviews.

3.6.2 Data collection using questionnaires

A questionnaire is a tool for collecting and recording information about a particular issue of interest, mainly made up of a list of questions. Hair *et al.* (2003) define a questionnaire as a scientifically developed instrument for measurement of key characteristics of individuals, business enterprises, phenomena or events, and consists of a set of pre-set questions designed to capture data from respondents in a sample. A good survey research requires a good questionnaire design and construction to ensure accuracy in the data collected.

A questionnaire affords anonymity, as there is no personal interaction between the researcher and the respondents. The chances of collecting accurate data when sensitive questions are asked are better with this measurement instrument. The major advantages of questionnaires are that they could reach large numbers of people from wide geographic areas, respondents have time to reflect on their answers or check information prior to responding, and there is a relatively low cost of administration (Swain 2017: 141). Contrary to unstructured interviews (Myers 2013: 129), structured surveys can be useful when the respondents need time to gather information or consider their answers; therefore, affording the researcher a more accurate response.

Questionnaires were also used because they draw reliable information from respondents and provide a standard form on which facts, comments and attitudes could be written and drawn. However, the major disadvantages of questionnaires are

that there is an inherent rigidity because of the struggle to modify the method as soon as questionnaires have been distributed and the likelihood of vague replies or completely no responses to some questions. Questionnaires may also have a lower response rate and there is need to take special care with designing them to ensure clarity and unambiguity (Swain 2017: 141). Kothari (2004: 100) mentions that properly completed questionnaires have a low level of return and the extent to which this compromises the findings of the study is usually unknown. In order to curb some of the disadvantages, such as a low response rate, the researcher administered the questionnaires herself.

The research questionnaire (refer to Appendix B) in this study comprised three sections and was designed to provide the necessary data to answer the research questions.

The first section (Section A) was on personal information (questions A1 – A6) and sought general information from the respondents. Respondents were required to select one response from the responses provided.

Section B was aimed at HODs and finance staff who are involved in the budgeting process at DUT. It was designed to examine the current costing model used in relation to the university's strategy as well as the current decision usefulness of cost information and how the overhead costs are currently allocated to the academic programmes. The questionnaire consisted of five point Likert-scale questions with listed statements for the respondents to select from, where applicable. Questions 6.1-6.19 required respondents to indicate their level of agreement with the statements provided, using a Likert-type scale of 1 'strongly disagree to 5 'strongly agree'. Respondents were asked to indicate their level of agreement with statements relating to DUT's current costing model as well as the allocation of costs under the current costing model at DUT. Question 6.20 was an open-ended question that allowed respondents to provide any other views regarding the adoption and implementation of a new overhead system at DUT.

Question 7.1 examined respondents' willingness to change the current overhead costing system. Respondents were required to select one response from the responses provided, which were unwilling, slightly willing, neutral, slightly willing and very willing. Respondents were also able to provide a reason for their answer (Question 7.2). To end this section (Section B), respondents were able to highlight any other information on the current overhead costing system and the factors that would influence the adoption and implementation of a new cost management system, in relation to the assignment or allocation of overheads to cost objects at DUT.

Section C (questions 8.1 – 8.28), was designed to examine the awareness of the respondents (finance and academic staff) regarding ABC and to determine factors that facilitate or constitute barriers in the adoption and implementation of ABC at DUT. HODs were not required to answer this section as some of the HODs were from non-accounting departments and were considered not to have knowledge of ABC. Their opinions were only required on the current overhead costing system (Section B) since they control departmental budgets. This section consisted of five point Likert-scale questions with listed statements for the respondents to select, where applicable.

A number of statements were provided which respondents were asked to indicate their level of agreement with the statements provided, using a Likert-type scale of 1 'strongly disagree to 5 'strongly agree'. Respondents were asked to indicate their level of agreement with statements relating to the factors that facilitate or constitute barriers to ABC adoption and implementation under the themes; strategy, information technology, system adaptability, environmental/contextual, organisational structure, technical factors, decision usefulness of cost information as well as behavioural and organisational factors that constitute barriers to ABC adoption and implementation. Question 8.28 allowed respondents to express their opinions in their own words on areas that may not have been covered by the closed questions.

3.6.3 Pre-testing

The data-gathering phase of the research process began with pre-testing. A pre-test is a small-scale or preliminary study that is undertaken to evaluate the feasibility, time, cost, adverse events, and to confirm the appropriate sample size in order to improve

the study design prior to the performance of a full research scale research study (Kumar 2014: 14). The purpose of pre-testing is to detect possible flaws in the measurement procedures and in operationalisation of the independent variable(s), and to identify unclear or ambiguously formulated items. It assists in deciding whether it is worth carrying out a detailed investigation. Pre-testing the measuring instruments before collecting data also helps researchers discover errors in the phrasing of questions, question sequencing and instructions (Blumberg *et al.* 2008: 344). Without pre–testing, the likelihood of the questionnaire being misunderstood is high. It may also result in inadequate responses, errors or unreliable answers. Similarly, pre-testing provides a chance to test the validity as well as the meaning attributed to the survey questions, before a substantial investment is made in the wrong questions.

Therefore, prior to administering the questionnaire, pre-testing was done with a group of individuals from DUT's finance department and the Faculties of Accounting and Informatics and Management Sciences. The purpose was specifically to pre-test the questionnaire and interview guide on a small sample of similar respondents to ensure that the questions posed were clearly understood and could be completed in less than 15 minutes. Pre-testing enabled the study to obtain some assessment of the questions' validity and the reliability of the data collected (Welman *et al.* 2011: 148). It also allowed the study to evaluate the arrangement of the questionnaire, the length of the questionnaire, transparency of questions, simplicity of instructions and grammar. The method of dispersing the questionnaires and gathering up of completed questionnaires was also assessed through this pre-test. Corrections and adjustments were effected and the questionnaire was sent for language editing and then pre-tested again to ensure that the respondents understood the requirements thereof.

The interview guide was also pre-tested to eliminate any bias. The outcomes revealed that respondents did not have any difficulties comprehending the questions; however, they valued the time spent on the survey, therefore, the questions had to be short and direct. Two spelling errors were also observed during the pre-test. The pre-testing was conducted on 22 August 2017.

3.6.4 Covering letter

A covering letter indicating the purpose of the study and a gatekeeper's permission letter was attached to the questionnaire. The covering letter included brief information about the researcher and gave participants a brief outline of the purpose of the study. The covering letter assured the participants of their anonymity, confidentiality and protection of their rights. The gatekeepers permission letter that was also attached to the questionnaire allowed the researcher to access different faculties as well as departments in the university.

3.6.5 Letter of informed consent

The study respected respondents' rights by obtaining consent letters (refer to Appendix D, Appendix E and Appendix F) which were sent to respondents before the study was conducted. Data was only collected once the informed consent had been obtained. The letter of consent from the Institutional Research Ethics Committee (IREC) accompanied the questionnaires. The essential principles of ethical practice, which are anonymity and confidentiality, were observed. The participants were clearly informed of all the outcomes of the study before signing the consent form. The respondents' names, phone numbers, addresses and other details were not included in the questionnaire to ensure confidentiality. Respondents were informed that their participation was voluntary, that they had the right to withdraw from the study at any time, and that the study did not expose them to risks, medical examinations, or any situation that could be harmful mentally or physically.

3.6.6 Distribution of the questionnaires

After the pre-testing, the survey was administered and hand delivered to respondents from 11 January 2018 to 4 March 2018. Two hundred and seventeen (217) questionnaires were distributed to finance and academic staff (Table 3.7). The researcher collected the completed questionnaires either on the day of the interviews or two weeks later. The next section describes the response rate.

3.6.7 Response rate

The target population comprised academic and administrative staff at DUT. A sample of 217 employees was selected using the judgmental sampling method. However, 15 questionnaires from the Faculty of Management Sciences (6), Faculty of Accounting and Informatics (8) and a Head of Department (1) were discarded as they were incomplete and the final questionnaires returned equated to n = 202. This number represented a high response rate of 93% (Table 3.7), which was largely attributed to the researcher using the personal method of data collection and being available in case of problems.

Table 3.7: The response rate for the finance and library, heads of departments, and the academic staff in the selected faculties				
	Planned sample	Discarded	Achieved sample	Achieved response rate
Finance and library	33	1	32	96.97%
Heads of Departments at DUT	52	11	41	78.85%
Academic staff in two faculties	132	3	129	97.73%
Overall Response	217	15	202	93.09 %

Table 3.7 shows the response rate for the finance department, Faculties of Accounting and Informatics as well as Management Sciences and Heads of Departments. The high response rate (93.09%) makes the data more representative of the population. According to Babbie and Mouton (2001: 261), the higher the number of respondents, the more accurate are the conclusions that can be drawn of the target population.

3.6.8 Interviews

Interviews are purposeful interactions in which an investigator attempts to learn what another person knows about a topic, to discover and record what that person has experienced, what he or she thinks and feels about it, and what significance or meaning it might have (Swain 2017: 183). Interviews are methods of gathering information through oral interactions using a set of pre-planned core questions.

In this research, the respondents were given the opportunity to share their views on the factors that influence the adoption and implementation of ABC at DUT by the use of semi-structured interviews (eight interviewees). For the third objective of this study, that is, to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected department (library) at DUT, four library staff members (including finance staff stationed at the library) were interviewed. An interview guide (Appendix C) was prepared for the semi-structured interviews. In-depth interviews offered a versatile way of collecting data as they allowed the researcher to probe respondents with a view to address the research aim and questions in this study. The interviews took place from 11 February 2018 to 30 March 2018.

3.7 DATA ANALYSIS

The following sections discuss how the data from the questionnaires and interviews was analysed.

3.7.1 Quantitative Data Analysis

In order to develop sound conclusions, the Statistical Package for Social Sciences (SPSS) (version 25®), was used for descriptive and inferential statistics data analysis to test for the relationship between variables, frequency, and reliability (Coe *et al.* 2017: 75). The data collected from the responses was analysed with SPSS (version 25®) in relation to the objectives outlined in Chapter 1.

Descriptive analysis involves statistically defining, combining, and presenting the concepts of interest or relations amid various concepts (Bhattacherjee 2012: 119). The preliminary computation of the results for Section A of the questionnaire involved the use of descriptive statistics to analyse the sample profile and the key demographic variables using Microsoft Excel. The results of the descriptive statistics are presented in the form of frequencies, percentages, tables and cross tabulations.

For Section B and Section C of the questionnaire, the main analysis for each section also involved the use of descriptive and inferential statistics to analyse the responses and, more importantly, to test the formulated themes in each section. In order to enhance the quality of the statistical findings, significant trends emerging from the

various themes in each section, were also reported and related to similar findings conducted in other studies by various researchers.

The nature of the data accessed in this study was ordinal in form, which negated the application of the more robust tools of parametric testing under the ambit of inferential statistics. This was moderately constrained by the fact that there were two independent, but homogeneous groups in the DUT, namely, the finance (administrative staff) and the academic staff. This intervening variable did not in any way, compromise the analyses of the results as most respondents appeared to have similar perceptions when responding to the Likert scale statements except for a few surprising findings. This was evident during the editing and coding phase of the data. Moreover, since the use of robust tools of parametric tests would have required a substantial transformation of the data, the researcher, with the assistance of an expert statistician, judged that for answering the research questions, the use of non-parametric procedures was deemed adequate. The questionnaire was given to a statistician who inputted all the data and calculated all the statistics. Table 3.8 shows a summary of the statistical tests used to analyse the data.

Table 3.8: Summary of the statistical tests used for the analysis of the data		
Sections	Descriptive statistics	Non-parametric inferential statistics
Section A	Tables depicting comparative analysis	
Sections B and C	Frequency distribution tables	Fisher's exact test Spearman's rank order Correlation coefficient

According to Bajpai (2011: 108), inferential statistics comprise two branches, namely, parametric statistical tests and non-parametric statistical tests. This study presented the results of the inferential statistics and relevant nonparametric tests conducted that provide an overview of the perceptions relating to the adoption and implementation of ABC at DUT. These tests were conducted on Section B and Section C of the questionnaire (Appendix B). The results are first presented using summarised percentages for the variables that constitute each section. The results are then further analysed according to the importance of the statements.

When studies compare proportions of a categorical outcome according to different independent groups, several statistical tests, such as chi-square test, Fisher's exact test, or z-test are considered. The inferential techniques used in this study included the use of Pearson's correlation tests and chi square test of values, which were interpreted using the p values.

A chi-square test is a statistical test used to compare observed results with expected results. The purpose of this test is to determine if a difference between observed data and expected data is due to chance, or if it is due to a relationship between the variables under studying (Collins and Hussey 2003: 241). Therefore, a chi-square test was considered ideal to better understand and interpret the relationship between categorical variables in this study.

To make a conclusion about the hypothesis with 95% confidence, the value labeled Asymp. Sig. (which is the p-value of the chi-square statistic) should be less than .05 (which is the alpha level associated with a 95% confidence level). When significant values (p-values) are less than 0.05 (the level of significance), it implies that the distributions were not similar, that is, the differences between the way respondents scored (strongly disagree, disagree, uncertain, agree and strongly agree) were significant. In all tests of significance, if $p < 0.05$, then there is a statistically significant relationship between the two variables (Collins and Hussey 2003: 244). The statistical table showing areas under the standard normal curve is shown in Appendix G.

To determine whether the scoring patterns per statement were significantly different per option, the Fisher exact test was done. The Fisher exact test is a nonparametric test for categorical data and can be used when the experimental procedure keeps the row and column totals fixed, regardless of the sample characteristics. This statistical test was chosen for its precision. The significance of the deviation from a null hypothesis, for example, p, could then be accurately (exactly) calculated, rather than relying on an approximation that becomes exact in the limit as the sample size grows to infinity, as with many statistical tests. Therefore, when more than 20% of cells have expected frequencies < 5, as in this study, the Fisher's exact

test is viewed as ideal as applying an approximation method is inadequate (Connelly 2016: 58).

Cronbach's alpha was used to measure the reliability of the questionnaires in this study. Gay *et al.* (2011: 166) define Cronbach's alpha as an explicit degree of internal constancy reliability of a set of items. Gravatter, Wallnau and Forzano (2017: 443) agree that the Cronbach's alpha was developed to be utilised when test substances exceed two choices. This is the case with the Likert scale used in this study, which required a choice from five answers. According to Gay *et al.* (2011: 166), Cronbach's alpha approximates internal consistency and reliability by defining the relation of substances on the test to other tests substances and to the overall test. Internal consistency then comes about when all substances tried are correlated or amount to equal things.

The research aim and questions in this study were considered at all stages of data analysis. To present the quantitative information, the researcher used tables to group and organise data so that it would be manageable and easy to interpret.

3.7.2 Qualitative data analysis

Bogdan and Biklen (2007: 3) define qualitative data analysis as 'working with the data, organising them, breaking them into manageable units, coding them, synthesising them, and searching for patterns'. The aim of analysis of qualitative data is to discover patterns, concepts, themes and meanings. In case study research, Yin (2014: 143) discusses the need for searching the data for 'patterns' which may explain or identify causal links in the database.

This study made use of the Nvivo 10 (QSR International Pty Ltd 2014) to further organise, code and manage non-numerical and unstructured qualitative data (Creswell and Clark 2011: 128). The thematic method of analysis found in the NVivo software enabled the study to analyse the qualitative data. According to Kumar (2014: 14), the thematic method allows the researcher to categorise the core findings into different subjects, themes, categories or segments. The method was selected as it allowed the researcher to categorise the volume of qualitative data collected. Once the interviews

had been transcribed verbatim, respondents were given the transcripts to confirm that this was a true record of the interview. The qualitative data was then grouped into small categories according to the themes/categories of the research questions (Creswell 2014: 201). Nine themes were identified, namely, the current overhead costing model, strategy, decision usefulness of cost information, information technology, system adaptability, environmental/contextual factors, technical factors, organisational structure, behavioural and organisational factors.

The different themes formed were then coded for more efficient data interpretation. Coe *et al.* (2017: 75) defines coding of data as the splitting of findings into the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon. After the data were coded, the researcher grouped the codes into small categories according to the themes of the research questions (such a strategy is supported by Saunders *et al.* 2012: 571; Collis and Hussey 2003: 256). Categorisation helped the researcher to make comparisons and contrasts between patterns, to reflect on certain patterns and complex threads of the data deeply and make sense of them.

3.8 CONSTRUCTS OF VALIDITY AND RELIABILITY

In a research study, reliability and validity are two important judgement criteria of the correctness of a measure for specific inferences, decisions and consequences (Muijs 2011: 56). The extent to which a measurement process is free of both systematic and random error is referred to as validity; this indicates how well the data measures what it is supposed to measure. Essentially, validity means how close the test comes to measuring the variable the study is interested in (sensitivity and specificity), that is, measures accurately and captures what it is intended or supposed to measure (Muijs 2011: 221).

On the other hand, reliability means how consistent the test is when used by different observers or over different periods. It is a measure to see if the study repeats the same results if the same experiment is performed again. Leedy and Ormrod (2005: 29) describe reliability as the degree to which the measurement process is free from random errors, and the extent to which the scores obtained, may be generalised to

different circumstances of measuring. Essentially, reliability refers to the stability of the measure. Reliability diminishes as errors escalate.

The validity and reliability of measuring instruments is defined as the influence to which a study contributes to the body of knowledge, presents statistical significance in the data analysis, and the extent to which one can draw meaningful conclusions from the data (Kumar 2014: 215) Therefore, in research, the two most important aspects of precision are reliability and validity.

The study ensured that validity was maintained by asking questions that are related to the findings in literature that were at the same time aligned with the research objectives. This was done by including questions on generally agreed factors that influence the adoption and implementation of ABC in literature. The questions were phrased concisely to avoid ambiguity.

The reliability of the study was improved by the use of two different research methods to collect data on the same phenomena. Reliability of primary data was also established by using questionnaires to collect data in the university's current environmental setting and subsequently using multiple sources of evidence. Reliability was also ensured by making sure that each question only covered one aspect and could easily be understood.

3.8.1 Data validity and reliability

The validity of the research instruments was also ensured by making sure that the questions asked directly related to the objectives of the study. During the data preparation phase, the coding of all the data indicated that there were no empty fields and all integer values were between 1 and 5. Furthermore, all Likert-scale based research variables had a Cronbach's alpha (α) greater than 0.7 (Table 3.9). In order to achieve an acceptable, consistent scoring in research, a minimum reliability score of 0.70 is recommended (Muijs 2011: 221). Hence, the data is reliable (Quinlan 2011 cited by Best 2012: 270).

Table 3.9: Validity and reliability of data collected		
Research variable	Number of items	Cronbach's alpha (α)
Strategy	3	0.936
Decision usefulness of cost information	6	0.977
Environmental/ contextual factors	16	0.980
Information technology	2	0.885
System adaptability	5	0.842
Organisational structure	2	0.835
Technical variables	4	0.979
Behavioural and organisational variables	10	0.876

3.8.2 Delimitation of scope

Due to time and resource constraints, the geographical area is limited to one state university, DUT, in KZN, SA. The location of the employees is within the five campuses of DUT that are located in Durban and Pietermaritzburg. The study was restricted to employees from the finance, library, Faculty of Accounting and Informatics, Faculty of Management Sciences as well as Heads of Departments at DUT. The staff of the other faculties were not included in the study, as the study focused on staff with background knowledge on cost and management accounting as well as those staff involved in decision making, budget allocation and cost allocation in their respective departments. The limited number of people posed a challenge, as participation by the majority of them was vital for the study to be more representative.

3.8.3 Ethical considerations

According to Saunders *et al.* (2012: 52) there are three major ethical considerations when undertaking all research processes (i.e., when recruiting, measuring and publishing). These are how the information is collected, how the information is processed, and, lastly, how the findings are used. Likewise, Welman *et al.* (2011: 61) support that formal procedures of obtaining permission to conduct a research study should be approved by an ethics committee. The relevant ethical issues were considered in this study. In this regard, ethical clearance was granted by the IREC of DUT. A copy of the ethical clearance letter is shown in Appendix F.

Confidentiality was also ensured through the protection of the data collected. The results were used only in an aggregated form and therefore anonymity of respondents and the confidentiality of their responses were assured. The completed questionnaires were securely stored and available only to the supervisors and the researcher.

3.9 SUMMARY

The chapter presented an overview of the research methodology adopted for this study. The 'onion' model was used as a guide to discuss issues relating to the research paradigm, choice of research methodology adopted, the research process on how the study was organised, including procedures, participants, as well as the methods and instruments used for data collection. The pragmatic paradigm was chosen based on the aim, objectives, research questions and methods of enquiry. Subsequently, the deductive and inductive approaches were selected and justified. The relevant research strategy adopted was a case study, using survey research, and the associated data collection tools chosen were semi-structured interviews and self-administered questionnaires. This was followed by quantitative and qualitative data analysis using the SPSS (version 25®) package and NVivo software, respectively. The chapter concluded by highlighting how validity, reliability and ethical issues were addressed. The next chapter presents the research findings together with a relevant discussion of the results.

CHAPTER FOUR
PRESENTATION AND DISCUSSION OF RESULTS

4.0 INTRODUCTION

The previous chapter presented the study's research methodology by describing and discussing how data was gathered using questionnaires and in-depth interviews. The purpose of this chapter is to present the results and discuss the findings obtained from the questionnaires and interviews used in the study. Therefore, this chapter presents the research findings and a discussion of the results.

The overall aim of the study was to determine and analyse the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in SA, using DUT as a case study. The variant of the mixed methods design used in this study is the embedded design (Creswell and Plano Clark 2007: 67). The priority of this mixed methods model is established by the quantitative methodology, and the qualitative dataset is subservient or plays a supplemental role within the methodology (Creswell and Plano Clark 2007: 69). The quantitative and qualitative embedded data is also used to answer different research questions within the study (Creswell and Plano Clark 2007: 69). The responses from the questionnaire and interviews were used to meet the following objectives of the study:

- to investigate the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA, and
- to determine the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT.

Further, in-depth interviews were used to address the third objective of the study which was as follows:

- to identify and evaluate cost activities, cost drivers as well as

relevant cost pools of a selected department at DUT.

Based on the above three objectives, it was possible to determine the current overhead costing system and the factors that influence the adoption and implementation of ABC at DUT. Furthermore, an ABC model was developed on the identified cost activities, cost drivers and cost pools in the DUT library.

The analyses of the results is presented in a sequential order following the three sections of the questionnaire (Appendix B). Data from the questionnaire was analysed and organised into the following headings:

- Demographic information;
- The current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT;
- Perceptions on the barriers to and success factors for the adoption and implementation of ABC in DUT; and
- The identification and evaluation of cost activities, cost drivers and relevant cost pools of a selected department.

The current overhead costing system as well as the perceptions on the barriers and success factors for the adoption and implementation of ABC at DUT are discussed under the following themes:

- Strategy;
- Decision usefulness of cost information;
- Environmental/contextual factors;
- Information technology;
- System adaptability;
- Organisational structure;
- Technical factors; and
- Behavioural and organisational factors.

This chapter also presents the findings from semi-structured interviews with top management (finance executive and HOD); middle management (cost accountants);

finance officer as well as library staff members. Findings from the interviews were used to support statistical data drawn from the questionnaire (Appendix B).

The results of the interviews are embedded to support quantitative data and presented under the following themes: the current overhead cost system (strategy, decision usefulness of cost information, environmental/contextual factors); strategy; information technology; system adaptability; contextual or environmental factors; organisational structure; technical factors; information technology; and behavioural and organisational factors. Furthermore, the results of the interviews with finance and library staff members are used to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected academic support department, the library at DUT. The chapter concludes with a summary of the major findings of the study.

The previous chapter presented the study's research methodology by describing and discussing how data was gathered using questionnaires and in-depth interviews. The purpose of this chapter is to present the results and discuss the findings obtained from the questionnaires and interviews used in the study. Therefore, this chapter presents the research findings and a discussion of the results.

4.1 DEMOGRAPHIC INFORMATION

This section presents the descriptive statistics of the respondents' demographics, namely, gender, age, highest qualification, job title and time at DUT. The section focuses on the preliminary analysis, which provides a baseline, or descriptive analysis of the demographic variables of the sample in totality.

4.1.1 Gender and age – questionnaire survey

Table 4.1 shows the percentage responses by the respondents per gender as well as age category. The results, illustrated in Table 4.1, indicate that the demographics of the respondents were almost evenly distributed across gender. The Fisher's exact test failed to show significant differences in the gender with respect to age distribution of the participants ($p > 0.05$).

Table 4.1: Age distribution of participants			Gender		Total
			Male	Female	
Age Profile (years)	20-25	Number	3	4	7
		% of Total	1.5%	2.0%	3.5%
	26-35	Number	6	12	18
		% of Total	3.0%	5.9%	8.9%
	36-45	Number	30	38	68
		% of Total	14.9%	18.8%	33.7%
	46-55	Number	41	25	66
		% of Total	20.3%	12.4%	32.7%
	56 – 65	Number	26	17	43
		% of Total	12.9%	8.4%	21.3%
Total		Number	106	96	202
		% of Total	52.5%	47.5%	100.0%
Fisher's Exact Test= 0.08					

As shown in Table 4.1, the number of male respondents (106 or 52.5%) was slightly higher than the female respondents (96 or 47.5%). With regards to the age distribution, the proportion of females (2.0%) below 25 years was higher than their male counterparts (1.5%). Similarly, more females were between 26-35 years (5.9%) and 36-45 years old (18.8%). In contrast, the proportion of males between the ages of 46-55 years (20.3%) and 56 years and above (12.9%) exceeded that of the females. Overall, Table 4.1 shows that the female respondents constituted the younger participants while the males were older.

These findings may indicate that, overall, DUT has a demographic diversity in terms of gender. Diversity in terms of gender is important particularly in SA as issues of inequality related to gender are constantly being addressed. This finding also shows that DUT is complying with affirmative action, because previously disadvantaged women are relatively well-represented (47.5%). Demographic diversity enables creativity, innovation, and improved group problem solving that, in turn, enhances the competitiveness of organisations (Ramaligela and Moletsane 2013: 156).

The results also show that only seven (7) respondents (3.5%) were millennials. Generally, the older the employees, the more they have invested in current practice and, therefore, they are less likely to accept change (Aladwani 2001: 266). Ramaligela

and Moletsane (2013: 156) also showed that the age of employees at a HE institution, as is the case with DUT, influences the sharing of tacit knowledge (expertise) amongst employees. Acemoglu and Robinson (2013: 178) further contend that the age of employees also influences the sharing and development of explicit knowledge.

4.1.2 Academic qualifications and years of experience at DUT – Questionnaire survey

To ascertain respondents' academic qualifications and, thus, the skill base, respondents were requested to provide their highest qualification obtained. Table 4.2. shows the percentage responses by the respondents per qualification category.

The qualifications were categorised as diploma, bachelor's degree, post-graduate qualification, master's degree and doctoral degree. Any other qualifications had to be specified. As depicted in Table 4.2, the majority of the respondents hold a master's degree (93 or 46%). This was followed by a doctoral degree (16.3%), a bachelor's degree (15.3%) an honour's degree or postgraduate diploma (14.4%), and diploma (7.9%). Since the sample was collected from an institution of higher learning, it was not surprising that there was a high proportion of staff with post-graduate qualifications. Some of the academic staff are Chartered Accountants who lecture in the Accounting and Informatics Faculty and have industrial experience and extensive knowledge on ABC. This finding indicates that DUT has attracted highly qualified staff members. Furthermore, DUT has done fairly well in attracting and retaining the Accounting scarce skill set, which is associated with ABC.

Table 4.2: Level of education of respondents						
Highest level of qualification	Diploma	Bachelor's degree	Honours/Post-graduate diploma	Master's degree	Doctoral degree	Total
Total	16	31	29	93	33	202
Percentage	7.9	15.3	14.4	46.0	16.3	100

The study also sought to ascertain whether the number of years the respondents had been employed in the university had an impact on their resistance to change to a new

system such as ABC. Table 4.3 shows the number of years respondents have spent in the university.

Table 4.3: Number of years at DUT			
		Number	Percentage
Number of years in the university	<1	19	9.4
	1-5	41	20.3
	6-10	32	15.8
	11-15	54	26.7
	16-20	29	14.4
	21-25	23	11.4
	26-30	2	1
	>31	2	1
	Total	**202**	**100**

The results show that DUT has a large cohort of experienced staff as the highest percentage reported was for respondents in employment at DUT for between 11 and 15 years (54 or 26.7%). This is followed by those who have served for 1 to 5 years (41 or 20.3%). This suggests that majority of the respondents have more than 10 years' work experience in the university. These results show that DUT has done fairly well in terms of staff retention. It was observed that only few (1%) of the participants have worked for 31 years and more. This may be related to the requirement to retire at 65 years of age at DUT.

Research conducted by Lourens (2016: 244) at DUT showed that those respondents who had been employed at the institution for less than 5 years (29.7%) may be more motivated and encouraged to engage actively within the DUT structures and processes and are more likely to embrace change. The study also suggests that employees in the HE sector with more than 15 years of service may become complacent and could suffer from burnout resulting in a lack of engagement and commitment towards the institution and possibly new ideas (Lourens 2016: 244). On the other hand, Naidoo and Wu (2011: 1125) contend that initiatives such as ABC and inventory control can be successfully applied if experienced individuals are involved. Consequently, there needs to be a good balance of experienced and inexperienced

staff members to ensure continuity and effective management in areas such as the overheads of an institution.

4.1.3 ABC knowledge – Questionnaire survey

The respondents were asked to indicate how familiar they are with the ABC system. Table 4.4 shows the ABC knowledge by the designation of the participants.

Table 4.4: ABC knowledge by designation of the participants								
			ABC knowledge					Total
			No knowledge	General knowledge	Good knowledge	Extensive knowledge	Expert knowledge	
Designation	Head of Departments	Number	20	7	6	5	3	41
		% of Total	9.9%	3.5%	3.0%	2.5%	1.5%	20.3%
	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	Number	28	55	31	10	5	129
		% of Total	13.9%	27.2%	15.3%	5.0%	2.5%	63.9%
	Staff from finance department	Number	0	10	8	11	3	32
		% of Total	0.0%	5.0%	4.0%	5.4%	1.5%	15.8%
Total		Number	48	72	45	26	11	202
		% of Total	23.8%	35.6%	22.3%	12.8%	5.4%	100.0%

As seen in Table 4.4, 20 (9.9%) Heads of Departments have no knowledge of ABC while only three (1.5%) of them claim to have expert knowledge. For the academic staff in the Faculties of Accounting and Informatics as well as Management Sciences, 55 (27.2%) participants have general knowledge on ABC while only 5 (2.5%) had expert knowledge. For finance staff, 10 (5%) indicated that they have general knowledge of ABC. Overall, the number of participants with general knowledge dominated (72 or 35.6%). There were 26 (12.8%) respondents with extensive knowledge on ABC and 11 (5.4%) respondents with expert knowledge. This indicates

that the majority of respondents had some knowledge of ABC. This finding further indicates that the respondents were the correct target sample and that the information was gathered from knowledgeable respondents. The Pearson chi-square revealed significant differences in the ABC knowledge based on the designation of the participants (p<0.01).

4.1.4 Gender and age distribution – interviewees

To determine whether the age of the interviewees at DUT has an impact on the adoption and implementation of ABC, respondents were asked to indicate their age groups. These results are shown in Table 4.5. Six (50%) respondents were between 36-45 years, three (25%) respondents were between 46-55 years and three (25%) respondents were between 56–65 years of age.

Table 4.5: Age group of interviewed participants					
		Respondents' age group			Total
		36-45 years	46-55 years	56-65 years	
35-49 years	Number	6	0	0	6
	% of total	50%	0%	0%	50%
50-59 years	Number	0	3	0	3
	% of total	0%	25%	0%	25%
60-65 years	Number	0	0	3	3
	% of total	0%	0%	25%	25%
Total	Number	6	3	3	12
	% of total	50%	25%	25%	100%

4.1.5 Academic qualifications - interviewees

Interviewees were asked to state their highest academic qualifications. Table 4.6 indicates that two (16.67%) respondents possess a diploma, three (25%) respondents possess a bachelor's degree, two (16.67%) respondents possess honours degrees, four (33.33%) respondents possess a masters degree and one (8.33%) interviewee has a PhD. Despite this good level of knowledge at DUT, respondents highlighted the absence of an ABC system.

Table 4.6: Level of education		
Highest qualification	Number of participants	Percentage
Diploma	2	16.67%
Bachelor's degree	3	25.00%
Honours/Postgraduate degree	2	16.67%
Master's degree	4	33.33%
Doctoral degree	1	8.33%
Total	12	100%

4.1.6 Knowledge of ABC system - interviewees

Respondents were asked to indicate their familiarity with the ABC system. Table 4.7 shows that nine (75%) respondents have good and expert knowledge of ABC and three (25%) respondents have general knowledge on ABC.

Table 4.7: Knowledge of ABC system		
ABC knowledge	**Number**	**Percentage**
General knowledge	3	25%
Good knowledge	6	50%
Expert knowledge	3	25%
Total	**12**	**100%**

4.1.7 Summary on background information

In concluding this section on the background information on all the respondents, there is an almost even balance between male and female with the majority of the staff having served at least 11 years in the university. The majority of the staff in the sample were academic staff between the ages 46-55, and possess a master's degree. However, a fair number, i.e., 72 (35.6%) of the staff reported that they only have a general knowledge of ABC. All interviewees had at least a good knowledge of ABC.

The next section addresses the first objective of the research, namely, the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA.

4.2 OBJECTIVE 1: THE CURRENT OVERHEAD COST MANAGEMENT SYSTEM IN RELATION TO THE ASSIGNMENT OR ALLOCATION OF OVERHEADS TO COST OBJECTS AT DUT, A STATE UNIVERSITY IN SA

The previous section presented the demographics of the respondents. This section investigates the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT. Studies have shown that the possibility of ABC adoption and implementation is related to the degree of satisfaction from the currently used cost accounting system (Cohen *et al.* 2005: 985). More specifically, this section uses the opinions of the HODs and staff from the finance department on the current overhead cost management system and its influence on strategic decision making.

4.2.1 The current overhead costing system and its influence on strategic decision making

Strategy is one of the factors that studies have identified as positively influencing the adoption and implementation of ABC (Gosselin 1997: 118; Michela and Irvine 2005: 63). This section discusses the responses of the HODs and finance staff on the current overhead costing strategy at DUT.

4.2.1.1 HODs' perspectives on the current overhead costing system and its influence on strategic decision making

The scoring pattern of the HODs regarding the influence of the current overhead costing system on strategic decision making in the university is summarised in Table 4.8. When asked to indicate whether the current overhead costing system fully meets the strategic needs of management (statement 6.1), most (52.9%) HODs were in agreement (agree=43.1%; strongly agree=9.8%) that the current overhead costing system meets the strategic needs of management. Despite this finding, more than half (56.9%) of the HODs were unsure if there is adequate, accurate overhead costing

information currently at DUT to assist in strategic decision making (statement 6.2). Fisher's exact test revealed a statistical significant difference in the scoring pattern in the two statements (6.1 & 6.2) measuring the influence of the current overhead costing system on strategic decision making (p<0.01).

Focus Area	Question	No	HODs n = 41					Mean	Standard deviation	*P*-value
			SD	D	Unsure	A	SA			
Strategy	6.1	41	7.8%	11.8%	27.5%	43.1%	9.8%	3.35	1.074	0.000**
	6.2	41	13.7%	21.6%	56.9%	7.8%	0.0%	2.59	0.829	0.000**

Table 4.8: HODs' perceptions on the influence of the current overhead costing system on strategic decision making

A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.

** Level of significance p< 0.01 (2-tailed).

4.2.1.2 Perceptions of finance staff on the current overhead costing system and its influence on strategic decision making

With reference to the scoring pattern of the staff from the finance department shown in Table 4.8, statistical differences were also observed in the statements measuring strategy (p<0.01). In response to the statement 'the current overhead costing system fully meets the strategic needs of management' (statement 6.1), 52.9% of the respondents were in agreement (agree=43.1%; strongly agree=9.8%) that the current overhead costing system meets the strategic needs of management. Although more of the respondents noted that the university has an overhead costing system that currently meets its strategic needs, half of (50%) them were, however, in disagreement (strongly disagreed=9.1%;disagreed=40.9%) with the statement that 'there is adequate, accurate overhead costing information currently at DUT to assist in strategic decision making' (statement 6.2).

Table 4.9: Perceptions of finance staff on the influence of the current overhead costing system on strategic decision making										
Focus Area	Question	No	(Finance staff n = 32)					Mean	Standard deviation	*P*-value
			SD	D	Unsure	A	SA			
Strategy	6.1	32	18.2%	18.2%	0.0%	54.5%	9.1%	3.18	1.368	0.014*
	6.2	32	9.1%	40.9%	9.1%	36.4%	4.5%	2.86	1.167	0.012*
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
* Level of significance p < 0.05 (2-tailed).										

4.2.1.3 Comparison of scoring patterns of HODs and finance staff on the current overhead costing system and its influence on strategic decision making

Tables 4.8 and 4.9 show that the results of the first two questions on the influence of current overhead costing system on strategic decision making showed some support for the current costing system with means of 3.35 and 3.18 for the HODs and finance staff, respectively; however, more than half of the respondents disagreed that the current costing information assists in adequate strategic decision making.

In the subsequent interviews conducted (A2), it was highlighted that although the current system is in alignment with requirements of the tertiary system, is essentially appropriate and meets the needs of the university, the cost information produced is not as comprehensive or as detailed as management would want it to be. A senior member of staff in finance (A1) confirmed that there was 'certainly room for improvement'. This was supported by responses to statement 6.15 in Table 4.14 where 62.8% of the HODs (disagree= 47.1%; strongly disagree=15.7%) and 59.1% of finance staff disagreed (disagree=27.3%; strongly disagree=31.8%) with the statement that there is 'detailed overhead costing information essential for internal planning as well as budgeting purposes'.

A respondent (A3) with ABC knowledge further explained that:

'*There is currently an aggregated and simplistic method for assigning overhead costs. An ABC perspective on the same transactions would provide more detailed cost information that was previously unavailable. The starting point would be with the budgets. The adoption and implementation of ABC could (1) provide more accurate service and programme costing, (2) improve insight into activities that drive costs and impact on cost behaviour, (3) enable more efficient resource allocation and essentially more accurate student/programme pricing.*'

Table 4.10 shows that the views expressed by the HODs and finance staff were more or less similar as there are no significant differences in the responses of the HODs and staff from the finance department (p>0.05).

Table 4.10: Independent t-test measuring the differences in scoring pattern on the influence of the current overhead costing system on strategic decision making						
Designation		N	Mean	Standard Deviation	Std. Error Mean	*P*- value
Scoring	HODs	41	2.9706	0.71702	0.10040	0.827
	Staff from finance department	32	3.0227	1.00567	0.21441	

4.2.2 The current overhead costing system in relation to decision usefulness of cost information

Studies have found a positive relationship between the successful implementation of ABC and decision usefulness of cost information (Baird *et al.* 2004: 395; Anderson and Young 1999: 544) in setting up a MAS. This section discusses the responses of the HODs and finance staff on the decision usefulness of cost information at DUT.

4.2.2.1 HODs' perspectives on the current overhead costing system in relation to the decision usefulness of cost information

The results of statements 6.3 to 6.8 are shown in Table 4.11

Table 4.11: HODs perceptions on the current overhead costing system in relation to the decision usefulness of cost information										
Focus Area	Question	No	HODs n = 41					Mean	Standard deviation	*P-* value
			SD	D	Unsure	A	SA			
Decision usefulness of cost information	6.3	41	7.8%	39.2%	7.8%	29.4%	15.7%	3.06	1.287	0.001**
	6.4	41	0.0%	3.9%	33.3%	52.9%	9.8%	3.69	0.707	0.000**
	6.5	41	21.6%	39.2%	19.6%	9.8%	9.8%	2.47	1.222	0.005**
	6.6	41	2.0%	37.3%	45.1%	11.8%	3.9%	2.78	0.832	0.000**
	6.7	41	9.8%	23.5%	52.9%	7.8%	5.9%	2.76	0.951	0.000**
	6.8	41	3.9%	25.5%	9.8%	35.3%	25.5%	3.53	1.239	0.002**
A Likert scale of 1= strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
** Level of significance p < 0.01 (2-tailed).										

In terms of the HODs' rating of the influence of decision usefulness of cost information on the current overhead costing system, the Fisher's exact test in Table 4.11 indicated that the scoring pattern of the HOD's was statistically significant for all statements (p<0.01). For example, when asked to indicate their level of agreement and or disagreement to the statement 'overhead cost information is an essential component in decision making within the university' (statement 6.3), 47% were in disagreement (strongly disagree=7.8%; disagree=39.2%), and 45.1% were in agreement (agree=29.4%; strongly agree=15.7%) with the statement. Given that more (47%) of the HOD's disagreed on the importance of overhead cost in decision making within the university, it was no surprise that most (62.7%) HOD's were in agreement (agree=52.9%; strongly agree=9.8%) that changing the overhead costing system is not a strategic priority in the university (statement 6.4).

In this respect, one of the participants (A1) in the interviews had the following to say:

"Overhead cost information in DUT is mainly being used for recording purposes only. For example, it is used for Council (board of directors), finance committee meetings as well as the University Planning and Resources Forum (UPRF) meetings where executives from academic and non-academic departments meet once every three months. It is also essentially used for the production of financial statements that are published on the Department of Higher Education and Training (DHET) website."

Table 4.11 also shows that when asked to indicate their level of agreement or disagreement to the statement 'the current overhead costing system is transparent on those overheads that are shared or allocated amongst different departments/programmes/ faculties' (statement 6.5), the majority (60.8%) of the HODs were in disagreement (strongly disagree=21.6%; disagree=39.2%). Table 4.11 shows that 45.1% of the HODs were unsure whilst 39.3% of them were in disagreement (strongly agree=2.0%; disagree=37.3%) that the current overhead costing system gives a clear understanding of the origin as well as the cause-and-effect of overhead costs (statement 6.6). Similarly, more (52.9%) of the HODs were unsure while 33.3% were in disagreement (strongly disagree=9.8%; disagree=23.5%) that the current overhead costing information gives a clear understanding of the behaviour of overhead costs (statement 6.7). Notwithstanding this finding, 60.8% of the HODs were in agreement (agree=35.3%; strongly agree=25.5%) that non-accounting staff would fully support the implementation of a new cost management system initiative, such as ABC (statement 6.8). Studies have found a positive relationship between the successful implementation of ABC and the involvement of non-accounting staff (Krumwiede 1998, Shield and McEwen 1996) in setting up an ABC system.

The results of statements 6.5, 6.6 and 6.7 show little support on the transparency of the current overhead costing system with means of 2.47, 2.78 and 2.76, respectively. However, more than half of the HODs agreed that changing the overhead costing system is not a strategic priority in the university (statement 6.4).

4.2.2.2 Perceptions of finance staff on the current overhead costing system in relation to the decision usefulness of cost information

The results of statements 6.3 to 6.8 in respect of the finance staff are shown in Table 4.12.

Focus Area	Question	No	Finance staff n = 32					Mean	Standard Deviation	P-value
			SD	D	Unsure	A	SA			
Decision usefulness of cost information	6.3	32	0.0%	4.5%	4.5%	36.4%	54.5%	4.41	0.769	0.000**
	6.4	32	0.0%	13.6%	31.8%	50.0%	4.5%	3.45	0.800	0.003**
	6.5	32	9.1%	45.5%	4.5%	40.9%	0.0%	2.77	1.110	0.002**
	6.6	32	13.6%	31.8%	4.5%	45.5%	4.5%	2.95	1.253	0.001**
	6.7	32	9.1%	40.9%	4.5%	45.5%	0.0%	2.86	1.125	0.002**
	6.8	32	9.1%	9.1%	54.5%	18.2%	9.1%	3.09	1.019	0.000**

Table 4.12: Perceptions of finance staff on the current overhead costing system in relation to the decision usefulness of cost information

A Likert scale of 1= strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.

**Level of significance p < 0.01 (2-tailed).

In respect to the scoring patterns of the finance staff regarding the influence of decision usefulness of cost information, the Fisher's exact test in Table 4.12 indicated that the scoring patterns of the finance staff were statistically significant for all the statements (p<0.01). When asked to indicate their level of agreement and or disagreement to the statement that 'overhead cost information is an essential component in decision making within the university' (statement 6.3), the overwhelming majority (90.9%) were in agreement (agree=36.4%; strongly agree=54.5%). Studies show that the importance given to overhead cost information in decision making (Baird *et al.* 2004: 394; Anderson and Young 1999: 555) is positively associated with the successful adoption and implementation of ABC.

When asked to indicate their level of agreement or disagreement to the statement 'the current overhead costing system is transparent on those overheads that are shared or allocated amongst different departments/programmers/ faculties' (statement 6.5), more (54.6%) of the finance staff were in disagreement (strongly disagree=9.1%; disagree=45.5%) on the transparency of the costing system. In contrast, half (50.0%) of the respondents were in agreement (strongly agree=45.5%; disagree=4.5%) that the current overhead costing system gives a clear understanding of the origin as well as the cause-and-effect of overhead costs (statement 6.6).

In response to the statement 'the current overhead costing information gives a clear understanding of the behaviour of overhead costs' (statement 6.7), half of the finance staff were in disagreement (strongly disagree=9.1%; disagree=40.9%) while nearly half (45.5%) of them agreed with the statement.

Given the mixed responses and divergent views expressed, more than half of the finance staff were unsure (mean of 3.09) if non-accounting staff would be in support of a new cost management system like ABC (statement 6.8). This indicates that finance staff perceive that the importance given to overhead cost information or current decision usefulness of cost information may not fully support the implementation of a new cost management system such as ABC.

4.2.2.3 Comparison of scoring patterns of HODs and finance staff on the current overhead costing system in relation to decision usefulness of cost information

Tables 4.11 and 4.12 show the opinions of staff from the finance department and HODs regarding the current decision usefulness of cost information in relation to the overhead costing system at DUT. It can be noted that the views of the academic staff and staff from the finance department were quite similar except for statement 6.3. For statement 6.3, the mean response for the HODs was 3.06, while that for the finance staff was 4.41. Interviews conducted revealed that the different views could be attributed to the level of involvement of these parties in overhead cost management. The interviews (A1) revealed that most shared or indirect overheads, such as the depreciation of buildings and equipment, electricity and water are handled at facility level in the finance department and not by HODs. Therefore, HODs are not consistently making decisions in relation to these overheads. This is probably the reason why some HODs disagreed with the statement 'overhead cost information is an essential component in decision making within the university' (statement 6.3).

To further compare the differences between the views expressed by the staff from finance department and those noted from the HODs, an independent t-test was done. These results are shown in Table 4.13. The independent t-test's results show no significant differences between the views expressed by both respondent groups when

considering the sum of all the responses making up the decision usefulness of cost information category (p>0.05).

Table 4.13: Independent t-test measuring the differences in scoring patterns on the decision usefulness of cost information in adopting ABC						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Scoring	HODs	41	3.0490	0.63184	0.08847	0.245
	Staff from the finance department	32	3.2576	0.71590	0.15263	

4.2.3 The current overhead costing system in relation to the DUT environment/context

Contextual variables include the values, culture and climate which uniquely identifies with an organisation and have been linked to the successful adoption and implementation of ABC (Malmi 1997: 473). This section discusses the responses of the HODs and finance staff on the current overhead costing system in relation to the DUT environment/context.

4.2.3.1 HODs' perspectives on the current overhead system in relation to the DUT environment/context

The results of statements 6.9 to 6.19 in respect of the HODs' perceptions are shown in Table 4.14.

Focus Area	Question	No	HODs n = 41					Mean	Standard Deviation	P-value
			SD	D	Unsure	A	SA			
	6.9	41	7.8%	19.6%	23.5%	45.1%	3.9%	3.18	1.053	0.000**
	6.10	41	2.0%	5.9%	58.8%	27.5%	5.9%	3.29	0.756	0.000**
	6.11	41	11.8%	9.8%	35.3%	23.5%	19.6%	3.29	1.238	0.031*
	6.12	41	5.9%	17.6%	45.1%	27.5%	3.9	3.06	0.925	0.000**
Environmental/	6.13	41	9.8%	5.9%	31.4%	47.1%	5.9%	3.33	1.033	0.000**
contextual	6.14	41	5.9%	5.9%	31.4%	51.0%	5.9%	3.45	0.923	0.000**
factors	6.15	41	15.7%	47.1%	9.8%	21.6%	5.9%	2.55	1.172	0.000**
	6.16	41	0.0%	13.7%	47.1%	39.2%	0.0%	3.25	0.688	0.010*
	6.17	41	0.0%	19.6%	33.3%	47.1%	0.0%	3.27	0.777	0.064
	6.18	41	21.6%	9.8%	51.0%	11.8%	5.9%	2.71	1.119	0.000**
	6.19	41	13.7%	41.2%	15.7%	29.4%	0.0%	2.61	1.060	0.017*

Table 4.14: HODs' perceptions on the current overhead costing system in relation to the DUT environment/context

A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.

**Level of significance p < 0.01 (2-tailed).

*Level of significance p < 0.05 (2- tailed).

With regards to the scoring pattern of the HODs' perspectives on the current overhead system in relation to the DUT environment/context, the Fisher's exact test shown in Table 4.13 revealed significant differences in nearly all the statements (p<0.01) except for statement 6.17, that is 'the overhead cost system in place makes non-value adding activities/courses/programmes/ services immediately visible to management' (p>0.05).

Table 4.14 shows that 49% of the HODs were in agreement (agree=45.1%; strongly agree=3.9%) that overhead costs at DUT are generally perceived as insignificant or a small percentage of total costs (statement 6.9). Despite this finding, 58.8% of the HODs were unsure whether the current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs (statement 6.10). Furthermore, 35.3% of the HODs were unsure whether most of the overhead costs in the departments are fixed and uncontrollable (statement 6.11) while 43.1% of the HODs believe that most of the overhead costs in the departments are fixed and uncontrollable (agree=23.5%; strongly agree=19.6%) (statement 6.11).

When asked to rate their level of agreement or disagreement to statement 6.12, 'the major cost in DUT is salaries and therefore there is no need for a multiple driver basis of apportioning overheads', nearly half (45.1%) of the HODs were unsure if the multiple driver basis would be appropriate where the major cost in DUT is salaries. There was a moderate level of agreement (53%) amongst the HODs that there is adequate and accurate overhead cost information essential for profitability and performance analysis (statement 6.13) (agree=47.1%; strongly agree=5.9%). More (56.9%) HODs believe that there is adequate overhead cost information that is useful in cost control in departments (statement 6.14) (agree=51.0%; strongly agree=5.9%). In contrast to this finding, 62.8% HODs were in disagreement (strongly disagree=15.7%; disagree=47.1%) with statement 6.15 that there is 'adequate and detailed overhead costing information essential for internal planning as well as budgeting purposes'. Nearly half of the HODs were, however, unsure (47.1%) if the current overhead allocation system helps fully explain the losses on unprofitable programmes/activities (statement 6.16).

Less than half (47.1%) of the HODs agreed that the overhead cost system in place makes non-value adding activities/courses/programmes/services immediately visible to management (statement 6.17). Nevertheless, more than half (51.0%) of the HODs were unsure if the current overhead costing system is comprehensive or well detailed and not too aggregated (statement 6.18). In addition, 54.9% of the HODs were in disagreement (strongly disagree=13.7%; disagree=41.2%) that the current overhead costing systems for financial analysis in DUT is the most appropriate and no additional details are necessary (statement 6.19).

It can be noted from the views shown in Table 4.14 that most HODs were mostly unsure on the statements that required an overall perception of the total influence of overheads in the DUT environment. For example, the mean response for the HODs was 3.18 and 3.06 on the statements 'overhead costs at DUT are generally perceived as insignificant or a small percentage of total costs' (statement 6.9) and 'the major cost in DUT is salaries and therefore there in no need for a multiple driver basis of apportioning overheads' (statement 6.12), respectively.

Furthermore, the means for the HODs were 2.71 and 2.61, respectively, on the statements 'the current overhead costing system is comprehensive or well detailed and not too aggregated' (statement 6.18) as well as 'the current overhead costing systems for financial analysis in DUT are most appropriate and no additional details are necessary' (statement 6.19). These opinions of the HODs indicate little support on the adequacy of the current overhead costing system in the DUT environment. In the interviews held, a respondent was concerned about the inadequate details on the figures that HODs receive from the finance department. Below is a direct quote made by the respondent (A1).

'*Effective cost control and turn around strategies by HODs could be enhanced by more detailed or a further breakdown of the overhead cost information that is received from finance. Management would benefit from understanding the activities involved in delivering each service and the costs associated with each activity*.'

4.2.3.2 Perceptions of finance staff on the current overhead costing system in relation to the DUT environment/context

The results of statements 6.9 to 6.19 in respect of the perceptions of finance staff are shown in Table 4.15.

Focus Area	Question	No	Finance staff n = 32					Mean	Standard Deviation	P-value
			SD	D	Unsure	A	SA			
Environmental/ contextual factors	6.9	32	9.1%	22.7%	9.1%	40.9%	18.2%	3.36	1.293	0.027*
	6.10	32	4.5%	4.5%	4.5%	77.3%	9.1%	3.82	0.853	0.000**
	6.11	32	22.3%	22.7%	4.5%	36.4%	9.1%	2.77	1.445	0.027*
	6.12	32	31.8%	22.7%	40.9%	4.5%	0.0	2.18	0.958	0.019*
	6.13	32	9.1%	40.9%	0.0%	40.9%	9.1%	3.00	1.273	0.006**
	6.14	32	13.6%	40.9%	0.0%	31.8%	13.6%	2.91	1.377	0.029*
	6.15	32	31.8%	27.3%	0.0%	36.4%	4.5%	2.55	1.405	0.052
	6.16	32	13.6%	50.0%	0.0%	36.4%	0.0%	2.59	1.141	0.038*
	6.17	32	9.1%	63.6%	13.6%	13.6%	0.0%	2.32	0.839	0.000**
	6.18	32	54.5%	18.2%	18.2%	4.5%	4.5%	1.86	1.167	0.000**
	6.19	32	36.4%	45.5%	9.1%	9.1%	0.0%	1.91	0.921	0.004**

Table 4.15: Perceptions of finance staff on the current overhead costing system in relation to the DUT environment/context

A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.

** Level of significance $p < 0.01$ (2-tailed).

 * Level of significance $p < 0.05$ (2- tailed).

In terms of the scoring pattern shown in Table 4.15, the Fisher's exact test revealed significant differences in nearly all the statements ($p<0.01$ or $p<0.05$) except for statement 6.15, 'there is adequate and detailed overhead costing information essential for internal planning as well as budgeting purposes' ($p>0.05$).

Table 4.15 shows that 59.1% of the finance staff were in agreement (agree=40.9%; strongly agree=18.2%) that overhead costs at DUT are generally perceived as insignificant or a small percentage of total costs (statement 6.9). Similarly, 86.4% of the finance staff were in agreement (agree=77.3%; strongly agree=9.1%) that the current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs (statement 6.10). This finding indicates that volume-based cost drivers associated with traditional costing system, are still being used in the university and shows a strong reliance on volume-based drivers of the traditional costing system.

On the other hand, 45% of the finance staff were in disagreement (strongly disagree=22.3%; disagree=22.7%) while a similar percentage (45.5%) were in agreement (agree=36.4%; strongly agree=9.1%) with the statement that most of the overhead costs in the departments are fixed and uncontrollable (statement 6.11). Similarly, more than half (54.5%) of finance staff do not agree that since the major cost in DUT is salaries, therefore there is no need for a multiple driver basis of apportioning overheads (statement 6.12) (strongly disagree=31.8%; disagree=22.7%). These results indicate that finance staff are in favour of multiple cost drivers for assigning overhead costs to cost objects in the university.

Furthermore, when asked to rate their level of agreement or disagreement to the statement 6.13, 'there is adequate and accurate overhead cost information essential for profitability and performance analysis', half (50%) of the respondents were in disagreement (strongly disagree=9.1%; disagree=40.9%) and the other half (50%) were in agreement (agree=40.9%; strongly agree=9.1%). This means that there was a split opinion on whether the current overhead information is essential for profitability and performance analysis. It was further explained in the interviews (A2) that the cost information is serving well its purpose for the preparation of financial statements but could be more effective in performance analysis when it is more comprehensive.

A similar mixed result was also noted regarding statement 6.14 'there is adequate overhead cost information that is useful in cost control in departments'. While 54.5% were in disagreement (strongly disagree=13.6%; disagree=40.9%) with statement 6.14, 45.4% were in agreement (agree=31.8%; strongly agree=13.6%). However, more (59.1%) of the respondents were in disagreement (strongly disagree=31.8%; disagree=27.3%) that there is adequate and detailed overhead costing information essential for internal planning as well as budgeting purposes (statement 6.15).

Similarly, most finance staff (63.6%) also disagreed (strongly disagree=13.6%; disagree=50.0%) with the statement that 'the current overhead allocation system helps fully explain the losses on unprofitable programmes/activities' (statement 6.16). Furthermore, finance staff were in disagreement (strongly disagree=9.1%; disagree=63.6%) that 'the overhead cost system in place makes non-value adding

activities/courses/programmes/ services immediately visible to management' (statement 6.17).

Table 4.15 also shows that 72.7% of the finance staff were in disagreement (strongly disagree= 54.5%; disagree=18.2%) with the statement that 'the current overhead costing system is comprehensive or well detailed and not too aggregated' (statement 6.18). In an interview with an executive, this was further explained (A1), as quoted below:

'*More detailed cost information is crucial in the current decision making framework - on campus expansion (more buildings are being erected); curriculum renewal, in building the university brand as well as the enhancement of the resource allocation model.'*

Finally, 81.9% of the finance staff were in disagreement (strongly disagree=36.4%; disagree=45.5%) with the statement that the current overhead costing system for financial analysis in DUT is most appropriate and no additional details are necessary (statement 6.19). This shows that finance staff perceive the current overhead system could be enhanced to provide more detailed cost information for financial analysis.

4.2.3.3 Comparison of scoring patterns of HODs and finance staff on the current overhead costing system in relation to the DUT environment/context

From the above discussion, it is clear that HODs and staff from the finance department at DUT have different views on the current overhead system in relation to the DUT environment/context. More specifically, and regarding the statements 6.11, 6.12, 6.13, 6.17 and 6.18, both respondent groups expressed different opinions. While the HODs were in more agreement with each of the statements, their counterparts in the finance departments were in disagreement. The means for the statements 'the current overhead costing system is comprehensive or well detailed and not too aggregated' (statement 6.18) and 'the current overhead costing systems for financial analysis in DUT are most appropriate and no additional details are necessary' (statement 6.19) for finance staff were 1.86 and 1.91 respectively. These results indicate that the

finance staff support the current overhead costing but perceive that a more enhanced system would allow more effective internal planning, profitability as well as performance analysis and cost control. It further indicates that the usage of the cost information produced by the existing costing system is very limited in enhancing accountability and transparency. Overall, the means of the HODs (3.09±0.46) were higher than that of staff from finance department for the two statements (m= 3.09 and 2.66 respectively).

Table 4.16 shows the results of the t-test for the summed means for the environmental/contextual factors of the two respondent groups.

Table 4.16: Independent t-test measuring the differences in scoring pattern on the current overhead costing system in relation to the DUT environment/context						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P* value
Scoring	HODs	41	3.0909	0.45745	0.06406	0.014*
	Staff from finance department	32	2.6612	0.70595	0.15051	
* Level of significance p < 0.05 (2-tailed).						

The independent t-test shown in Table 4.15 revealed a statistically significant difference in the views expressed by both designations (p<0.05). This suggests that the HODs and the finance staff have varying views on the influence of the environmental/contextual category in adopting and implementing an enhanced overhead costing at DUT. The finding may be a result of the ABC knowledge possessed by the finance staff. This is critical since both designations play a vital role in determining the overhead costing for individual students at the institution.

The study received only one comment on statement 6.20, which solicited for other views regarding adopting a new overhead costing system. The respondent from finance highlighted that DUT already has well researched Full-time Equivalents (FTEs) that are being used to assign overheads at departmental or faculty level. The respondent added that these FTEs could be useful when determining the relationship

among activities, resources and cost objects for the adoption and implementation of ABC at DUT.

4.2.3.4 Perceptions on the current costing model at DUT

Statement 6.10 was used to determine the current costing model at DUT. Respondents were asked whether student numbers are currently used to allocate overheads (statement 6.10). The results in Table 4.15 (statement 6.10) showed that 86.4% of the finance staff agreed (strongly agreed=9.1%; agreed=77.3%) that the current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs. This finding indicates that volume-based cost drivers are still mainly being used in the university and shows a strong reliance on volume-based cost drivers of the traditional costing system.

A respondent (A2) with ABC knowledge further explained that:

'*The current system allocates overhead costs mostly at faculty as well as departmental level and not at programme/course or student type level. Direct costs are traced through to program level but some indirect costs are not.'*

This is concerning, as this allocation determines the pricing of every single programme in the university. The use of a single overhead absorption rate at departmental level has been associated with various cost distortions (Naidoo 2011: 112). Furthermore, an absorption base, such as labour hours at departmental or faculty level does not provide an understanding of how overhead costs (cost behaviour) are incurred by a single programme or specific student type (Broad and Crowther 2001: 62).

Interviews conducted with respondents (A1 and A2) on the current overhead costing system show that the traditional costing method is used. The following basic illustration was revealed:

FTEs is a measurement used to calculate the estimated number of subsidy students or the number of students carrying a full load of coursework. To determine the university's weighted FTEs, a number of factors are considered that include the

teaching input, teaching output and institutional factors, such as scarce skills and non-scarce skills.

Therefore, DUT uses the fund accounting system whereby the overhead costs are allocated to the cost centres and FTEs are used to apportion these overheads to departments. FTEs are mainly based on the number of students carrying a full load in the programme but other factors, such as scarce skills and non-scarce skills influence the final weighted figures, as illustrated in Table 4.17.

Table 4.17: Weighting for faculty or department	
Area	Weighting
Science engineering and technology	0.63*
Commerce, philosophy and humanities	0.37*
*.Illustration purpose figures	

Trussel and Bitner (1998: 445) as well as Granof *et al.* (2000: 27) suggest that this costing system is more functional based using volume-based cost drivers that are biased towards student numbers. Although the system considers factors such as scarce skills and non-scarce skills that are considered unique and essential to state universities in SA, high-volume programmes in faculties and departments account for most of the overhead costs. Furthermore, the university's overheads are traced through to faculty as well as departmental level without multiple transaction based cost drivers to apportion the overheads to specific, individual programmes/courses or different student types. Studies show that these characteristics are aligned with the traditional costing systems which accumulate costs into facility wide or departmental cost pools using volume-based allocation bases (Granof *et al.* 2000: 9).

The major advantage of this system is that it recognises all the costs involved in delivering the services (including fixed costs), does a better job of accurately tracking profit during an accounting period and is designed for compliance as well as reporting purposes. However, the literature review revealed that the use of volume-related overhead absorption rates is inappropriate as resource consumption varies with

activities and not volume (Naidoo 2011: 111). Consequently, management decisions related to tuition and programme mix can be affected.

According to Kaplan and Porter (2011: 48) the biggest cause of high costs and prices is that poor costing systems are used that cannot accurately measure the cost per procedure. Having a more complete picture of cost per unit for a product line (programme) can be helpful to university management in evaluating profitability and determining accurate tuition charges. Hence, the sole use of size of a department or student numbers is not a reliable cost driver as it does not fully explain the consumption of overheads and resources adequately or accurately.

The findings of this study are similar to those by Naidoo (2011: 111) on forty-five registered private universities in SA, who reported that the allocation of indirect costs is the traditional costing method. According to Naidoo (2011: 110), this traditional costing system is structure-oriented and perhaps aligned with current university organisational structures and control.

4.2.3.5 The relationship between strategy, decision usefulness of cost information and environmental/contextual factors

A Pearson correlation was used to quantify the relationship between the strategy, decision usefulness of cost information and environmental/contextual factors. As shown in Table 4.18, the Pearson correlation value revealed that a significant positive relationship exists between strategy and decision usefulness of cost information ($r=0.255$; $p<0.05$). A similar positive relationship was also observed between strategy and environmental/contextual factors ($r=0.329$; $p<0.01$), albeit a weak correlation coefficient. A significant positive correlation exists between decision usefulness of cost information and environmental/contextual factors ($r=0.380$; $p<0.01$). It can, therefore, be inferred that as one factor increases, so does the other factor increase and vice versa.

Table 4.18: Correlation analysis of factors on the current system		Strategy	Decision usefulness of cost information	Environmental/contextual factors
Strategy	Pearson Correlation	1		
	Sig. (2-tailed)			
Decision usefulness of cost information	Pearson Correlation	.255*	1	
	Sig. (2-tailed)	0.030		
Environmental/Contextual factors	Pearson Correlation	.329**	.380**	1
	Sig. (2-tailed)	0.004	0.001	
**Correlation is significant $p < 0.01$ (2-tailed).				
*Correlation is significant $p < 0.05$ (2-tailed).				

Table 4.19 shows the relationships between respondents' age, level of education, ABC knowledge, and job title, and the factors affecting the adoption and implementation of ABC as reflected by their views on the current cost and management system of overheads at DUT.

Table 4.19: Spearman correlations between demographic variables and the investigated factors		Gender	Age	Level of education	Time at DUT	ABC knowledge	Job Title
STR	Spearman's Correlation	-.094	-.158*	-.313**	.054	.171*	.294**
	Sig. (2-tailed)	.185	.024	.000	.449	.015	.000
	N	73	73	73	73	73	73
DU	Spearman's Correlation	-.068	-.151*	-.270**	.061	-.162*	.254**
	Sig. (2-tailed)	.339	.032	.000	.388	.021	.000
	N	73	73	73	73	73	73
ENV	Spearman's Correlation	-.071	.154*	-.270**	.021	-.187**	.224**
	Sig. (2-tailed)	.313	.028	.000	.765	.008	.001
	N	73	73	73	73	73	73
**. Correlation is significant $p < 0.01$ (2-tailed).							
*. Correlation is significant $p < 0.05$ (2-tailed).							
STR – strategy; DU – decision usefulness of cost information, ENV- environmental/contextual factors							

Table 4.19 shows that the perceptions of environmental or contextual factors at DUT is associated with age, level of education, ABC knowledge and job title. However, there is no association between the perceptions of environmental/contextual factors with gender or time at DUT. It is worth noting the strong negative relationship between the environmental/contextual variables and ABC knowledge. This shows that the better the ABC knowledge, the more the respondents view the current cost information as inadequate or that there is room for improvement. Another example is the outcome on the perceptions on decision usefulness of cost information that is negatively associated with age, level of education and ABC knowledge. This shows that the higher the level of education and ABC knowledge, the less the respondents view the current decision usefulness of cost information as adequate and that they consider that changing the current overhead costing system should be a strategic priority in the university.

4.2.3.6 Willingness to change the current DUT overhead costing system

In order to gauge willingness to change the current system, respondents were asked that 'if given the opportunity, to what degree would you like to change the current costing system for overheads' (question 7.1). Table 4.20 shows the responses on the willingness to change the DUT overhead system for the sample respondents.

Table 4.20: Willingness of HODs and finance staff to change the current overhead costing at DUT						
	Gender					
	Male		Female		Total	
Profile	Number	%	Number	%	Number	%
Unwilling	7	18.42	4	11.43	11	15.07
Slightly unwilling	17	44.74	15	42.86	32	43.84
Neutral	5	13.16	7	20	12	16.44
Slightly willing	4	10.53	3	8.57	7	9.59
Very willing	5	13.16	6	17.14	11	15.07
Total	38	100	35	100	73[*]	100
*Total sample (73) excludes respondents who were not supposed to answer this section; the section was supposed to be answered by HODs and finance staff only						

Table 4.20 shows that most (58.91% i.e. 15.07% + 43.84%) staff were unwilling to change the current overhead allocation system that meets the reporting requirements of the DHET. There was more or less a similar pattern of responses between male and female respondents. However, more males (63.16% i.e.18.42%+44.74 %) were either unwilling or slightly unwilling to change the system than women (54.29% i.e. 11.43%+42.86%).

The interviews sought to probe staff on why there was a high level of reluctance to change the current overhead costing system. The following were the major responses from the interviews as well as the open-ended question 7.2:

- The current system is viewed as a specialised, educational system that gives appropriate cost information (A2) particularly for reporting purposes.
- The current system allows for cross-subsidisation that is essential in preserving those programmes that are closely attached to the university brand and have a positive contribution to DUT, such as Art and Design, Health Sciences and Engineering. An example cited in the interviews with a respondent (A3) was that the faculty of Art and Design has specialised cost activities, such as ceramic, weaving and sculpturing. These activities consume high indirect costs that may result in high incidences of loss making departments. However, cross-subsidisation allows the losses to be absorbed by the system. Broad and Crowther (2001: 82) support this finding in a survey carried out in universities in the UK that showed that these universities offer a range of courses in various portfolios, not purely for financial reasons, but on academic grounds as well.
- Some staff in the finance department argued in the interviews (A2 and A3) that cost activities in the university are complex and interwoven, which may render the identification of multiple as well as appropriate cost drivers for assigning resources to activities difficult and expensive.
- Respondent (A1) also highlighted that costs in the university are perceived as being predominantly labour that is estimated to be above 63% of the total expenditure. In a similar study in the UK, Broad and Crowther (2001) also argue that if a course proved to be making a deficit using full absorption costing, the removal of that course would only eliminate the marginal costs of its delivery, such as part-time teaching hours, printing and possibly costs of staff who were solely teaching the course. The

overheads, such as depreciation, that caused the course to show an accounting loss would still have to be absorbed by the other courses in the university.

- According to the follow-up interviews in finance (A3, A2), DUT is operating at a profit/surplus and the unwillingness may also be attributed to '*resistance to change.*' The finding on responses from finance staff ('there is no internal resistance from relevant staff to the adoption and implementation of ABC' statement 8.26) also supports this finding. Xu (2012: 134) argues that a major reason for employees' resistance to the implementation of ABC is the fear of the changes associated with business process re-engineering, lack of training and poor communication between relevant departments sharing indirect costs.

It appears that, generally, the respondents are relatively satisfied by the current system (Table 4.6). Similar findings have shown that organisations that were generally more satisfied with their existing cost accounting system were unwilling to adopt and implement ABC (Cohen *et al.* 2005: 18).

However, since tracing of costs tends to occur at faculty as well as departmental level, these findings imply that a proper analysis of costs and the relevant cost drivers is lacking. If costs were traced from course and student type level, then an audit trail would be readily available. Work undertaken by KPMG, the JCPSG (Broad and Crowther 2001: 82) and the Higher Education Funding Councils in the UK has suggested ABC as an appropriate tool for costing activities such as teaching, research and other educational studies. Through surveys and possibly through interviews with HODs and finance staff, DUT can determine its own activities in faculties, such as teaching, research, service and administration to enable the adoption and implementation of ABC (Cox *et al.* 1999: 9).

4.2.3.7 Summary on objective 1: the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA

This section presented and discussed the results of the questions related to the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT. The results showed that DUT still uses the

traditional costing system. The study revealed that DUT spreads its indirect costs among departments using FTEs, an enhanced method that simplistically uses volume-related overhead absorption rates as its sole cost drivers. Volume-based cost drivers assume that a programme's consumption of overhead resources is correlated to the number of students. This costing system may not be adequate since a single or a few volume-based cost drivers are associated with less accurate cost information for planning, cost control and decision making. The university's overheads are only traced through to faculty as well as departmental level and not specific, individual programmes/courses or student type level. The themes, which were developed in the literature review, were also tested in the section. Furthermore, more (54.5%) of the respondents in finance as with the HODs, were in agreement that changing the overhead costing system is not a strategic priority in the university (statement 6.4). The majority of HODs and finance staff were in agreement that the current overhead costing system generally meets the strategic needs of management. Staff perceived the specialised, academic system as enabling cross-subsidisation to preserve the DUT brand, and did not see the need to change as the university has been in surplus (profitable) over the years. Some members of staff perceived multiple cost drivers as being difficult to identify as cost activities in the university were complex and interwoven. Changing the overhead costing system was not considered a strategic priority in the university. However, some HODs were of the opinion that the current system requires improvement as it is providing aggregated as well as inadequate information to assist in strategic decision making. Notwithstanding this, the majority of HODs were in agreement that non-accounting staff would fully support the implementation of a new cost management system, initiative, such as ABC. This factor would positively influence the adoption of a new cost management system, such as ABC, as the overhead costing system requires teamwork across the organisation and requires staff to take time in identifying specialised as well as routine cost activities, assigning costs to activities, identifying and tracking cost drivers before finance staff assigns the costs to the ideal programmes.

4.3 OBJECTIVE 2: PERCEPTIONS ON THE BARRIERS TO AND THE FACTORS THAT FACILITATE THE ADOPTION AND IMPLEMENTATION OF ABC IN A SOUTH AFRICAN STATE UNIVERSITY, DUT AS A CASE STUDY

The relevant questions to meet this objective which is to investigate the perceptions on the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT were contained in section C of the questionnaire (Appendix B). This section discusses the findings with regard to the above objective based on the responses to questions in Section C.

Although ABC has been successful in other sectors, there are varied views on the adoption and implementation of this costing system in universities. Given the significant role played by the accounting unit and finance departments at the institution, this section attempts to gauge from the perspective of the staff from the finance department as well as academic staff in the Faculties of Accounting and Informatics as well as Management Sciences why ABC has not yet been adopted and implemented at the DUT.

4.3.1 Perceptions of academic and finance staff on 'organisational strategy' as a benefit or barrier to ABC adoption at the DUT

This section discusses the perceptions of academic and finance staff on organisational strategy as a benefit or barrier to ABC adoption and implementation at DUT.

4.3.1.1 Perceptions of academic staff

Table 4.21 shows that, when asked to indicate whether the current university strategy supports innovation (statement 8.1), only 48% of the academic staff agreed (agree=24.0%; strongly agree=24.0%) with this statement. This shows that not all academic staff perceive that the university strategy facilitates innovation such as the adoption of ABC. However, 69.0% of the respondents disagreed (disagree=51.2%; strongly agree=17.8%) that 'ABC would be aligned with the competitive strategies and continuous improvement programs within the university' (statement 8.2).

Table 4.21: Perceptions of academic staff on the benefits and barriers of strategy in adoption and implementation of ABC at the DUT

Focus Area	Question	No	(Academic staff n = 129)					Mean	Standard deviation	P-value
			SD	D	Unsure	A	SA			
Strategy	8.1	129	3.9%	42.6%	5.4%	24.0%	24.0%	3.22	1.323	0.000**
	8.2	129	17.8%	51.2%	5.4%	5.4%	20.2%	2.59	1.390	0.000**

A Likert scale of 1= strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.

** Level of significance p < 0.01 (2-tailed).

To test for differences in the responses shown in Table 4.21, Fisher's exact test was used. This showed that the scoring patterns of the academic staff were statistically significant for both statements (p<0.01).

4.3.1.2 Perceptions of finance staff

Table 4.22: Perceptions of finance staff on the benefits and barriers of strategy in adoption and implementation of ABC at the DUT

Focus Area	Question	No	Finance staff n = 32					Mean	Standard deviation	P-value
			SD	D	Unsure	A	SA			
Strategy	8.1	32	0.0%	0.0%	9.1%	59.1%	31.8%	4.23	0.612	0.018*
	8.2	32	0.0%	0.0%	9.1%	72.7%	18.2%	4.09	0.526	0.000**

A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.

**Level of significance p < 0.01 (2-tailed).

*Level of significance p < 0.05 (2- tailed).

Table 4.22 shows that 90.9% of the finance staff agree (agree=59.1%; strongly agree=31.8%) that the organisational strategy fully supports the need for innovation in the form of ABC. In this respect, one of the respondents (A3) in the interviews concurred with the above findings:

"*The Durban University of Technology has a prospector strategy and is generally open to innovation.*"

A business culture that includes innovation, outcome orientation and tight versus loose control has a positive relationship with the level of ABC adoption (Baird *et al.* 2004: 394). Gosselin (1997: 118) also found that organisations that adopted a prospector strategy would be more likely to adopt ABC.

Contrary to the perceptions of academic staff, finance staff agreed (agree= 72.7%; strongly agree=18.2%) with the statement 'ABC would be aligned with the competitive strategies and continuous improvement programs within the university' (statement 8.2). It has also been previously reported that positive synergies can be obtained from the concurrent use of other competitive as well as strategic business initiatives and ABC (Krumwiede 1998: 252). The difference in the responses of academic and finance staff could be attributed to an explanation given in the interviews with A1 and A2, who highlighted that some of the competitive strategies identified as being aligned to ABC in literature, such as JIT, FMS, and TQM are all efforts on which the finance department is working. Therefore, finance staff are aware of these efforts as well as the goal of management to improve the activities of the business process.

4.3.1.3 Comparison of academic and finance staff

Table 4.23 shows that the scoring patterns of the staff from the finance department and academic staff, using the Fisher's exact test, were statistically significantly different (p<0.01) concerning their perceptions on strategy as a barrier or benefit to the adoption and implementation of ABC at DUT. Finance staff viewed strategy positively while academic staff viewed it as a barrier to the adoption and implementation of ABC.

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Table 4.23: Independent t-test on the barriers and or benefits of strategy						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
	Academic staff in the Faculty of Accounting and Informatics and Management Sciences	129	2.9031	1.14748	0.10103	0.000**
	Staff from finance department	22	4.1591	0.49729	0.10602	
**Level of significance p < 0.01 (2-tailed).						

4.3.2 Perceptions of academic and finance staff on 'information technology' as a benefit or barrier to ABC adoption and implementation at DUT

Anderson and Young (1999: 544) claim that ABC is an information technology (IT) innovation, which provides information for managers to make their decisions, as opposed to a pure technical innovation. Accordingly, managers would need to comprehend the stages of the IT implementation process to implement ABC successfully. This section discusses the perceptions of academic and finance staff on IT as a benefit or barrier to ABC adoption and implementation at DUT.

4.3.2.1 Perceptions of academic staff

Table 4.24 shows that academic staff had divergent opinions on the influence of IT on the adoption and implementation of ABC.

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Table 4.24: Perceptions of academic staff on the barriers of information technology in adoption and implementation of ABC at the DUT										
Focus Area	Question	No	(Academic staff n = 129)					Mean	Standard deviation	*P*-value
			SD	D	Unsure	A	SA			
Information technology	8.3	129	7.8%	40.3%	7.0%	39.5%	5.4%	2.95	1.155	0.000**
	8.4	129	8.5%	11.6%	16.3%	38.8%	24.8%	3.60	1.222	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
**Level of significance p < 0.01 (2-tailed).										

Table 4.24 also shows that academic staff at DUT were split in the middle with 48.1% in disagreement (strongly disagree= 7.8%; disagree=40.3%) and 44.9% in agreement (agree=39.5%; strongly agree=5.4%) with the statement that 'there is a high level of architectural and information technology software design in the university to support an ABC system' (statement 8.3). The architectural and software design of ABC systems involves the extent to which customised ABC software is used.

In an interview, a respondent (A2) who is an expert in IT highlighted that indeed there is a high level of architectural and information technology, software design in the university to provide support and generate cost information for the adoption and implementation of ABC. According to Horngren *et al.* (2014: 161) computer technology or integrated information systems that supports all functional areas of an organisation, has reduced the costs of developing and operating ABC systems. However, a study by Sartorius *et al.* (2007: 15) showed that the availability and use of commercial software versus custom software proved to be unimportant to the success of ABC. Shields and McEwen (1997) cited in Fei and Isa (2010: 145) also argue in their study that the choice of software as a technical information, system is important for accountants and MIS specialists, but this choice is relatively unimportant to non-accountants or for the ultimate success of an ABC project. Shields (1995: 148) suggested that users' or non-accounting staff's perceptions of ABC were not linked to the technical characteristics of the system such as custom software and external consultancy.

Table 4.24 shows that the majority (63.6%) of the academic staff perceive (agree=38.8%, strongly agree=24.8%) that the university already has a number of high-level IT and cost management system initiatives that are running smoothly within the university (statement 8.4). This could also be another reason why more staff are unwilling to change the current overhead costing system. This finding is similar to the findings in some previous studies (Anderson 1995: 39; Anderson and Young 1999: 544). These studies showed that firms that have relatively strong existing information systems and are generally satisfied with the information provided by the existing system may be reluctant to invest the necessary resources in ABC. Such firms with high-level information systems tend to abandon ABC easily after implementing it (Krumwiede 1998: 267). On the other hand, the availability of high-level information is an important factor at the implementation stage as the information system provides detailed historical data and an easy access to users that may provide much of the driver information needed by ABC (Gurses 1999: 20).

4.3.2.2 Perceptions of finance staff

According to Kaplan and Anderson (2007: 7) ABC systems can successfully be implemented when the current accounting system supports the collection of ABC information.

Table 4.25: Perceptions of finance staff on information technology as a benefit or barrier in the adoption and implementation of ABC at DUT										
Focus Area	Question	No	Finance staff n = 32					Mean	Standard Deviation	*P*-value
			SD	D	Unsure	A	SA			
Information technology	8.3	32	0.0%	13.6%	27.3%	40.9%	18.2%	3.64	0.953	0.306
	8.4	32	0.0%	13.6%	9.1%	54.5%	22.7%	3.86	0.941	0.011*
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
*Level of significance p < 0.05 (2-tailed).										

Table 4.25 shows that when finance staff were asked to indicate their level of agreement or disagreement to the statement 'There is a high level of architectural and information technology software design in the university to support an ABC system'

(statement 8.3), 59.1% (strongly agree=18.2%; agree=40.9) of the finance staff were in agreement and 27.3% were unsure on the level of architectural and information software design. However, more than half (77.2%) of the finance staff were in agreement (strongly agree=22.7%; agree= 54.5%) with the statement that 'there are already a number of high level IT and cost management system initiatives running smoothly within the university' (statement 8.4). This finding shows that finance staff perceive the university as already having a number of high level IT and cost management system initiatives that are working well. This finding could be another reason to support the findings on Q7.1 on why there is high unwillingness to change the overhead costing system in the university. In addition, other cost management system initiatives may also impede the adoption and implementation of ABC because they, too, need considerable time and effort (Krumwiede 1998: 240).

Table 4.26: Independent t-test on barriers and or benefits of information technology						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-Value
Scoring	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	3.2713	0.80285	0.07069	0.015*
	Staff from finance department	32	3.7500	0.79806	0.17015	
*Level of significance p < 0.05 (2- tailed).						

4.3.2.3 Comparison of academic and finance staff

Table 4.26 shows that there was a statistical difference (p<0.05) between the perceptions of academic and finance staff on the influence of IT on the adoption and implementation of ABC at DUT. This finding shows that finance and academic staff perceive the university's IT as well as and cost management system initiatives differently.

4.3.3 Perceptions of academic and finance staff on 'system adaptability' as a benefit or barrier to ABC adoption and implementation at DUT

Argyris and Kaplan (1994: 83) suggest that the process of implementing an initiative may not be successful as a result of the barriers created by organisational defensive routines, which are threats to the acceptance of new ideas. This section discusses the perceptions of academic and finance staff on system adaptability as a benefit or barrier to ABC adoption and implementation at DUT.

4.3.3.1 Perceptions of academic staff

Table 4.27 shows that the majority of academic staff agreed (agreed= 51.2%, strongly agree= 6.2%) with the statement that 'there are sufficient skills as well as continuous training of employees for adopting, designing and implementing ABC' (statement 8.5). This finding could positively influence the adoption and implementation of ABC at DUT. Training in designing, implementing and using ABC is essential in understanding the link between ABC and strategy, performance evaluation and staff compensation (Garrison *et al.* 2015: 278). In the long-term, training also creates awareness among both non-accounting and accounting employees, which helps to foster full ownership of the costing system.

Table 4.27 shows that 44.2% of the academic staff disagreed (disagree=39.5%; strongly disagree= 4.7%) with the statement that 'there is sufficient top management involvement to support the adoption and implementation of ABC' (statement 8.7) and 25.6% of the respondents indicated that they were unsure. A finding on system adaptability that could positively influence the adoption and implementation of ABC is that 82.2% of the academic staff agreed (agreed= 41.1%; strongly agreed=41.1%) that 'there is a high participation of relevant, external consultants in all cost management system initiatives' (statement 8.8). Studies have shown that external consultants are an essential component in the adoption and implementation of ABC (Sartorius *et al.* 2007: 15).

Table 4.27: Perceptions of academic staff on system adaptability as a benefit or barrier in the adoption and implementation of ABC at the DUT

| Focus Area | Question | No | Academic staff n = 129 | | | | | Mean | Standard Deviation | *Fisher's exact test P*-value. |
			SD	D	Unsure	A	SA			
System adaptability	8.5	129	4.7%	34.9%	3.1%	51.2%	6.2%	3.19	1.126	0.000**
	8.6	129	17.1%	14.0%	8.5%	41.1%	19.4%	3.32	1.386	0.000**
	8.7	129	4.7%	39.5%	25.6%	25.6%	4.7%	2.86	1.006	0.000**
	8.8	129	0.0%	4.7%	13.2%	41.1%	41.1%	4.19	0.836	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
**Level of significance p < 0.01 (2-tailed).										

4.3.3.2 Perceptions of finance staff

Argyris and Kaplan (1994: 83) suggest that a systems adaptability as well as management of the change process can enable the successful adoption and implementation of ABC.

Table 4.28: Perceptions of finance staff on system adaptability as a benefit or barrier in the adoption and implementation of ABC at the DUT

| Focus Area | Question | No | Finance staff n = 32 | | | | | Mean | Standard Deviation | *Fisher's exact test P*-value |
			SD	D	Unsure	A	SA			
System adaptability	8.5	32	9.1%	54.5%	4.5%	13.6%	18.2%	2.77	1.343	0.002**
	8.6	32	22.7%	27.3%	27.3%	13.6%	9.1%	2.59	1.260	0.601
	8.7	32	18.2%	13.6%	31.8%	31.8%	4.5%	2.91	1.192	0.203
	8.8	32	4.5%	9.1%	13.6%	63.8%	9.1%	3.64	0.953	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
**Level of significance p < 0.01 (2-tailed).										

Table 4.28 shows that the majority (63.6%) of finance staff disagreed (strongly disagree=9.1%; disagree=54.5%) with the statement that 'there are sufficient skills as well as continuous training of employees for adopting, designing and implementing ABC' (statement 8.5). This shows that finance staff perceives the need for continuous training in adapting and implementing a new system such as ABC.

Fifty percent (50.0%) of the finance staff also disagreed (disagree=22.7%; strongly disagree=27.3%) with the statement that 'there is consensus about and clarity on the objectives of the ABC system in the accounting department' (statement 8.6). Furthermore, 31.8% of the respondents disagreed (disagree=13.6%; strongly disagree=18.2) and 31.8% were unsure about the statement that 'there is sufficient top management involvement to support the adoption and implementation of ABC' (statement 8.7). The impact of top management support on the successful implementation of ABC is well researched and it has been proven that a strong correlation exists between the level of top management support and the successful implementation of ABC (Cotton *et al.* 2003: 71); Innes and Mitchel 1998: 103). One explanation for this strong correlation could be that finance staff may not see the need for change without the support from top management (Garrison *et al.* 2012: 277).

According to a respondent (A3) in the finance department,

'Top management plays a major role in adopting innovations, including ABC, at DUT. However, currently, top management has not shown a strong active support for the adoption or implementation of ABC. The objectives and benefits of the adoption and implementation of ABC are currently not shared.'

This indicates that top management support in finance would be influential in the adoption or rejection of ABC at DUT. On the contrary, Wessels and Shotter (2000: 222) found that a lack of top management support was not a major problem when implementing ABC in SA.

Table 4.28 shows that the majority (72.9%) of finance staff agreed (agree=63.8%, strongly agree=9.1%) with the statement that 'there is a high participation of relevant external consultants in all cost management system initiatives' (statement 8.8). Nassar (2013: 18) alluded to the fact that ABC requires adequate resources that include relevant external consultants for its implementation to be successful. Therefore, this factor would positively influence the adoption and implementation of ABC in the university.

4.3.3.3 Comparison of academic and finance staff

From the above, it can be deduced that the views expressed by academic and finance staff were not similar. This assertion is supported by the Independent t-test in Table 4.29. Significant differences (p<0.05) were observed in the responses of the academic and finance staff. Overall, it may be deduced that staff are unsure on whether DUT would be able to adapt to a new cost management system such as ABC.

Table 4.29: Independent t-test on barriers and or benefits of system adaptability						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Scoring	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	3.3895	0.60184	0.05299	0.045*
	Staff from finance department	32	2.9773	0.87936	0.18748	
*Level of significance p < 0.05 (2- tailed).						

4.3.4 Perceptions of academic and finance staff on 'environmental/contextual factors' as benefits or barriers to ABC adoption and implementation at DUT

This section discusses the perceptions of academic and finance staff on environmental/contextual factors as a benefit or barrier to ABC adoption and implementation at DUT.

4.3.4.1 Perceptions of academic staff

The results of questions on environmental /contextual factors that were identified as benefits or hindrances to ABC adoption and implementation of ABC at DUT are shown in Table 4.30.

Table 4.30: Perceptions of academic staff on environmental/contextual factors as a benefit or barrier in the adoption and implementation of ABC at DUT										
Focus Area	Question	No	Academic staff n = 129					Mean	Standard deviation	P-value
			SD	D	Unsure	A	SA			
Environmental/ contextual factors	8.9	129	55.8%	38.8%	3.9%	1.6%	0.0%	1.51	0.651	0.000**
	8.10	129	21.7%	38.8%	17.1%	17.1%	5.4%	2.46	1.166	0.000**
	8.11	129	1.6%	20.9%	19.4%	48.1%	10.1%	3.44	0.984	0.000**
	8.12	129	7.8%	39.5%	19.4%	29.5%	3.8%	2.82	1.064	0.000**
	8.13	129	1.6%	12.4%	24.8%	48.8%	12.4%	3.58	0.916	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
** Level of significance p < 0.01 (2- tailed).										

Fisher's exact test in Table 4.30 indicated that the scoring pattern of the academic staff were statistically significantly different for all statements (p<0.001). For example, when asked to indicate their level of agreement or disagreement to the statement 'there are little cost distortions in the system to warrant the adoption and implementation of ABC' (statement 8.9), it emerged that an overwhelming majority (94.6%) of the academic staff were in disagreement (strongly disagree=55.8%; disagree=38.8%) on the accuracy of overhead costs shared by departments. The prevalence of cost distortions in a system has been strongly associated with the adoption of ABC. According to a survey conducted by the IMA, firms that had a high potential of having cost distortions were more likely to adopt ABC (Krumwiede 1998: 33). ABC has the fundamental characteristic to seek to reduce distortions caused by arbitrary allocation of indirect costs in traditional systems.

For statement 8.10 'ABC can only be adopted and implemented at DUT after being initiated by the Ministry of Higher Education and Training and the regulatory environment', it was observed that the majority (60.5%) of academic staff disagreed (disagree=38.8%; strongly disagree=21.7%) with the statement. This may indicate that academic staff considers the implementation of ABC as being an internally motivated process.

Table 4.30 also shows that 58.2% of academic staff agreed with the statement 'an ABC initiative would be aligned with the university's performance evaluation and

compensation structure' (statement 8.11). This finding indicates that academic staff perceive the reporting system offered by ABC as being positively linked to as well as allowing the university to evaluate the performance and compensation structure. The ability of an organisation to link performance evaluation and ABC is crucial for its successful implementation as it enables the identification of opportunities for improvement (Garrison *et al.* 2015: 278). However, contrary to this finding, some scholars have refuted the significance of performance evaluation and compensation in the successful implementation of ABC (Sartorius *et. al.* 2007: 16).

The results in Table 4.30 also show that the majority (47.3%) of academic staff were in disagreement (disagree= 39.5% strongly disagree=7.8%) with the statement: 'there are little difficulties in collecting cost data necessary for implementing ABC from various departments in the university' (statement 8.12). This finding shows that technical factors (identifying cost activities, cost drivers and relevant cost pools) of ABC are generally perceived as a hindrance to the adoption and implementation of ABC in the university. It also shows that academic staff may be aware of cost distortions in the system (as evidenced by responses to statement 8.9), but may not contemplate adopting a system such as ABC because it is perceived as being complex.

It can, however, be seen in Table 4.30 that 61.2% of the academic staff agreed (strongly agree=12.4%; agree=48.8%) with the statement that 'the organisational goals and culture of the university are well aligned with an ABC initiative' (statement 8.13). This is a supportive factor if ABC was to be implemented. Any change that is aligned to the organisational goals and culture is easy to implement as there is likely to be a supportive environment and less resistance (Gosselin 1997: 119).

4.3.4.2 Perceptions of finance staff

Table 4.31 shows the results of the perceptions of finance staff on the 'environmental/contextual factors'.

Table 4.31: Perceptions of finance staff on environmental/contextual factors as benefits or barriers in the adoption and implementation of ABC at the DUT										
Focus Area	Question	No	Finance staff n = 32					Mean	Standard deviation	*P-* value
			SD	D	Unsure	A	SA			
Environmental/ contextual factors	8.9	32	9.1%	9.1%	36.4%	36.4%	9.1%	3.27	1.077	0.043*
	8.10	32	4.5%	51.8%	27.3%	11.8%	4.5%	3.00	1.024	0.064
	8.11	32	4.5%	9.1%	18.2%	59.1%	9.1%	3.59	0.984	0.000**
	8.12	32	13.6%	36.4%	18.2%	27.3%	4.5%	2.73	1.162	0.169
	8.13	32	0.0%	13.6%	13.6%	50.0%	22.7%	3.82	0.958	0.048*
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
**Level of significance p < 0.01 (2- tailed).										
*Level of significance p < 0.05 (2- tailed).										

Contrary to the responses by the academic staff on statement 8.9, Table 4.31 shows that with regards to statement 8.9 that 'there are little cost distortions in the system to warrant the adoption of ABC' 45.5% of finance staff agreed (strongly agree 9.1%; agree=36.4%), 18.2% of the finance staff disagreed (strongly disagree=9.1%; disagree=9.1%) and 36.4% of the respondents were unsure.

The pattern of responses of finance staff to the statement: 'ABC can only be adopted and implemented at DUT after being initiated by the Ministry of Higher Education and Training and the regulatory environment' (statement 8.10) were similar to that of academic staff. This indicates that finance staff also considers the implementation of ABC as being an internally motivated process that does not need to be initiated by the Ministry of Higher Education or regulatory bodies.

Finance staff also provided responses that were similar to those of academic staff regarding alignment of ABC with the university's performance evaluation and compensation structure (statement 8.11). This link is essential as it convinces employees that rewards depend on their behaviour and the resulting system demonstrates their performance and reflects their future compensation (Garrison *et al.* 2015: 278). The link between performance evaluation and ABC has been empirically demonstrated (Shields 1995: 150) and is considered crucial for its successful implementation (Garrison *et al.* 2015: 278). When staff continue to be evaluated and rewarded using traditional cost systems, they perceive ABC as not being important

and may abandon it (Garrison *et al.* 2015: 278). Notwithstanding this, half (31.8 %) of the finance staff agreed (agree=27.3%; strongly agree=4.5%) that there are difficulties in collecting data at DUT (statement 8.12) necessary for the implementation of a new cost management system initiative, such as ABC. However, the fact that they agree (72.7%) with the statement: 'the organisational goals and culture of the university are well aligned with an ABC initiative', indicates that the DUT culture and goals might positively influence the adoption and implementation of ABC, as previously explained (section 4.3.4.1).

4.3.4.3 Comparison of academic and finance staff

From the foregoing, it can be construed that academic and finance staff generally perceive the university environment as being conducive for an ABC system with academics attributing the lack of ABC as leading to cost distortions and finance staff perceiving that the ABC system would be well aligned with the current performance and evaluation structure of the university. However, both groups of staff perceive the ABC system as being difficult to adopt and implement at DUT. Hence, both groups of staff may not welcome a new costing initiative, such as ABC, as they perceive it to be a system that poses many changes and challenges. This is consistent with the responses to Q7.1 (Table 4.20), where the majority of the respondents expressed an unwillingness to change the current system but rather improve on it, if possible.

Table 4.32 shows a comparison of the perceptions of academic and finance staff on the barriers and or benefits of environmental/contextual factors. The results indicate that academic staff and finance staff at DUT have different views on the overall influence of environmental/contextual factors on the adoption and implementation of ABC at the DUT. The independent t-test shown in Table 4.32 revealed a significant difference ($p < 0.01$) in the views expressed by both respondent groups. This suggests that academic and finance staff perceive the influence of environmental/contextual factors in adopting and implementing overhead costing at DUT differently.

Table 4.32: Independent t-test on barriers and or benefits of environmental/contextual factors						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Scoring	Academic staff in the faculty of Accounting and Informatics or Management Sciences	129	2.7628	0.48462	0.04267	0.000**
	Staff from finance department	32	3.2818	0.43495	0.09273	
**Level of significance p < 0.01 (2- tailed).						

4.3.5 Perceptions of academic and finance staff on 'organisational structure' factors as benefits or barriers to ABC adoption and implementation at DUT

This section discusses the perceptions of academic and finance staff on organisational structure as a benefit or barrier to ABC adoption and implementation at DUT.

4.3.5.1 Perceptions of academic staff

Table 4.33: Perceptions of academic staff on organisational structure factors as benefits and barriers in the adoption and implementation of ABC at DUT										
Focus Area	Question	No	Academic staff n = 129					Mean	Standard Deviation	*P*-value
			SD	D	Unsure	A	SA			
Organisational structure	8.14	129	0.0%	0.8%	10.9%	68.2%	20.2%	4.08	0.581	0.000**
	8.15	129	0.0%	0.0%	7.8%	58.1%	34.1%	4.26	0.593	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
** Level of significance p< 0.01 (2- tailed).										

Table 4.33 shows that the majority (88.4%) of academic staff agreed (agree=68.2%; strongly agree=20.2) with statement 8.14 that 'the organisational structure of the university can positively influence the university's ability to implement ABC'. Similarly, 92.2% (agree=58.1%; strongly agree=34.1%) of the academic staff perceive the large size of the university as warranting the adoption of a sophisticated system, such as

ABC (statement 8.15). Studies on ABC have suggested that there is a link between mechanistic, strategic (Gosselin 1997: 107) as well as large (Krumwiede 1998: 34) organisational structures and the adoption of modern management accounting practices, such as activity management or ABC (Drury 2011: 238). The arguments for this link include that these organisations have a high demand for activity management information for planning, control and coordination of activities; larger communication networks; the necessary infrastructure or resources for the development and implementation of activity management practices; and more resources are available to activity management practices (Elagili 2015: 50).

4.3.5.2 Perceptions of finance staff

Similar to the scoring by academic staff on organisational structure, the majority of finance staff (72.7%) agreed (agree=50.0%; strongly agree=22.7%) with statement 8.14 that 'the organisational structure of the university can positively influence the university's ability to implement ABC'. Moreover, Table 4.34 shows that 81.9% (agree=45.5%; strongly agree=36.4%) of the finance staff perceive the large size of the university as warranting the adoption of a sophisticated system, such as ABC (statement 8.15).

Table 4.34: Perceptions of finance staff on organisational structure factors as benefits or barriers in the adoption and implementation of ABC at DUT										
Focus Area	Question	No	Finance staff n = 32					Mean	Standard Deviation	*Fisher's exact test* *P*-value
			SD	D	Unsure	A	SA			
Organisational structure	8.14	32	0.0%	9.1%	18.0%	50.0%	22.7%	3.86	0.889	0.043*
	8.15	32	4.5%	4.5%	9.1%	45.5%	36.4%	4.05	1.046	0.011*
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
*. Level of significance p < 0.05 (2- tailed).										

4.3.5.3 Comparison of academic and finance staff

The results indicate that academic and finance staff agreed or strongly agreed that the organisational structure at DUT can positively influence the university's ability to implement ABC. Similarly, Gosselin (1997: 119) reported the significance of

organisational structure in the adoption and implementation of ABC. Centralised and formal organisations, such as DUT, have significantly been associated with the successful adoption and implementation of ABC (Gosselin 1997: 118). However, contrary to these findings, Naidoo (2011: 110) suggests that the organisational structure in universities that involves tracing costs at faculty or departmental level is a hindrance to the adoption and implementation of ABC.

The results shown in Table 4.35 suggest that academic and finance staff have similar views on the influence of the organisational structure on the adoption and implementation of ABC at the DUT. The independent t-test highlighted in Table 4.35 revealed that there is no significant difference (p>0.05) in the views expressed by both designations. This suggests that both the academic and finance staff view the influence of the organisational structure in adopting and implementing overhead costing at DUT in a similar manner.

Table 4.35: Independent t-test on barriers and or benefits of organisational structure						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Scoring	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	4.1705	0.48209	0.04245	0.160
	Staff from finance department	32	3.9545	0.67098	0.14305	

4.3.6 Perceptions of academic and finance staff on 'technical factors' as benefits or barriers to ABC adoption and implementation at DUT

This section discusses the perceptions of academic and finance staff on technical factors as benefits or barriers to ABC adoption and implementation at DUT.

4.3.6.1 Perceptions of academic staff

In respect to the scoring patterns of academic staff on the influence of technical factors, the Fisher's exact test in Table 4.36 indicated that the scoring pattern of the academic staff was statistically significant for all statements (p<0.01).

Table 4.36 shows that 64.4% of academic staff agreed (agree=56.6%, strongly agree=7.8%) with the statement 'there are difficulties in identifying and grouping activities for ABC' (statement 8.16). The complexity of ABC has been previously highlighted by Lucey (2009: 129) noted that the assumption that a chosen cost driver is an adequate summary measure of complex activities is too simplistic. A similar pattern of responses was observed regarding the statement: 'there are difficulties in grouping activities into cost pools for ABC' (statement 8.17). The results show that 65.1% of the academic staff agreed (agree=55.0%, strongly agree=10.1%) with the statement. Related to these responses, were the findings on the statement: 'there is limited knowledge on the exact data requirements needed to implement ABC' (statement 8.19). While there was a sizeable percentage (27.1%) who was unsure on this statement, the majority (46.7%) indicated that there is limited knowledge on the exact data requirements needed to implement ABC. These findings are consistent with previous studies that also suggest that there are practical problems in choosing appropriate cost drivers to cover all transactions grouped together in an activity (Lucey 2008: 124).

However, the academic staff disagreed (disagreed=44.2%; strongly agreed=8.5%) with the statement 'cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities difficult' (statement 8.18). This finding may indicate that, despite the perceived complexity of ABC, staff feel that it is still possible to identify cost drivers required for assigning resources to activities in the university.

Table 4.36: Perceptions of academic staff on technical factors as benefits or barriers in the adoption and implementation of ABC at the DUT

Focus Area	Question	No	Academic staff n = 129					Mean	Standard Deviation	P-value
			SD	D	Unsure	A	SA			
Technical factors	8.16	129	0.0%	24.8%	10.9%	56.6%	7.8%	3.47	0.953	0.000**
	8.17	129	0.0%	25.6%	9.3%	55.0%	10.1%	3.50	0.985	0.000**
	8.18	129	8.5%	44.2%	6.2%	22.5%	18.6%	2.98	1.329	0.000**
	8.19	129	2.3%	23.3%	27.1%	35.1%	11.6%	3.31	1.029	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
** Level of significance p < 0.01 (2- tailed).										

In contrast, in interviews conducted (A1 and A3), academic staff showed that they did not perceive technical factors as barriers to ABC adoption. This finding is contrary to the research conducted in universities in the UK by Broad and Crowther (2001: 61). The research postulated that cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities more difficult (Broad and Crowther 2001: 61).

4.3.6.2 Perceptions of finance staff

Contrary to the views of most academic staff, finance staff mainly perceived identifying and grouping activities for ABC (statement 8.16), as well as grouping activities into cost pools for ABC (statement 8.17), as being difficult in a university setting (statement 8.18). Table 4.37 shows that 77.2% of the finance staff agreed (strongly agreed=22.7%; agreed=54.5%) that 'enhanced overhead costing systems, such as ABC systems are too complex and difficult to design' (statement 8.22). This finding confirms the findings from interviews conducted by Sartorius *et al.* (2007: 13-14) with ABC consultants on the problems that are encountered when implementing ABC. The problems that were cited by the majority of consultants were that it is difficult to collect the appropriate data and to define cost pools and cost drivers. This also refutes findings in previous research that implementation problems of ABC are neither attributable to technical flaws nor to the way ABC is applied, but to behavioural and organisational factors, such as employee resistance (Garrison *et al.* 2015: 278).

The complexity associated with the implementation, inadequate resources related to costs associated with ABC adoption and implementation, as well as the difficulty in collecting the data needed to set up the ABC system, are also mentioned in similar international studies (Clarke, Hill, and Stevens 1999: 456; Cohen *et al.*, 2005: 984). This shows that these problems are not limited to SA. According to Cropper and Cook (2000: 66), some universities in the UK cited deriving an appropriate set of cost drivers for ABC as an insurmountable task and preferred the traditional costing method because of its simplified system of cost drivers (Cropper and Cook 2000: 66). On the other hand, Turney (1990: 36-37) suggests that ABC systems are easy to understand and the perception that they are difficult to understand is not reflected where it has been implemented.

Table 4.37: Perceptions of finance staff on technical factors as benefits or barriers in the adoption and implementation of ABC at the DUT										
Focus Area	Question	No	Finance staff n = 32					Mean	Standard Deviation	*P*-value
			SD	D	Unsure	A	SA			
Technical factors	8.16	32	4.58%	9.1%	9.1%	54.5%	22.7%	3.82	1.053	0.001**
	8.17	32	4.5%	13.6%	4.5%	50.0%	27.3%	3.82	1.140	0.003**
	8.18	32	0.0%	18.2%	4.5%	54.5%	22.7%	3.82	1.006	0.008**
	8.19	32	9.1%	13.6%	0.0%	45.5%	31.8%	3.77	1.307	0.070
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
**Level of significance p < 0.01 (2- tailed).										

4.3.6.3 Comparison of academic and finance staff

Table 4.38 shows that there was no statistical difference (p<0.01) between the perceptions of academic and finance staff on the influence of technical factors in the adoption and implementation of ABC at DUT. Both groups agree that there are technical difficulties concerning the adoption and implementation of ABC at DUT.

Table 4.38: Independent t-test on barriers and or benefits of other technical factors						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Scoring	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	3.3159	0.89896	0.07915	0.057
	Staff from finance department	32	3.8068	1.09363	0.23316	

4.3.7 Perceptions of academic and finance staff on 'behavioural and organizational factors' as benefits or barriers to ABC adoption and implementation at the DUT

This section discusses the perceptions of academic and finance staff on behavioural and organisational factors as benefits or barriers to ABC adoption and implementation at DUT.

4.3.7.1 Perceptions of academic staff

The results of academic staff's scoring of statements 8.20 to 8.28 are shown in Table 4.39.

Table 4.39: Perceptions of academic staff on behavioural and organisational factors as benefits or barriers in the adoption and implementation of ABC at DUT										
Focus Area	Question	No	Academic staff n = 129					Mean	Standard Deviation	*Fisher's* *exact* *test* *P*-value
			SD	D	Unsure	A	SA			
Organisational and behavioural factors	8.20	129	3.9%	43.4%	5.4%	24.0%	23.3%	3.19	1.317	0.000**
	8.21	129	18.6%	51.9%	5.4%	4.7%	19.4%	2.54	1.375	0.000**
	8.22	129	7.8%	41.9%	7.0%	38.0%	5.4%	2.91	1.153	0.000**
	8.23	129	8.5%	10.9%	16.3%	38.0%	26.4%	3.63	1.225	0.000**
	8.24	129	4.7%	34.9%	3.1%	51.2%	6.2%	3.19	1.126	0.000**
	8.25	129	17.8%	13.2%	8.5%	41.9%	18.6%	3.30	1.390	0.000**
	8.26	129	5.4%	37.2%	25.6%	25.6%	6.2%	2.90	1.045	0.000**
	8.27	129	0.0%	3.9%	13.2%	41.1%	41.9%	4.21	0.817	0.000**
	8.28	129	55.8%	39.5%	3.9%	0.8%	0.0%	1.50	0.614	0.000**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
** Level of significance p < 0.01 (2- tailed).										

Table 4.39 shows that 70.5% of the academic staff disagreed (disagree=18.6%; strongly disagree=51.9%) with the statement 'ABC is suited to the manufacturing sector only and is not relevant to a university setting' (statement 8.21). This shows that staff perceive ABC as being relevant to a university setting. It also indicates that staff acknowledges that ABC can be used in service industries, such as a university setting. The results also indicate that academic staff understand the principles of different cost systems and are able to relate to a method which is relevant to their situation. This perspective is well aligned with the suggestion that the service industry, such as universities, is better suited to ABC adoption and would benefit more from the adoption thereof than the manufacturing industry (Cooper and Kaplan 1998: 231). This is because the majority of service costs are indirect in nature, whereas the manufacturing industry has a much smaller portion of indirect costs in relation to direct costs. Vazakidis, Karagiannis and Tsialta (2010: 382) also illustrated a successful application of ABC in the public sector.

The results in Table 4.39 show that the majority (49.7%) of academic staff disagreed (disagree=41.9%, strongly disagree=7.8%) with the statement 'enhanced overhead costing systems, such as ABC systems are too complex and difficult to design'

(statement 8.22). This shows that academic staff do not perceive ABC as being too complex or too difficult to adopt and implement at DUT. This is probably because of the high levels of education in the university which would simplify training for the adoption and implementation of ABC. A high level of skills is an important factor in getting to the usage stage of ABC as staff assists in the identification and evaluation of cost activities, cost pools as well as relevant cost drivers of the ABC model (Granof *et al.* 2000: 14; Ellis-Newman 2003: 338; Reich and Abraham 2006: 23; Krishnan 2006: 80).

On the other hand, 60.5% of the academic staff agreed (strongly agree=18.6%; agree=41.9%) with the statement 'the benefits of a more enhanced system, such as ABC, would not justify the high cost of implementing it' (statement 8.25). This shows that staff perceive that the benefits of a more enhanced system, such as ABC, would not justify the high cost of implementing it. Kaplan and Anderson (2007: 7) noted that ABC is difficult and costly to implement and maintain, especially when the current accounting system does not support the collection of ABC information. The high cost of implementing ABC also includes the relevant software packages, engaging external ABC consultants and meeting the detailed data requirements. However, in a survey carried out in New Zealand, Cotton *et al.* (2003: 69) reported that respondents considered the investment in ABC as having been financially beneficial to their organisations.

In the interviews conducted, one respondent (A3) was concerned that the university may not have adequate resources to implement ABC. The respondent argued that budgetary constraints being faced by state universities in SA may not facilitate the engagement of more staff or external consultants to help set up ABC. Some activities require specialised skill input. In similar studies in the developed world, resources such as time have also been significantly related to the successful implementation of ABC (Krumwiede 1998: 265). Similarly, in this study, the majority (47.3%) of academic staff agreed (agree=24%, strongly agree=23.3%) with the statement that the amount of time required for calculations in setting up ABC is a hindrance to its adoption and implementation (statement 8.20). Time has been shown to be an especially

important element needed for the acceptance and routine phases of implementing ABC (Krumwiede 1998: 265).

The results also showed that 64.4% of the academic staff agree (agree= 38.0%; strongly agree=26.4%) with the statement that 'ABC is appropriate for outsourcing decisions' (statement 8.23). This is supported by similar studies that suggest that as managers gain awareness of the true costs of providing services, they can make choices on how to better utilise limited resources, for example, whether to outsource a service or not (Ellis-Newman 2003: 336). Activities that are not value adding can be eliminated so that resources are channelled to activities that are the most beneficial to the organisation and increase efficiency (Ellis-Newman 2003: 336).

Table 4.39 also shows that 57.4% of academic staff agreed (agree=51.2%; strongly agree=6.2%) with the statement 'there is uncertainty on the long-term benefits of ABC' (statement 8.24). Compared with traditional costing methods, ABC is a relatively recent management accounting system (CIMA 2008: 66) and staff may be unsure of its long-term benefits in a university setting. This finding is contrary to previous studies that have suggested that ABC provides a reliable indication of long-run variable product costing that is relevant to long-term strategic decision making (Lucey 2009: 129).

The results also show that the majority (42.6%) of the academic staff agreed (disagree=37.2%, strongly disagree= 5.4%) with the statement that 'there is no internal resistance from relevant staff to the adoption and implementation of ABC' (statement 8.26). The finding is supported by the result that 83.0% of the academic staff agreed with the statement 'ABC would facilitate more efficient, financial management for universities under budgetary constraints' (statement 8.27). These findings suggest that ABC could successfully be implemented at DUT as there is support from both accountants and non-accountants who perceive that ABC is of practical use throughout the university (Shields 1995: 163; Krumwiede 1998: 265). Another positive factor that emerged from these results is that 95.3% of the academic staff disagreed with the statement 'ABC is only necessary when other competitors or universities have

also introduced it' (statement 8.28). This was supported by a respondent (A2) who stated:

'Managerial accounting at DUT aims to provide meaningful cost information that gives insight into causes of costs; allows better cost control and cost management; allows a better understanding of cost reduction opportunities; improves managerial decision making; and provides more accurate resource allocation. Therefore, as financial constraints for universities increase, it is up to the university to find the best system that helps the university to manage resources better. Management also agrees that ABC use may improve financial performance.'

4.3.7.2 Perceptions of finance staff

The results of relating to scoring patterns of finance staff on statements 8.20 to 8.28 are shown in Table 4.40.

Table 4.40: Perceptions of finance staff on behavioural and organisational factors as benefits or barriers in the adoption and implementation of ABC at DUT										
			Finance staff n= 32							*Fisher's*
Focus Area	Question	No	SD	D	Unsure	A	SA	Mean	Standard deviation	*exact test* *P*-value
Behavioural and organisational factors	8.20	32	4.5%	13.6%	9.1%	54.5%	18.2%	3.68	1.086	0.002**
	8.21	32	22.7%	50.0%	4.5%	4.5%	18.2%	2.45	1.405	0.004**
	8.22	32	9.1%	59.1%	9.1%	13.6%	9.1%	2.55	1.143	0.000**
	8.23	32	0.0%	0.0%	18.2%	54.5%	27.3%	4.09	0.684	0.096
	8.24	32	4.5%	36.4%	9.1%	36.4%	13.6%	3.18	1.220	0.038*
	8.25	32	13.6%	36.4%	4.5%	22.7%	22.7%	3.05	1.463	0.203
	8.26	32	18.2%	31.8%	18.2%	22.7%	9.1%	2.73	1.279	0.601
	8.27	32	9.1%	0.0%	4.5%	45.5%	40.9%	4.09	1.151	0.008**
	8.28	32	22.7%	59.1%	9.1%	9.1%	0.0%	2.05	0.844	0.002**
A Likert scale of 1=strongly disagree (SD), 2 = disagree (D), 3=unsure, 4 = agree (A), 5 = strongly agree (SA) was used.										
** Level of significance p < 0.01 (2- tailed).										
*Level of significance p < 0.05 (2- tailed).										

Table 4.40 shows that 50% of the finance staff agreed or strongly agreed with the statement that 'there is uncertainty on the long-term benefits of ABC' (statement 8.24).

Similar studies have suggested that management often question the accuracy and long-term benefits of ABC systems since cost assignments are based on individual subjective information on how they spend their time (Reich and Abraham 2006: 23). Furthermore, according to Botha and Vermaak (2015: 521), the low rate of ABC adoption in SA of between 12% and 15.18% suggests that ABC is still in its infancy and, therefore, companies may still be using a very basic form of ABC and remain uncertain of its long-term benefits. This could also be the reason why respondents did not consider changing the overhead costing system at DUT as a strategic priority in the university (statement 6.4).

Fifty percent (50%) of the finance staff disagreed with the statement that 'there is no internal resistance from relevant staff to the adoption and implementation of ABC' (statement 8.26) with 18.2% of the finance staff being unsure. This shows that the majority of the finance staff perceive that there is staff resistance to the adoption and implementation of ABC. The resistance could possibly also be explained by uncertainties about the long-term benefits of ABC, as evidenced by responses to statement 8.24. This is also consistent with the finding on the unwillingness of staff to change the current system as indicated by Q7.1. Staff resistance often arises as a result of pessimism even when there are promises that their work will be improved (Siguenza-Guzman 2014: 164).

Table 4.40 shows that an overwhelming majority of finance staff (81.8%) disagreed (strongly disagreed=22.7% disagree=59.1%) with the statement 'ABC is only necessary when other competitors or universities have also introduced it.' (statement 8.28) This finding indicates that most finance staff perceive that the adoption of ABC, as a component of cost management accounting, should be predominantly influenced by internal factors and competitor moves should be relatively immaterial when decisions of whether or not to implement ABC are made. This is in contrast to James (2013: 15) whose study provides evidence that one of the major factors that influences the adoption of ABC in financial institutions, such as banks, is the perception on whether competitors have introduced ABC.

Table 4.40 also shows that 86.4% of the finance staff agreed (strongly agreed=40.9%; agreed=45.5%) with the statement that 'ABC would facilitate more efficient, financial management for universities under budgetary constraints' (statement 8.27). This positive perception of the quality of information produced by ABC could positively influence the adoption and implementaton of ABC at DUT. The findings by Granhof *et al.* (2000: 27), in a university setting in the US, also supports that ABC systems provide useful information that facilitates more efficient, financial management for universities. McGowan and Klammer (1997: 235) found a positive relationship between user involvement and user perception of the quality of information produced with the successful implementation of ABC. Madwe (2017: 141) made a similar finding in a study on TVETS in KZN, that staff agreed that ABC produces useful cost information. An interesting comment in this regard made by one of the respondents (A1) is shown below:

"One of the biggest causes of high educational costs in SA which is associated with the fees must fall campaign etc. is the inadequate costing systems that cannot accurately measure the cost per programme. Without being able to effectively measure the cost of resources consumed to perform educational procedures, it is impossible to effectively manage these costs and have more efficient financial management in universities."

4.3.7.3 Comparison of academic and finance staff

To further compare the differences between the views expressed by the staff from finance department and those noted from academic staff, an independent t-test was done. These results are shown in Table 4.41. The results of the independent t-test suggest that there are no significant differences between the views expressed by the academic and finance staff (p<0.05).

Table 4.41: Independent t-test on barriers and or benefits of behavioural and organisational factors						
Designation		N	Mean	Std. Deviation	Std. Error Mean	*P*-value
Scoring	Academic staff in the Faculties of Accounting and Informatics and Management Sciences	129	3.0424	0.46735	0.04115	0.685
	Staff from finance department	32	3.0964	0.58701	0.12515	

4.3.8 The relationship between respondents' demographics and the behavioural and organisational factors

The results of the chi-square test are presented in Tables 4.42 to 4.44 in terms of their confirmation (sig. < 0.05) or disconfirmation (sig. > 0.05) of the association between variables.

Chi-square tests were performed to determine whether there was a statistically significant difference between the demographic data variables (gender, race group, age group, highest qualification) and the perceptions relating to the behavioural and organisational factors. These results are shown in Table 4.42.

Table 4.42: Pearson chi-square test on variables	Gender	Age	Qualification	Job Title	ABC Knowledge	Number of years at DUT
The amount of time required for calculations in setting up ABC is a hindrance to its adoption and implementation.	.236	.208	.173	.000*	.179	.003*
ABC is suited to the manufacturing sector only and is not relevant to a university setting.	.294	.298	.061	.000*	.722	.004*
Enhanced overhead costing systems, such as ABC systems are too complex and difficult to design.	.194	.578	.040*	.000*	.883	.060
ABC is appropriate for outsourcing decisions.	.093	.707	.158	.000*	.781	.036*
There is uncertainty on the long-term benefits of ABC.	.111	.285	.048*	.000*	.484	.016*
The benefits of a more enhanced system, such as ABC, would not justify the high cost of implementing it.	.365	.227	.210	.000*	.781	.009*
There is no internal resistance from relevant staff to the adoption and implementation of ABC.	.283	.000*	.000*	.000*	.123	.000*
ABC would facilitate more efficient, financial management for universities under budgetary constraints.	.235	.049*	.095*	.000*	.277	.048*
ABC is only necessary when other competitors or universities have also introduced it.	.286	.128	.118	.000*	.206	.005*
** Level of significance p < 0.01 (2- tailed).						
* Level of significance p < 0.05 (2- tailed).						

In terms of perceptions relating to the behavioural and organisational factors, the chi-square analysis in Table 4.42 indicated there was no significant relationship with respect to gender. From Table 4.42, it can be observed that there is a statistical significance between the statement 'there is no internal resistance from relevant staff to the adoption and implementation of ABC' (statement 8.26) with regards to age, qualification, ABC knowledge and the number of years at DUT.

From Table 4.42, it can also be observed that there was a statistical significance for the statement 'ABC would facilitate more efficient, financial management for universities under budgetary constraints' (statement 8.27), with respondents' age, qualification, job title and number of years at DUT ($p<0.05$). This means that

respondents with different qualifications, job titles, number of years at DUT and of different ages perceive that 'ABC would increase efficiency, as well financial management for universities under budgetary constraints' (statement 8.27) in a dissimilar manner.

Table 4.42 shows that the perceptions on that 'ABC is suited to the manufacturing sector only and is not relevant to a university setting' (statement 8.21) as well as that 'the amount of time required for calculations in setting up ABC is a hindrance to its adoption and implementation' (statement 8.20) correlate with the respondents' job titles and number of years at DUT ($p<0.05$). This finding indicates that respondents with different job descriptions and respondents who have served for different numbers of years at DUT view the suitability and time required for calculation in setting up ABC in different ways ($p<0.05$). Similarly, these two demographic variables (job title and number of years at DUT) were also associated ($p<0.05$) with the statements 'ABC is appropriate for outsourcing decisions' (statement 8.23); 'the benefits of a more enhanced system, such as ABC, would not justify the high cost of implementing it (statement 8.25) and 'ABC is only necessary when other competitors or universities have also introduced it' (statement 8.28).

An association ($p< 0.05$) was observed between the respondents' qualifications and job title and their view that an 'enhanced overhead costing systems, such as ABC systems is too complex and difficult to design' (statement 8.22). Furthermore, the number of years at DUT, qualification and the job title correlate ($p<0.05$) with the respondents' views on whether there is uncertainty surrounding the long-term benefits of ABC (statement 8.24.) This means that respondents with different qualifications, job titles, and with different number of years at DUT perceive that there are uncertainties on the long-term benefits of ABC (statement 8.24) in a dissimilar manner.

4.3.9 The relationship between demographic variables and the themes

The statements in the questionnaire were grouped into themes. These themes have been discussed separately in this chapter. The themes were organisational strategy (STR), Information Technology (IT), decision usefulness of cost information (DU), system adaptability (SA), environmental/contextual factors (ENV), organisational

structure (OS), technical factors (TV), and behavioural and organisational factors (BV). Table 4.43 shows the results of Spearman's correlation test on the relationship between demographic variables and the themes, namely, organisational strategy, decision usefulness of cost information, information technology, system adaptability, environmental factors, organisational structure, technical factors and behavioural and organisational factors.

The chi-square analysis shown in Table 4.43 indicated there was no significant relationship with respect to gender and the themes of strategy, information technology, system adaptability, organisational structure, decision usefulness of cost information factors, technical factors, behavioural and organisational factors. Table 4.43 shows the outcome on perception of strategy at DUT is associated with age, level of education, ABC knowledge and job title, with the level of education and job title showing a strong correlation ($p<0.01$). On the contrary, there is no association between perception of strategy with gender or time at DUT. It is worth noting the positive relationship between perceptions on strategy and ABC knowledge. The more staff understood ABC, the more positively they viewed the strategic implications of implementing ABC.

The results in Table 4.43 show that IT factors correlated with age, level of education, ABC knowledge and job title. The level of education and job title had a strong correlation with IT. From the results, it was also observed that system adaptability factors were associated with age, level of education, time at DUT and job title. As shown in Table 4.43, the Spearman correlation value suggests that a strong positive relationship ($p<0.01$) exists on the system's adaptability and respondents' ages, level of education and job titles.

Table 4.43: Spearman's correlations between demographic variables and outcomes related to perceptions on the benefits of and barriers to ABC adoption and implementation at DUT

		Gender	Age	Level of education	Time at DUT	ABC knowledge	Job title
STR	Spearman's Correlation	.079	-.244**	-.182**	-.089	.154*	.416**
	Sig. (2-tailed)	.262	.000	.009	.206	.028	.000
	N	161	161	161	161	161	161
IT	Spearman's Correlation	.091	-.172*	-.182**	-.041	.152*	.394**
	Sig. (2-tailed)	.196	.015	.010	.567	.031	.000
	N	161	161	161	161	161	161
SA	Spearman's Correlation	.103	-.312**	-.216**	-.171*	.119	.409**
	Sig. (2-tailed)	.144	.000	.002	.015	.093	.000
	N	161	161	161	161	161	161
ENV	Spearman's Correlation	.152*	-.289**	-.220**	-.150*	.109	.428**
	Sig. (2-tailed)	.031	.000	.002	.033	.124	.000
	N	161	161	161	161	161	161
DU	Spearman's Correlation	.133	-.229**	-.183**	-.101	.095	.408**
	Sig. (2-tailed)	.060	.001	.009	.154	.180	.000
	N	161	161	161	161	161	161
OS	Pearson Correlation	.133	-.229**	-.183**	-.101	.095	.408**
	Sig. (2-tailed)	.060	.001	.009	.154	.180	.000
	N	161	161	161	161	161	161
TV	Spearman's Correlation	.061	-.204**	-.219**	-.071	.720**	.368**
	Sig. (2-tailed)	.389	.004	.002	.317	.000	.000
	N	161	161	161	161	161	161
BV	Spearman's Correlation	.117	-.271**	-.197**	-.101	.102	.385**
	Sig. (2-tailed)	.097	.000	.005	.154	.149	.000
	N	161	161	161	161	161	161

** Correlation is significant $p < 0.01$ (2-tailed).
* Correlation is significant $p < 0.05$ (2- tailed).

STR – strategy; IT - Information Technology; SA - system adaptability; DU – decision usefulness of cost information, ENV – environmental/contextual factors; OS - organisational structure; TV - technical factors; BV - behavioural and organisational factors.

The outcome on contextual/environmental factors is associated with gender, age, level of education, time at DUT and job title. This shows that respondents of different

gender, age, level of education and job title view the university context in a dissimilar manner.

The outcome of perceptions of technical factors is associated with age, level of education and ABC knowledge. It is interesting to note that ABC knowledge has a positive, strong correlation with technical factors ($p<0.01$). This shows that the more knowledge staff had on ABC the more they understood the complexities of implementing ABC in a university setting.

Organisational structure factors significantly correlated ($p<0.01$) with age, level of education and job title. A similar observation was made on behavioural and organisational factors that were shown to be strongly associated ($p<0.01$) with age, level of education and job title.

4.3.10 The correlation between the themes/factors

The previous section revealed the relationship between the demographic factors and outcomes related to the themes on the factors that influence the adoption and implementation of ABC at DUT. It emerged that age, number of years at DUT, level of education, ABC knowledge and job designation were associated with some themes; namely, strategy, information technology, decision usefulness of cost information, contextual/environmental factors, system adaptability, organisational structure factors, technical factors, behavioural and organisational factors. Table 4.44 shows the correlations between the themes.

Pearson's correlation was used in this section to quantify the relationships among strategy, information technology, decision usefulness of cost information, system adaptability, behavioural and organisational factors, organisational structure, contextual/environmental factors. Only correlation values above r= 0.4 that are significant at 0.01 interval level are explained here.

Table 4.44: Spearman's correlations between factors									
		STR	IT	SA	ENV	DU	TV	BV	OS
STR	Pearson Correlation	1							
	Sig. (2-tailed)								
	N	161							
IT	Pearson Correlation	.375	1						
	Sig. (2-tailed)	0.000							
	N	161	161						
SA	Pearson Correlation	0.112	-0.015	1					
	Sig. (2-tailed)	0.171	0.855						
	N	161	161	161					
ENV	Pearson Correlation	-0.077	0.048	-0.045	1				
	Sig. (2-tailed)	0.345	0.556	0.587					
	N	161	161	161	161				
DU	Pearson Correlation	-.211**	-0.062	.174*	0.081	1			
	Sig. (2-tailed)	0.009	0.451	0.032	0.325				
	N	161	161	161	161	161			
TV	Pearson Correlation	.440**	.178*	0.008	-.234**	-0.019	1	*	
	Sig. (2-tailed)	0.000	0.029	0.925	0.004	0.817			
	N	161	161	161	161	161	161		
BV	Pearson Correlation	.659**	.496**	.549**	-0.095	-0.110	.369**	1	
	Sig. (2-tailed)	0.000	0.000	0.000	0.245	0.180	0.000		
	N	161	161	161	161	161	161	161	
OS	Pearson Correlation	-.277**	-.279**	-.284**	.830**	.825**	.664**	.866**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	
	N	161	161	161	161	161	161	161	161

**Correlation is significant p < 0.01 (2-tailed).
*Correlation is significant p < 0.05 (2-tailed).

STR – strategy; IT - Information Technology; SA - system adaptability; DU – decision usefulness of cost information, ENV – environmental/contextual factors; OS - organisational structure; TV - technical factors; BV - behavioural and organisational factors.

As shown in Table 4.44, the Pearson correlation value suggests that a strong positive relationship exists between strategy and behavioural and organisational factors (r=

0.659; p<0.01). This finding suggests that as the universities strategy characteristics improves, behavioural and organisational characteristics will improve and vice versa. Equally, a positive correlation was observed concerning strategy and technical factors (r= 0.440; p<0.01). This suggests that as technical factors improve there is an associated improvement in strategy attributes or factors and vice versa.

Similarly, it was observed that IT correlates strongly with behavioural and organisational factors (r= 0.596; p <0.01). Significantly, it emerged that behavioural and organisational factors of the university correlates positively with strategy (r=-0.659; p<0.01), information technology (r=0.496; p<0.01), system adaptability (r=0.549; p<0.01 and technical factors (r=0.359; p<0.01). This strongly suggests that behavioural and organisational factors will positively respond to an improvement of IT, strategy, system adaptability and technical factors. Overall, it can be surmised that an improvement in IT, technical factors, strategy and system adaptability will positively impact the behavioural and organisational characteristics of staff.

Before concluding this analysis, the following section shows the results of factor analysis.

4.3.11 Factor analysis

Factor analysis is a form of analytical procedure that is mainly aimed at data reduction. Factor analysis has the ability to reduce the gathered items into smaller and more meaningful components or factors (Sekeran 2006: 408). The factor extraction method was used to identify the underlying constructs and patterns of relationships among the items constituting the questionnaire.

To help validate the factors influencing the adoption and implementation of a new cost system at the DUT, exploratory factor analysis making use of Principal component analysis (PCA) extraction method and Varimax rotation on all 19 statements that constituted Section B of the questionnaire were conducted. Before running the PCA, the suitability of the data for factor analysis was assessed. The correlation matrix revealed the presence of many coefficients of 0.5 and above. The Kaiser-Meyer value was 0.627 which exceeds the recommended value of 0.6 (Field 2007: 640) and the

Barlett's Test of Sphericity were statistically significant, thus supporting the suitability of the correlation matrix. Importantly, and using the eigenvalues-greater than-one, the principal component analysis revealed five components that were identified with a total variance of 64.8%. This is shown in Table 4.45.

Table 4.45: KMO and Bartlett's test on the factors influencing adoption and implementation of ABC		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.627
Bartlett's Test of Sphericity	Approx. chi-square	614.493
	Df	171
	Sig.	.000

Table 4.46 shows the extracted factors and the rotated factor loadings.

Table 4.46: Extraction of the principal components of factors influencing the adoption and implementation of a new cost management									
(i) The extracted factors									
Component	Initial Eigenvalues above (1)			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.733	24.908	24.908	4.733	24.908	24.908	3.382	17.802	17.802
2	2.909	15.313	40.221	2.909	15.313	40.221	2.675	14.081	31.883
3	1.896	9.976	50.197	1.896	9.976	50.197	2.402	12.643	44.527
4	1.557	8.195	58.393	1.557	8.195	58.393	2.337	12.298	56.825
5	1.212	6.378	64.771	1.212	6.378	64.771	1.510	7.946	64.771

(ii) Rotated factor loadings

Factors influencing adoption and implementation of ABC	Factor description	Component				
		1	2	3	4	5
The current overhead costing system fully meets the strategic needs of management	Strategy	-	-	-	-	0.826
There is currently adequate, accurate overhead costing information to assist in strategic decision making	Strategy	-	-	-	-	0.655
Overhead cost information is an essential component in decision making within the university	Decision usefulness of cost information	0.661	-	-	-	-

Statement	Category	1	2	3	4	5
Changing the overhead costing system is not a strategic priority in the university	Decision usefulness of cost information	0.710	-	-	-	-
The current overhead costing system is transparent on those overheads that are shared or allocated amongst different departments/programmers/faculties	Decision usefulness of cost information	-	0.798	-	-	-
The current overhead costing system gives a clear understanding of the origin as well as the cause-and-effect of overheads costs	Decision usefulness of cost information	-	0.740	-	-	-
The current overhead costing information gives a clear understanding of the behavior of overhead costs	Decision usefulness of cost information	-	0.808	-	-	-
Non-accounting staff would fully support the implementation of a new cost management system, initiative, such as ABC	Decision usefulness of cost information	-	-	-	0.796	-
Overhead costs at DUT are generally perceived as insignificant or a small percentage of total costs	Contextual/environmental factors	-	-	-	-	0.666
The current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs	Contextual/environmental factors	0.501	-	-	-	-
Most of the overhead costs in the departments are fixed and uncontrollable	Contextual/environmental factors				0.597	
The major cost in DUT is salaries and therefore there is no need for a multiple driver basis of apportioning overheads	Contextual/environmental factors	0.652				
There is adequate and accurate overhead cost information essential for profitability and performance analysis	Contextual/environmental factors			0.783		
There is adequate overhead cost information that is useful in cost control in departments	Contextual/environmental factors			0.604		
There is adequate and detailed overhead costing information essential for internal planning as well as budgeting purposes	Contextual/environmental factors			0.739		
The current overhead allocation system helps fully explain the losses on unprofitable programmes/activities	Contextual/environmental factors	0.670				
The current overhead costing system is comprehensive or well detailed and not too aggregated	Contextual/environmental factors	0.537				
The current overhead costing systems for financial analysis in DUT are most appropriate and no additional details are necessary	Contextual/environmental factors	0.711				
The overhead cost system in place makes non-value adding activities/courses/programmes/services immediately visible to management	Contextual/environmental factors	0.741				

Extraction Method: Principal Component Analysis.	
Rotation Method: Varimax with Kaiser Normalization.	
a. Rotation converged in 7 iterations.	

From Table 4.46 above, and following the PCA, statements with a loading less than 0.5 were dropped from further analysis. The resulting items were then reduced to 18 statements within five components from the initial three constructs that constituted the survey (Section B). Although the majority of the statements that measured environmental/contextual factors as well decision usefulness of cost information were returned to their original groups, some (Appendix B) of the statements (6.3; 6.4; 6.8; 6.9; 6.11; 6.13; 6.14 and 6.15) loaded on different components. These findings, however, could be attributed to the differences in the rating between the staff from the finance department and the HODs.

The next section discusses the factor analysis carried out in respect of the factors that constitute barriers to or facilitate the adoption and implementation of ABC at DUT.

Table 4.47: KMO and Bartlett's Test on the factors influencing adoption and implementation of ABC		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.505
Bartlett's Test of Sphericity	Approx. chi-square	3445.572
	Df	378
	Sig.	.000

Table 4.48 shows the extracted factors and the rotated factor loadings.

Table 4.48: Extraction of the principal components of respondents' perceptions on the benefits of and barriers to ABC adoption at DUT

(i) The extracted factors

Component	Initial Eigenvalues above (1)			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.306	18.950	18.950	5.306	18.950	18.950
2	3.334	11.908	30.859	3.334	11.908	30.859
3	2.831	10.110	40.969	2.831	10.110	40.969
4	2.445	8.731	49.700	2.445	8.731	49.700
5	2.083	7.440	57.139	2.083	7.440	57.139
6	2.030	7.250	64.390	2.030	7.250	64.390
7	1.577	5.631	70.021	1.577	5.631	70.021
8	1.194	4.263	74.284	1.194	4.263	74.284
9	1.121	4.003	78.287	1.121	4.003	78.287

(ii) Rotated factor loadings

Perceptions on the benefits of and barriers of the adoption and implementation of ABC	Factor descriptor	Component								
		1	2	3	4	5	6	7	8	9
The organisational strategy fully supports the need for innovation in the form of ABC	Strategy	0.520	-	-	-	-	-	-	-	-
ABC would be aligned with the competitive strategies and continuous improvement programs within the university	Strategy	0.637	-	-	-	-	-	-	-	-
There is a high level of architectural and information technology software design in the university to support an ABC system	Information Technology	-	-	0.845	-	-	-	-	-	-
There are already a number of high level IT and cost management system initiatives running smoothly within the university	Information Technology	-	-	-	-	-	0.955	-	-	-
There are sufficient skills as well as continuous training of employees for adopting, designing and implementing ABC	System adaptability	-	-	-	-	0.863	-	-	-	-
There is consensus about and clarity on the objectives of the ABC system in the finance department	System adaptability	-	0.828	-	-	-	-	-	-	-
There is sufficient top management involvement to support the adoption and implementation of ABC	System adaptability	-	-	-	-	0.920	-	-	-	-

Item	Factor	C1	C2	C3	C4	C5	C6	C7	C8	C9
There is a high participation of relevant external consultants in all cost management system initiatives	System adaptability	-	-	-	0.821	-	-	-	-	-
There are little cost distortions in the system to warrant the adoption and implementation of ABC	System adaptability	-	-	-	-	-	-	-	0.870	-
ABC can only be adopted and implemented at DUT after being initiated by the DHET	Environmental /contextual factors	-	-	-	-	-	-	-	-	0.573
An ABC initiative would be aligned with the university's performance evaluation and compensation structure	Environmental /contextual factors	-	-	-	-	-	-	-	-	0.533
The organisational goals and culture of the university are well aligned with an ABC initiative	Environmental /contextual factors	-	-	0.548	-	-	-	-	-	-
There are little difficulties in collecting cost data necessary for implementing ABC from various departments in the university	Environmental /contextual factors	-	-	-	-	-	-	-	-	0.614
The organisational structure of the university can positively influence the university's ability to implement ABC	Organisational structure	-	-	-	-	-	-	-	-	0.754
The large size of the university would warrant the adoption of a sophisticated system, such as ABC	Organisatonal structure	-	-	-	0.709	-	-	-	-	-
There are difficulties in identifying and grouping activities for ABC	Technical factors	0.869	-	-	-	-	-	-	-	-
There are difficulties in grouping activities into cost pools for ABC	Technical factors	0.871	-	-	-	-	-	-	-	-
Cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities difficult	Technical factors	0.750	-	-	-	-	-	-	-	-
There is limited knowledge on the exact data requirements needed to implement ABC	Technical factors	0.846	-	-	-	-	-	-	-	-
The amount of time required for calculation in setting up ABC is a hindrance to its adoption and implementation	Behavioural and organisational factors	-	0.652	-	-	-	-	-	-	-
ABC is suited to the manufacturing sector only and is not relevant to a university setting	Behavioural and organisational factors	-	0.553	-	-	-	-	-	-	-

Statement	Construct	1	2	3	4	5	6	7	8	9
Enhanced overhead costing systems, such as ABC systems are too complex and difficult to design	Behavioural and organisational factors	-	-	0.841	-	-	-	-	-	-
ABC is appropriate for outsourcing decisions	Behavioural and organisational factors	-	-	-	-	-	0.950	-	-	-
There is uncertainty on the long-term benefits of ABC	Behavioural and organisational factors	-	-	-	-	0.895	-	-	-	-
The benefits of a more enhanced system, such as ABC, would not justify the high cost of implementing it	Behavioural and organisational factors	-	0.830	-	-	-	-	-	-	-
There is no internal resistance from relevant staff to the adoption and implementation of ABC	Behavioural and organisational factors	-	-	-	-	-	-	0.944	-	-
ABC would facilitate more efficient, financial management for universities under budgetary constraints	Behavioural and organisational factors	-	-	-	0.868	-	-	-	-	-
ABC is only necessary when other competitors or universities have also introduced it	Behavioural and organisational factors	-	-	-	-	-	-	-	0.827	-
Extraction Method: Principal Component Analysis.										
Rotation Method: Varimax with Kaiser Normalization.										
a. Rotation converged in 7 iterations.										

From Table 4.48 above, and following the PCA, statements with a loading less than 0.5 were dropped from further analysis. The resulted items were then reduced to 28 statements within nine components from the initial three constructs that constitute the survey (Section C of the questionnaire). Although the majority of the statements that measured environmental/contextual factors as well as behavioural and organisational factors were returned to their original groups, some (Appendix B) of the statements (8.4; 8.8; 8.12; 8.15; 8.22; 8.23; 8.24; 8.26; 8.27 and 8.28) loaded on different components. These findings, however, could be attributed to the differences in the rating between the staff from the finance department and HODs.

4.3.12 Summary for objective 2: to determine the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT

This section presented and discussed the results of the questions related to the perceptions on the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT. The data is a compilation of responses to question Q8.1 - Q9 of the questionnaire. The themes that were developed in the literature review and the contingency theory, namely, organisational strategy, information technology, decision usefulness of cost information, system adaptability, environmental/contextual factors, organisational structure, technical factors, behavioural and organisational factors were also tested.

The study found that both academic and finance staff overwhelmingly agreed that the current strategy at the university supports innovation and would fully support a new initiative such as ABC. However, academic staff did not agree that ABC would be aligned with the competitive strategies and continuous improvement programmes within the university. Furthermore, both academic and finance staff perceive the university as already having a number of high-level IT and cost management system initiatives that are running smoothly within the university. This finding is a possible explanation why staff are unwilling to change the current overhead costing system. This is supported by previous studies or literature that suggest that organisations with high levels of information technology and cost management system are usually reluctant to adopt and implement ABC.

Most hindrances to the adoption and implementation of ABC in the university were mainly highlighted under the theme, system adaptability. These factors include the availability of continuous training and top management support for ABC. However, one enabling factor was identified under the system adaptability theme. The results show that staff alluded to the fact that there are relevant external consultants if ABC was to be successfully adopted and implemented in the university. Studies show that the amount of assistance from external consultants influences the success of the implementation of ABC as outside consultants have specialised knowledge on ABC that can be used to the benefit of their clients. Therefore, the perceived technical

hindrances that were observed in the results identified could be minimised significantly by external consultancy. It can be construed that academic and finance staff generally perceive the university environment or context as being conducive for an ABC system with academics attributing the need for ABC to address cost distortions and finance staff perceiving the ABC system as being well aligned with the performance and evaluation structure of the university.

A number of factors that could positively influence the adoption and implementation of ABC at DUT were highlighted under the behavioural and organisational factors. The perception by both academic and finance staff that ABC could facilitate more efficient, financial management for universities under budgetary constraints is worth noting. However, both groups of staff perceive the ABC system as being difficult and complex to adopt and implement at DUT. Hence, both groups of staff may not welcome a new costing initiative, such as ABC, as they perceive it to be a system that poses many changes and technical challenges. This is consistent with the responses to Q7.1 (Table 4.6), where the majority of the respondents expressed an unwillingness to change the current system but rather improve on it, if possible. It was found that the perceptions of the staff on the use of ABC was affected by the demographics (Gender, Age, Level of education, Time at DUT, ABC Knowledge and Job Title). It was also found that there is a relationship between the perceptions on the institution's strategy, decision usefulness of cost information, environmental factors, information technology, organisational structure as well as technical factors and the adoption or implementation of ABC.

4.4 OBJECTIVE 3: THE IDENTIFICATION AND EVALUATION OF COST ACTIVITIES, COST DRIVERS AND RELEVANT COST POOLS OF A SELECTED DEPARTMENT

To address the third objective, an academic support department, the library at DUT, has been chosen. This third objective was to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected department at DUT.

Support costs, such as IT, library, student services, as well as examinations are usually considered fixed costs and allocated on some arbitrary basis instead of being allocated on some reliable basis. This makes it difficult to allocate service costs to programmes. ABC has proven to be a valuable tool for libraries through its implementation, as reported in a number of case studies (Goddard and Ooi 1998: 37, Ellis-Newman 2003: 347). Ellis-Newman (2003: 347) examined the successful application of ABC in the academic libraries of two Western Australian universities. Similarly, Goddard and Ooi (1998: 37) examined the development of ABC through a case study applied to library services at the University of Southampton. This current study identified the cost activities, cost drivers as well relevant cost pools of the DUT library in order to meet the third objective of this study. According to Horngren *et al.* (2014: 165), these components together with the purpose of the new system, determine the scope of the ABC system.

The implementation of an ABC system in a library can be based on a four-step approach proposed by Ellis-Newman (2003: 338). The four steps are:

1. Identifying the key activities and relevant cost drivers;
2. Allocating staff time to activities;
3. Attributing staff salaries and other costs to activity cost pools; and
4. Determining a cost per cost driver.

This study identified the key activities, cost pools and possible cost drivers of ABC in the DUT library. Based on a series of interviews conducted, the following section describes the steps that could be followed in undertaking an ABC implementation in the DUT library.

The first step in implementing an ABC is to identify the key activities and cost pools in the library. The information required for this step was mainly gathered from interviews with staff employed in the user services and finance staff. From the interviews, the key sections identified were the Circulation section, Subject librarians, Post Graduate Library and Central Services. Once the key sections were identified, the next step was to identify the key activities for each section such as Item loan, item returns and item renewal. The cause-and-effect relationships had to be examined in library record-

keeping procedures and the computerisation of some activities. Once the key activities were identified, the study selected relevant cost drivers that caused the occurrence of each activity. Therefore, the following cost pools and corresponding cost drivers (Table 4.49) were identified and grouped according to the main sections of the DUT library.

Table 4.49: User service cost pools and cost drivers		
Cost pools	**Cost drivers**	**Activity classification**
1. **Circulation Section**		
Item loans (media, bound journals, books etc.)	Number of loans	Unit
Item returns	Number of book returns	Unit
Item renewals	Number of book renewals	Unit
Item recalls	Number of recalls	Unit
Overdue books	Number of overdue books	Unit
Interlibrary loans	Number of library requested	Unit
Intercampus loans	Number of items requested	Unit
Shelving	Items schedule	Unit
2. **Subject Librarians**		
Collection development	Number of items	Unit
Training students/academics	Number of workshops	Unit level
Liaising with departments	Number of meetings	Unit level
Consultation	Number of inquiries	Unit level
3. **Post-graduate Library**		
Consultation	Number of inquiries	Unit level
Collection development	Number of items	Unit level
Training students/academics	Number of workshops	Unit level
Liaising with faculties	Number of meetings	Unit level
4. **Central services**		
Issue of purchase orders e.g. for stationery, books, journals	Number of purchase orders	Unit level
Inspection of goods received	Number of purchase orders	Unit level
Storing of materials	Value of materials stored	Unit level
Servicing or requisitions	Number of requisitions	Unit level
Inspection and verification of goods received/issued	Number of times inspected	Batch level
Stock taking	Value of stock	Batch level

Indirect overheads, such as electricity and the depreciation of buildings and equipment, are handled at facility level; hence they were ignored in this study.

In developed countries such as Australia, cost activities have been closely monitored (Ellis-Newman 2003: 338). An example is given that each time reference desk staff answered a student or staff enquiry they would press a button under the desk to record the inquiry statistic. Therefore, precise statistics are kept for the number of enquiries at the desk (Ellis-Newman 2003: 339). On the other hand, at the circulation desk at DUT, only significant enquiries are currently recorded manually. According to one staff member (A3), 'no two days are the same in the library and this makes it difficult to constantly record queries'. Although there is no precise time keeping record in place, staff could estimate the time they spent on most activities. In addition, most library statistics are computerised and each time staff needed to perform an activity, a student scans his or her card to access the service.

Other administration tasks undertaken by the supervisors, such as planning, report writing, attending meetings, etc., were not separately identified as key activities as it was considered that these related to their duties in user services and could, therefore, be attributed to the existing user service activities. Based on the findings, the model

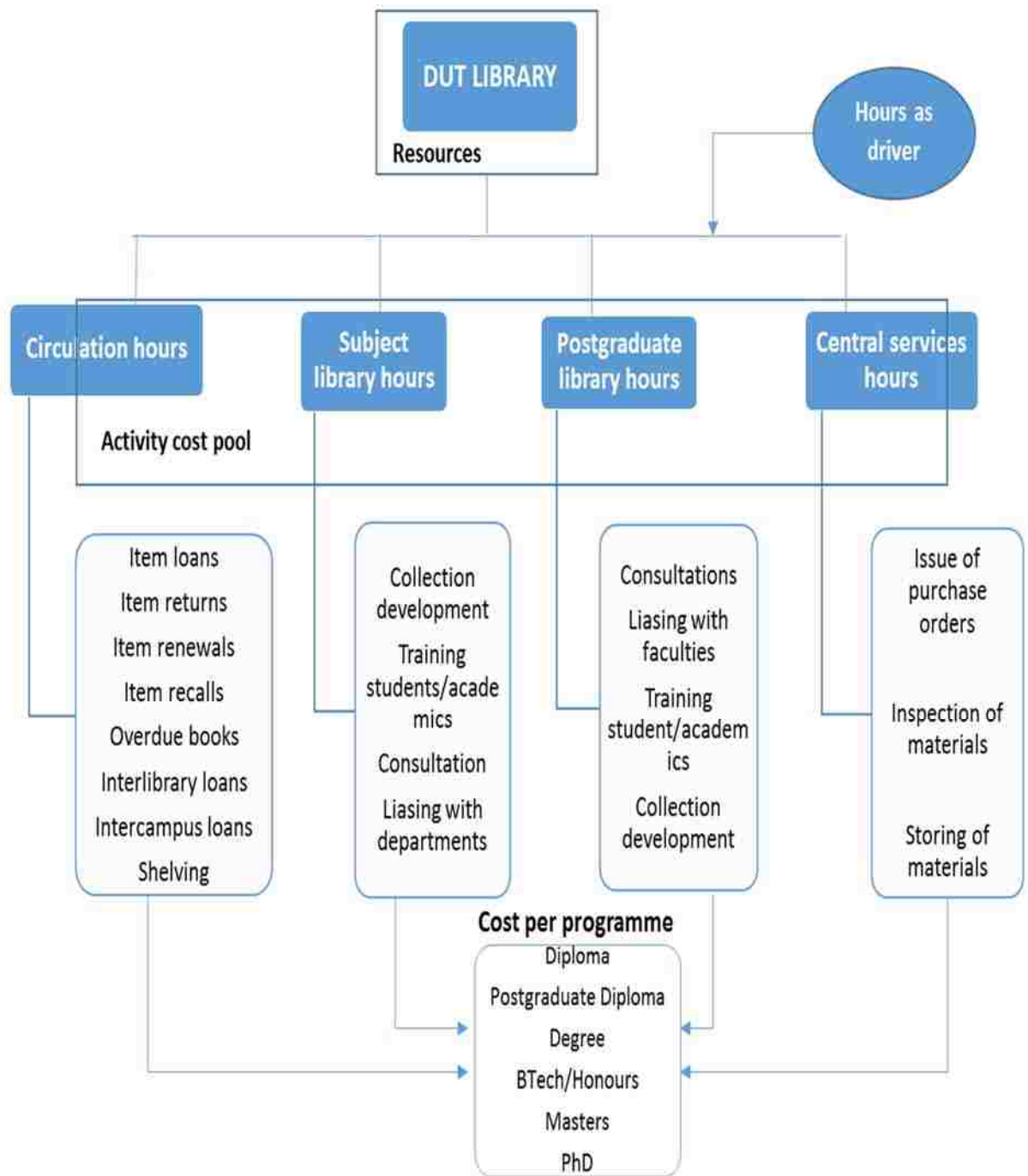shown in Figure 4.1 could be used for the DUT library.

Figure 4.1 Proposed ABC model for the allocation of DUT library hours into activities and sub-activities

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4.5 SUMMARY

This chapter presented, interpreted and discussed the analysis of the data collected in the research study. It has applied qualitative analysis and different methods of quantitative analysis to obtain both descriptive and inferential statistics. It was determined that the traditional overhead costing system is still being used in the university. Staff at DUT strongly agreed that the current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs. The majority of staff were in agreement that the current overhead costing system generally meets the strategic needs of management. In addition, both academic and finance staff perceived the ABC system as posing a number of organisational changes and technical challenges. Consequently, staff did not think there was an overwhelming need to completely change the overhead costing system.

Although changing the overhead costing system was not considered a strategic priority in the university, some executives/HODs were of the opinion that the current system requires improvement (detail) as it is providing inadequate information to assist in strategic decision making and formulation of turnaround strategies. The interviews also revealed that the existing system largely meets the needs of the university, but there is room for improvement particularly on the components that inform the budgets. This argument is well supported in literature, that 'without good budgets, there are no schools' (Thompson and Wood 2005: 136). Furthermore, finance staff highlighted the need for the system to provide more meaningful details on cost information to facilitate planning, decision making and cost control. However, the interviews revealed that the accounting costs that would be incurred to maintain a more detailed overhead costing system, such as ABC, would be prohibitively high. The general feeling in the finance department was that, currently, the benefits may not justify the high cost of implementing ABC given the current budgetary constraints at DUT. However, staff strongly perceived that, as with any course of action, the implementation of ABC is only justified if the costs of installing and operating the system are more than offset by the long-term benefits. In addition, staff perceived the university as already having a number of high-level information technology and cost management system initiatives that are running smoothly within the university. Notwithstanding this, the majority of

HODs were in agreement that non-accounting staff would fully support the implementation of a new cost management system initiative, such as ABC. Staff also alluded to the fact that there are relevant external consultants that would positively influence the adoption and implementation of ABC.

Overall, both academic and finance staff agreed that ABC would provide DUT with a better understanding of cost activities and associated costs, which often leads to an improved resource allocation model, efficiency and reduced costs. However, the results also showed that there has not yet been official two-directional feedback between top management and lower level employees that supports the adoption and implementation of ABC at DUT. Consequently, there is no consensus or clarity on the objectives of ABC in the departments yet. Similar to most findings in literature, this study ascertained that, until top management in the university is willing to use the ABC information for planning, cost control and decision making, the rest of the staff would see no point in implementing such a system. The study further identified the key activities, cost drivers and cost pools in the university's library and found that most of the data requirements for setting up an ABC accounting system already existed. These components together with the purpose of the new system may determine the scope of the ABC system. The following chapter focuses on the summary, conclusions and recommendations of the study.

CHAPTER FIVE
CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH

5.0 SUMMARY

The main aim of this study was to determine and analyse the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in SA, using DUT as a case study.

The objectives of the study were as follows:

- to investigate the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA;
- to determine the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT; and
- to identify and evaluate cost activities, cost drivers as well as relevant cost pools of a selected department at DUT.

The literature review was discussed in Chapter 2. The following aspects were examined in the literature review: the traditional costing methods of overheads, the difference between traditional costing methods and ABC in the allocation of overheads to products, the factors that influence the implementation and adoption of ABC, the strengths and limitations of ABC and a brief background of DUT. The review of the factors that influence the adoption and implementation of ABC, as identified in the literature published since 1987 assisted in identifying the themes used in the study on the adoption and implementation of ABC at DUT. These themes/factors were used as a guide in collecting the relevant data for the study.

A mixed method (quantitative and qualitative) research design was adopted for this study. Primary data was collected in two phases. In the first phase, a consent form accompanied by a covering letter, as well as a survey questionnaire was given to all personnel in the finance department at DUT, HODs and academic staff in the Faculties

of Accounting and Informatics as well as Management Sciences. A pre-coded closed ended questionnaire using a 5-point Likert scale was personally distributed to the target population of 217 staff members at the DUT. This included both academic and finance staff at DUT. The questionnaire comprised of three sections, each under a specific theme related to the topic as well as the testing of the factors and components of the study. In the second phase, structured interviews with a self-selecting sub-sample was conducted according to a prepared interview guide to supplement the survey data.

The analysis of the data was conducted using the SPSS (version 25®) for Windows and although the sample respondents returned 217 questionnaires, 8 questionnaires were discarded as they were incomplete. Therefore, the final questionnaire returns equated to n = 202, namely, 129 questionnaires from the academic staff, 41 HODs and 32 questionnaires from the finance staff, which elicited a high response rate of 93%. The researcher solicited the services of an expert statistician who used the SPSS (version 25®) to test the various themes and the factors. The qualitative data were analysed using Nvivo 10 (QSR International Pty Ltd 2014). Nvivo 10 was used to further organise, code and manage non-numerical and unstructured qualitative data.

There were many significant findings that emerged from the comprehensive empirical analysis of the data. Moreover, these findings were also corroborated by other authors and researchers who conducted similar studies and their findings were contextualised to the results of the current study. Hence, the themes developed for this study proved their tenability and scientific worth. However, these findings may not be generalised to other state universities in the HE sector as it was an in-house investigation pertaining to one specific entity, namely, the DUT and situational factors may differ in other state universities.

5.1 CONTRIBUTION OF THE STUDY

This study has attempted to narrow the gap in knowledge in overhead costing within state universities in SA by providing an empirical understanding of factors that assist in the adoption as well as implementation of the ABC system within this environment. This is the first study that the researcher is aware of that addresses and develops an

ABC model for the adoption of ABC in a South African state university (using the DUT library as a template).

This study specifically focused on factors that influence the adoption and implementation of ABC, as an indicator of the reasons as to why it has taken so long for ABC to be adopted in state universities, despite the numerous advantages of such a system. In addition, this study identified and evaluated cost activities, cost drivers as well as relevant cost pools of a selected department in order to suggest an ABC model in a South African state university. The model might be useful as a guideline for the adoption and implementation of this cost management system in other state universities. It is envisaged that the adoption of ABC may improve the financial wellbeing of state universities through optimal allocation of resources in the face of the current budgetary constraints.

The success of this study can be determined by the ability to contribute to the body of knowledge and practice (Missa 2013: 252). This study has ultimately developed a conceptual framework for the adoption of ABC in a support service in the university, namely, the university library, to increase ABC adoption and implementation rate at the higher institution of learning. It is this framework that is the contribution of this study to the body of knowledge and practice in the field of cost management accounting.

This study contributed to the existing cost management accounting literature by developing a conceptual framework for the adoption and implementation of ABC and incorporated factors, which may act as barriers or facilitators to ABC adoption and implementation into the contingency theory. The ABC model developed in this study benefits various studies relating to ABC adoption and implementation to identify and solve factors such as difficulties in identifying activity centres, cost drivers and in assigning costs to activities. Subsequently, this study provides a basis for the development of scientific research in this area, and contributes theoretically and methodically to management accounting literature. Moreover, little attention has been paid to ABC system in the higher education institutions in SA in general, and Africa, in particular. Therefore, this study will add to the body of knowledge in this sector (DHET)

because it relates to the factors that assist in the adoption and implementation of the ABC system in the higher education sector in SA.

This study makes the following contribution to the existing body of knowledge in the area of overhead costing in a state university setting in South Africa using DUT as a case study:

- This study addresses the lack of empirical studies on the adoption and implementation of the ABC systems in South African state universities;
- One of the main contributions to knowledge is the development of a new ABC model applicable to the DUT library. This can potentially be used as a template for the implementation of the ABC system at DUT; and
- This study provides a useful resource for both researchers and practitioners who have an interest in understanding the factors that might influence the adoption and implementation of the ABC system in a state university within the South African context.

This chapter next indicates how the objectives of the study have been achieved. It presents the conclusion, recommendations drawn from the empirical findings, recommendations for future research and the limitations of the study.

5.2 THE MAIN RESEARCH OUTCOMES

This section focuses on the findings presented in chapter four and formulates conclusions of the study based on the objectives that were set out in chapter one. The questionnaire was structured to achieve the stated objectives and the interview schedule was set out to achieve the stated objectives and validate the findings of this study.

5.2.1 Research findings

The findings addressed the objectives, which are outlined below.

Objective 1: The current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA.

This objective determined how indirect costs are spread among the programmes within DUT.

The literature review provided an understanding of the different methods of allocating overheads including the traditional costing system and ABC. The results in chapter 4 revealed the following related to the current overhead costing system at DUT (objective 1):

The traditional overhead costing methods are being used at DUT. Staff at DUT strongly agreed that the current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs. This indicates that volume-based cost drivers are still mainly being used in the university and shows a strong reliance on volume-based cost drivers of the traditional costing system.

Interviews conducted in the library also indicated that academic support departments also use student numbers to allocate their services to departments. This means that the number of students is usually the sole cost driver used to determine the cost per student. As a result, the respondents in such services indicated that the programme with most students consumes a higher percentage of the departmental budget. Therefore, overheads are monitored at departmental level and the current system does not use multiple cost drivers to spread overhead costs among the different programmes offered in the university. This means that the university is not yet using ABC.

Staff showed support on the impact of the current overhead costing system on strategic decision making and indicated that cost information is considered an essential component in decision making within DUT. However, staff showed little support on the adequacy, transparency and accuracy of the current overhead costing system. Despite the highlighted shortcomings of the current system, changing the

current overhead costing system is not perceived as a strategic priority in the university. Furthermore, staff are unwilling to change the system; rather they want it to be improved. This is possibly due to general resistance to change and fears that it would be too costly and complicated. Although staff with ABC knowledge are aware that results show that the implementation of the ABC system has resulted in significantly more accurate, reliable, timely and understandable information than traditional costing system, staff expressed moderately favourable attitudes towards the adoption and implementation of ABC at DUT.

Objective 2: Perceptions on the benefits and barriers to the adoption as well as implementation of ABC and the reasons why the ABC system has been/not yet been adopted and implemented

The factors found to affect the successful adoption and implementation of ABC in literature are strategy (Gosselin 1997; Anderson 1995; Michela and Irvine 2005), decision usefulness of cost information (Krumwiede 1998; Baird *et al.* 2004; Anderson and Young 1999), environmental or contextual factors (Anderson and Young 1999; Cagwin and Bouwman 2002; Krumwiede 1998; Malmi 1997; Anderson, Hesford and Young 2002), behavioural and organisational factors (Shields 1995; Shields and McEwen 1996; Foster and Swenson 1997; McGowan and Klammer 1997), organisational structure (Gosselin 1997); technical factors (Fei and Isa 2010; Anderson and Young 1999; Innes and Mitchel 1998), information technology (Cagwin and Bowman 2002; Krumweide 1998) and system adaptability (Argyris and Kaplan 1994; Drake, Haka and Ravenscroft 1999; James 2013). Therefore, responses were sought regarding the respondents' perceptions on these factors. The following were the key findings for each theme.

5.2.1.1 Organisational strategy

Staff perceive the current DUT strategies as being supportive of innovation in the form of ABC. Specifically, the, prospector strategy prevalent in the university is positively viewed in relation to the adoption of ABC. The perception that ABC is aligned with the competitive strategies and continuous improvement programmes within the university was deemed a positive factor in the adoption and implementation of ABC at DUT.

5.2.1.2 Information technology

The high level of IT in the university was perceived as a positive factor that would provide support and generate cost information for the adoption and implementation of ABC. The availability of high-level information is perceived an important factor at the implementation stage as the information system provides detailed historical data and an easy access to users that may provide much of the cost driver information needed by ABC. According to Drury (2011: 225), a simplistic overhead allocation system cannot be justified in an environment where information processing costs are no longer a barrier to introducing ABC.

However, the finding that the university already has a number of high-level IT and cost management system initiatives that are running smoothly within the university could be a hindrance to adoption and implementation of ABC. Literature has shown that management that has relatively strong, existing information systems and are generally satisfied with the information provided by the existing IT system may be reluctant to invest the necessary resources in ABC (Anderson 1995: 36).

5.2.1.3 System adaptability

The finance staff who are essential in championing the adoption and implementation of ABC perceived that there are insufficient skills as well as sufficient, continuous training of employees for adopting, designing and implementing ABC and that there is little consensus about and clarity on the objectives of the ABC system in the accounting department. Furthermore, finance staff were generally unsure if 'there is sufficient top management involvement to support the adoption and implementation of ABC' (statement 8.7). A lack of top management support is a reason for non-adoption of ABC. This study supports the surveys carried out in New Zealand (Cotton *et al.* 2003: 71) and the UK (Innes and Mitchell 1998: 103) that showed that the most significant variable related to the success of ABC was top management. The findings show that ABC cannot be adopted and successfully implemented without commitment from senior management, as the adoption and implementation of ABC requires considerable resources which require managerial approval and support. In addition, a high level of skills is an important factor in getting to the usage stage of ABC as staff

assist in the identification and evaluation of cost activities, cost pools as well as relevant cost drivers of the ABC model (Granof *et al.* 2000: 14; Ellis-Newman, 2003: 338; Reich and Abraham 2006: 23; Krishnan 2006: 80).

These perceptions on the university's ability to adopt a new system such as ABC may be viewed as possible challenges that can be addressed through training, engaging external consultants and establishing a two-way communication channel on ABC. The already existing high participation of relevant external consultants in all cost management system initiatives (statement 8.8) would not only help address these challenges but positively influence the adoption and implementation of ABC.

5.2.1.4 Contextual/environmental factors

The findings on environmental/contextual factors show the organisational goals and culture as a positive factor in the adoption and implementation of ABC as staff view them as being well aligned with an ABC initiative (statement 8.13). Academic staff showed that they perceive 'the proportion of cost distortions in the system as warranting the adoption and implementation of ABC' (statement 8.9). This finding could positively influence the adoption and implementation of ABC at DUT as literature reveals that ABC has the fundamental characteristic to seek to reduce distortions caused by arbitrary allocation of indirect costs in traditional systems.

Two additional positive factors were identified at DUT. Firstly, the study observed that staff perceive ABC as a system that can be adopted and implemented at DUT with no constraints from the Ministry of Higher Education and Training and the regulatory environment. This also indicates that they consider the adoption and implementation of ABC as being an internally motivated process that does not need to be initiated by the Ministry of Higher Education or regulatory bodies. Secondly, staff perceive an ABC initiative as being aligned with the university's performance evaluation and compensation structure (statement 8.11). Notwithstanding this, staff agreed that there are difficulties in collecting data at DUT (statement 8.12), necessary for the implementation of a new cost management system initiative, such as ABC. Hence, technical factors (identifying cost activities, cost drivers and relevant cost pools) of

ABC are generally perceived as a hindrance to the adoption and implementation of ABC in the university.

These findings show that although the DUT context/environment may be conducive for the adoption and implementation of ABC, as evidenced by responses to this theme, statements 8.9 -8.11), DUT may still not contemplate adopting the system as it is perceived as being complex. This is consistent with the responses to Q7.1 (Table 4.6), where the majority of the respondents expressed an unwillingness to change the current system but rather improve on it, if possible. This study found that DUT staff are satisfied with the current system of allocating overheads, despite the fact that this system was reported to produce distorted programme costs. This finding suggests that DUT is unsure of the benefits of using ABC.

5.2.1.5 Organisational structure

The majority of staff agreed that the organisational structure of the university could positively influence the university's ability to implement ABC. Staff did not perceive the functional departments of the university or formal structure as a hindrance to the adoption and implementation of ABC. Furthermore, staff perceive the large size of the university as warranting the adoption of an enhanced or sophisticated system, such as ABC. These findings are consistent with literature as centralised and formal organisations, such as DUT, have significantly been associated with the successful adoption and implementation of ABC (Gosselin 1997: 118-119).

5.2.1.6 Technical factors

Technical factors (identification of major activities, grouping activities, assigning cost to activities and assigning costs of activities to cost object) were identified as factors that could constitute hindrances to the adoption and implementation of ABC at DUT. Staff mainly perceived identifying and grouping activities for ABC as being difficult in a university setting. The results of the interviews indicated that technical factors are of significance in the adoption and implementation of ABC at DUT. This finding supports the findings from interviews conducted by Sartorius *et al.* (2007: 13-14) with ABC consultants on the problems that are encountered when implementing ABC in SA. The

problems that were cited by the majority of consultants were that it is difficult to collect the appropriate data and to define cost pools and cost drivers.

However, staff did not conceive the complexity of ABC to be a result of the unique activities in a university setting as they disagreed with the statement 'cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities difficult' (statement 8.18). This finding may indicate that, despite the perceived complexity of ABC, staff still feel that it is possible to identify cost drivers required for assigning resources to activities in the university/in a university setting. This finding is further supported in that staff disagreed with the statement 'ABC is suited to the manufacturing sector only and is not relevant to a university setting' (statement 8.21). This shows that staff perceive ABC as being relevant in a university setting.

5.2.1.7 Behavioural and organisational factors

Some factors that could constitute hindrances to the adoption and implementation of ABC at DUT were identified under the behavioural and organisational factors. Firstly, the majority of the finance staff perceive that there is staff resistance to the adoption and implementation of ABC. This is also consistent with the finding on the unwillingness of staff to change the current system, as indicated by Q7.1.

However, under the organisational and behavioural theme some factors that could positively influence the adoption and implementation of ABC at DUT emerged. These factors include positive staff perceptions on ABC and how they can positively influence outsourcing decision making. Furthermore, another positive factor that emerged is that staff do not perceive ABC as only being necessary when other competitors or universities have also introduced it. This finding would positively influence the adoption and implementation of ABC at DUT if it was deemed necessary.

5.2.1.8 Correlations between the factors

The Pearson's correlation tests found the following:

- The Pearson correlation value suggests that a strong positive relationship exists

between strategy and behavioural and organisational factors (r= 0.659; p<0.01). This suggests that the university's strategy characteristics as well as behavioural and organisational characteristics move in tandem. The results of this study support previous ABC studies which indicated that being open to change/innovation is associated with and identified as being one of the factors for the positive behavioural and organisational factors for the adoption and implementation of ABC;

- A positive correlation was also observed concerning strategy and technical factors (r= 0.440; p <0.01). This finding suggests that as the characteristics of strategy improve, there is an associated improvement in technical attributes or factors and vice versa;

- The results showed that IT is strongly correlated with behavioural and organisational factors (r= 0.596; p <0.01). This means that as the characteristics of IT improve, the behavioural and organisational factors also improve and vice versa; and

- Similarly, it was observed that behavioural and organisational factors are positively correlated with system adaptability (r=0.661; p<0.01), strategy (r=-0.659; p<0.01), information technology (r=0.496; p<0.01), system adaptability (r=0.549; p<0.01 and technical factors (r=0.359; p<0.01). These findings strongly suggest that behavioural and organisational factors will positively respond to an improvement of IT, strategy, system adaptability and technical factors. Overall, it can be surmised that an improvement in IT, technical factors, strategy and system adaptability will positively impact the behavioural and organisational factors.

5.2.1.9 Correlations with demographic factors

The findings show that there was no correlation between the behavioural and organisational factors with gender.

Other correlations are as follows:

- The statement 8.20 (The amount of time required for calculations in setting up

ABC is a hindrance to its adoption and implementation) and statement 8.21 (ABC is suited to the manufacturing sector only and is not relevant to a university setting) respectively correlated with job title and number of years at DUT;

- Enhanced overhead costing systems, such as ABC systems are too complex and difficult to design (statement 8.22) correlated with qualification and job title;

- ABC is appropriate for outsourcing decisions (statement 8.23) correlated with number of years at DUT;

- There is uncertainty on the long-term benefits of ABC (statement 8.24) correlated with qualification, job title and number of years at DUT;

- The benefits of a more enhanced system, such as ABC, would not justify the high cost of implementing it correlated with job title and number of years at DUT;

- There is no internal resistance from relevant staff to the adoption and implementation of ABC (statement 8.26) correlated with age, level of education, job and number of years at DUT.

- ABC would facilitate more efficient, financial management for universities under budgetary constraints (statement 8.27) correlated with age, level of education, job title and number of years at DUT; and

- ABC is only necessary when other competitors or universities have also introduced it (statement 8.28) correlated with job title and number of years at DUT.

Objective 3: The identification and evaluation of cost activities, cost drivers and relevant cost pools of a selected department

5.2.2 Evaluation of Cost activities, Cost drivers and Relevant Cost Pools

After the survey, interviews were conducted with a sample of 12 staff members and cost activities, cost pools and relevant cost drivers were identified (refer to Table 4.49). Nineteen activities were identified. These activities could potentially be used as a starting point for the implementation of ABC as suggested in the model developed in chapter 4 (Figure 4.1).

5.2.2.1 Cost drivers

Multiple cost drivers were identified. In the circulation section the following cost drivers were identified: number of loans; number of book returns; number of book renewals; number of recalls; number of inter-library requests; number of items requested; number of inter-campus items requested; and items schedule.

For the subject librarian section, the following cost drivers were identified: number of items; number of workshops; number of meetings; and number of inquiries.

For the post-graduate library section, the following cost drivers were identified: number of inquiries; number of items; number of workshops; number of meetings; and number of inquiries.

For the central services section, the following cost drivers were identified: number of purchase orders; number of purchase orders; value of materials stored; number of requisitions; number of times inspected; and value of stock.

5.2.4.2 Cost Pools

From the activities identified above four major cost pools were identified. These were: circulation section; subject librarians; post-graduate library; and central services.

The model of ABC (see Figure 4.1) was developed to assist in the adoption of ABC at DUT.

5.3 RECOMMENDATIONS

The main recommendations of this study are elicited from the rigorous analysis of empirical findings. The main recommendations relate to a two-way communication on the overhead structure, budget figures, supplement overhead costing system and training.

5.3.1 Communication on overhead structure

It is suggested that top management at the DUT should continue to emphasise the value of overhead costs at the institution. Top management could create an open forum for knowledge-sharing; and empower employees by showing them how the new system will, in turn, empower them and enhance their effectiveness. Sharing knowledge has a significant impact in overcoming internal resistance to change (Toribio and Hernandez 2011: 65) and enabling the successful implementation of ABC. Argyris and Kaplan (1994: 87) suggest that the process of implementing ABC should begin with educating key or top management due to its independence as well as influence subordinates' learning.

It is also suggested that top management sets an official, two-way, two-directional feedback between top management and lower level employees that supports the adoption and implementation of ABC. Top management support could bring more consensus and clarity on the objectives of the enhanced overhead costing system that has multiple cost drivers through two-directional communication.

5.3.2 Revisit and recalculate the budget figures

The university's accounting system begins with the allocation of budgets. Without the knowledge of activity costs, it is difficult to comprehend how budgeted figures are calculated and whether or not they are subjective. Budgets that are not based on well-understood relationships between activities and costs provide little relevant information for managing the indirect costs and support activities (Drury 2011: 371). As a result, some HODs may not be convinced by the reported unfavourable or favourable variances.

An ABC system that would adopt activity based budgeting would not only translate the total general ledger account balances into their work activities, but also inform the starting figures or base level of the budgets. This would ensure an adherence to zero-based budgeting and every function within the university would be analysed for its need and costs. This is opposed to incremental budgeting that simply bases budgeting decisions on a previous year's funding level plus an increase to cover higher prices

caused by inflation. The major shortcoming of incremental budgeting is that, the cost of non-unit level activities become fixed and past inefficiencies and waste inherent in the current way of doing things are perpetuated (Drury 2011: 371).

During the merger of M. L Sultan and Technikon Natal some divisions or activities may have became irrelevant or dysfunctional and, therefore, a recalculation of all overheads would give a better insight into the actual current costs. The university may also discover they can trace directly to cost objects some previously indirect or even unallocated costs, thus increasing the accuracy of service costs (Horngren *et al.* 2012: 168). In this regard, traditional costing systems and ABC can complement each other. Therefore, ABC would provide the university with information for better projections and forecasting.

5.3.3 Supplement the overhead costing system

For state universities, the ability to attract additional funds, goodwill and creation of new budget resources could become an incentive to implement ABC. This would provide management with more comparative data and a clearer picture of the university's overhead cost operations, which would facilitate decision making, planning and overhead cost control. It is envisaged that the process of identifying cost activities, cost pools and cost drivers, as illustrated for the DUT library would not function at variance with or as a substitute for traditional accounting systems but in parallel or supplemental (Papadeas 2013: 1431) to the current overhead system. An ABC model such as this would help to further process and translate the total general ledger account balances into work activities that consume the financial general ledger's expenses. This helps to increase the management's insight into costs. The increased insight into what drives costs, coupled with the claim that ABC allows efficient allocation of resources, means that the system may be suitable to DUT, especially as it operates under budgetary constraints (Mushonga 2015: 21).

After implementing ABC, universities often realise they were over-costing high volume programmes and under-costing low volume programmes (Granof *et al.* 2000: 9). Cost behaviour activities vary significantly from subject/programme to subject/programme and from course to course within the same department. In addition, ABC is designed

to provide more accurate information on both academic and support activities. These improvements can be made in the level of sophistication of the costing system up to the point where the marginal cost of improvement equals the marginal benefit from the improvement (Drury 2011: 235).

Detailed cost information may help DUT attract third stream income from the private sector. HE UoT institutions, such as, DUT, have been encouraged to develop links with individual and business partners in a series of new venture partnerships with the private sector in order to create a third stream of income (Du Pré, 2009: 15). It has been observed that the value perceived by society of a UoT depends either on the cost information it generates or on the transparency of its costs, along with the usefulness of the technology as well as research it develops (Du Pré 2010: 4-5).

5.3.4 Training

Since there was a large number of staff unwilling to change the current system, despite its inadequacies, it is suggested that more training of staff be provided to reduce internal resistance, and bring consensus on the adoption and implementation of a supplemental overhead costing system with multiple cost drivers. For as much as employees get the job done, and possess the knowledge, skills, tools and experiences, it is clear that organisational changes can be achieved with the employees' support and involvement. The university is increasing its curriculum development and adding new programmes and courses at an ever-increasing rate. The programmes differ in levels of complexity. Managing and sustaining these programmes requires many more overhead resources and many of the overhead resources have no obvious connection with student numbers. Therefore, ABC implementation could be unavoidable in the near future. Training on handling technical problems associated with ABC to demystify complexity issues, as observed in this study, could be imperative.

Nevertheless, as observed in this study, direct labour remains a viable base for applying overhead costs to programmes, particularly for external reports. However, in those instances in which a single overhead base does not move in tandem with direct labour, some other means of assigning costs must be found or programme costs will

be distorted. ABC is a technique that is designed to reflect these diverse factors more accurately when costing programmes.

5.4 LIMITATIONS

A limitation is a characteristic of a research project that cannot be controlled by the researcher and may have a negative impact on the outcome of the study (Gay, Mills and Airasian 2012: 115). Yin (2014: 74) points 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 research effort, it was not possible to control all the influences that were likely to affect the quality of the research.

Although, if adopted, ABC implementation would take place in all state universities, this study focused on the adoption and implementation of ABC within DUT and this limited the scope of the study. The findings of this study can only be representative of ABC implementation at DUT and, therefore, cannot be generalised to the other state universities and other higher education institutions in South Africa. There is a lack of literature on the ABC system's usage within the public state universities in South Africa. This issue was considered as a limitation of the research. Moreover, there is also little literature on such studies conducted within African state universities and all other institutions of higher education within South Africa.

The results of this case study of a state university, DUT, in SA may not be generalised to other industries or organisations; however, the findings can assist other organisations in improving their cost information.

5.5 SUGGESTIONS FOR FUTURE RESEARCH

The findings of this research have exposed some loose ends that could not be answered conclusively by the data, and considering the limitations of this study as outlined above, the following areas are suggestions for further research:

- Further empirical research could be conducted using case study and survey

research at more state universities in South Africa to determine the difficulties and barriers that prevent the adoption of the ABC system as well as any supportive factors;

- The ABC model developed in this study could be assessed in the other functional departments of the university so that a university-wide model is developed;

- An empirical study could be carried out at a South African state university to compare the actual results relating to both the traditional costing system and the activity based costing system in order to verify the accuracy of determining the cost and benefits of the ABC system;

- An empirical study in South African state universities could be conducted to determine the impact of DHET support in adoption of the ABC system.

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APPENDIX A: COVERING LETTER

11 January 2018

Dear Participants,

I am working towards a Master of Accounting degree through the Faculty of Accounting and Informatics at Durban University of Technology. The research project that is being undertaken seeks to determine the factors that influence the adoption and implementation of Activity Based Costing (ABC) as a cost management tool particularly in a period when state universities need to deal with limited government funding and controlled fee increases.

You are invited to participate in this project. While your co-operation in completing the questionnaire is valued, your participation is voluntary. The results will be used only in an aggregated form and therefore your anonymity and the confidentiality of your responses are assured. The completed questionnaires will be securely stored and available only to the supervisors and myself. The results will be contained in the thesis which will be available at the Durban University of Technology library. Your participation would be appreciated and I look forward to receiving your completed questionnaire by the end of August 2017.

Should you have any queries regarding the project or questionnaire, please feel free to contact me on 072 904 3424 or e-mail:akudanga@gmail.com or 21649502@dut4life.ac.za or my senior supervisor, Professor Lesley Stainbank on email:LesleyS@dut.ac.za I shall personally collect the questionnaires once completed. Thank you for your willingness to complete the questionnaire.

Yours faithfully,

_____

Annah Kudanga

Student Number: 21649502

APPENDIX B: QUESTIONNAIRE

Instructions to respondents

1. Please use a tick **(✓)** to indicate your response(s).
2. Please do not leave any question/statement blank.

Section A: Demographic profile

Please provide information about yourself by ticking **(✓)** the appropriate response.

1. Please specify your gender.

1.1	Male	
1.2	Female	

2. Kindly indicate your age category.

2.1	Below 25 years	
2.2	26 – 35 years	
2.3	36 – 45 years	
2.4	46 – 55 years	
2.5	56 years and above	

3. What is your highest educational attainment?

3.1	National Senior Certificate/Matric	
3.2	Diploma	
3.3	Bachelor's degree	
3.4	Honour's degree/ Postgraduate diploma	
3.5	Master's degree	
3.6	Doctorate degree	

3.7	Other (please specify)	

3. How long have you been working at Durban University of Technology?

4.1	Below 12 months	
4.2	1 – 5 years	
4.3	6 – 10 years	
4.4	11 – 15 years	
4.5	16 – 20 years	
4.6	21 – 25 years	
4.7	26 – 30 years	
4.8	56 years and above	

4. Please indicate how familiar you are with the Activity Based Costing (ABC) system

4.1	No knowledge	
4.2	General knowledge	
4.3	Good knowledge	
4.4	Extensive knowledge	
4.5	Expert knowledge	
4.6	Other	

5. How would you describe your current designation?

5.1	Head of Department		Please answer Section B only
5.2	Academic staff		Please answer Section C only
5.3	Staff from finance department		Please answer Section B and C

Section B: To investigate the current overhead cost management system in relation to the assignment or allocation of overheads to cost objects at DUT, a state university in SA

6. Using the following five-point scale, select the descriptor that best describes each attribute of the current cost and management system of overheads in your department

PLEASE TICK (✓) THE APPROPRIATE RESPONSE		STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	STRONGLY DISAGREE
	STRATEGY					
6.1	The current overhead costing system fully meets the strategic needs of management.					
6.2	Changing the overhead costing system is not a strategic priority in the university.					
	DECISION USEFULNESS OF COST INFORMATION					
6.3	Overhead costing information is not an essential component in decision making within the university.					
6.4	There is no need for a more accurate overhead costing system to assist in strategic decision making.					
6.5	There is no need for a cost management system that is more transparent on those overheads that are shared or allocated amongst different departments/programmes/ faculties.					
6.6	There is need for an overhead costing system that gives a clear understanding of the origin, cause-and-effect of overhead costs.					
6.7	There is need for an overhead costing system that gives a clear understanding of the behavior of overhead costs.					
6.8	Non-accounting staff would fully support the implementation of a new, overhead costing system, initiative, such as, ABC.					

	ENVIRONMENTAL/CONTEXTUAL VARIABLES					
6.9	Overhead costs at DUT are generally perceived as insignificant or a small percentage of total costs.					
6.10	Most of the overhead costs in the departments are fixed and uncontrollable.					
6.11	The current systems of financial analysis in DUT are most appropriate and no additional details on costs is needed.					
6.12	The major cost at DUT is salaries and therefore there is no need for a multiple driver basis of apportioning overheads.					
6.13	There is adequate accurate overhead cost information on overheads essential for profitability and performance analysis.					
6.14	There is adequate overhead cost information that is useful in cost control of overhead costs in departments.					
6.15	There is adequate and detailed overhead costing information essential for internal planning as well as budgeting purposes.					
6.16	The current overhead costing system assumes that there is a proportional relationship between student numbers (volume) and overhead costs.					
6.17	The current overhead allocation system helps explain the losses on unprofitable programmes/activities.					
6.18	The overhead cost system in place makes non-value adding activities /courses/programmes/ services immediately visible to management.					
6.19	The current overhead costing system is comprehensive or well detailed and not too aggregated.					
6.20	Other views regarding adopting a new overhead cost management system (please specify) _____					

7.1. If given the opportunity, to what degree would you like to change the current costing system for overheads?

a) Unwilling

b) Slightly unwilling

c) Neutral

d) Slightly willing

e) Very willing

7.2 Please give a reason for you answer……………………………………….

Please use the space below to highlight any other information you would want to share with the researcher regarding the current cost management structure at DUT

……
……
……
…………………………………………………………………………………………………

Section C: To determine the barriers to and the factors that facilitate the adoption and implementation of ABC at DUT

8. Although ABC has been successful in other sectors, there are varied views on the adoption of this new and more enhanced costing system in universities. Using the statements in the table below, what is your opinion regarding the adoption of ABC at DUT?

PLEASE TICK (✓) THE APPROPRIATE RESPONSE		STRONGLY AGREE	AGREE	NEUTRAL	DISAGREE	UNSURE
	STRATEGY					
8.1	The organisational strategy fully supports the need for innovation in the form of ABC.					
	INFORMATION TECHNOLOGY					
8.2	There is a high level of architectural and information technology software design in the university to support an ABC system.					
8.3	There are already a number of high level I.T and cost management systems initiatives running smoothly within the university.					
	SYSTEM ADAPTABILITY					
8.4	There are sufficient skills as well as continuous training of employees for adopting, designing and implementing ABC.					
8.5	There is consensus about and clarity of the objectives of the ABC cost management system in the accounting department.					
8.6	There is sufficient top management involvement to support the adoption and implementation of ABC.					
8.7	ABC would be coherent with the competitive strategies and continuous improvement programs within the university.					
8.8	There is a high participation of relevant external consultants in all cost management system initiatives.					

	ENVIRONMENTAL/CONTEXTUAL VARIABLES					
8.9	The proportion of cost distortions in the system warrants the adoption and implementation of ABC.					
8.10	ABC can only be adopted and implemented at DUT when initiated by the Ministry of Education and the regulatory environment.					
8.11	There are difficulties in collecting cost data necessary for implementing ABC from various departments in the university.					
8.12	An ABC initiative would be linked to institution's performance evaluation and compensation structure.					
8.13	The organisational goals and culture are in coherence with ABC.					
	ORGANISATIONAL STRUCTURE					
8.14	The organisational structure of the institution can positively influence the institution's ability to implement ABC.					
8.15	The large size of the institution is statistically significant to warrant the adoption of a sophisticated system such as ABC.					
	TECHNICAL VARIABLES					
8.16	There are difficulties in identifying and grouping activities for ABC.					
8.17	There are difficulties in grouping activities into cost pools for ABC.					
8.18	Cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities difficult.					
8.19	There is limited knowledge on the exact data requirements needed to implement ABC.					
	BEHAVIOURAL AND ORGANISATIONAL FACTORS					
8.20	The amount of time for calculations required in setting up ABC is a hindrance to its adoption and implementation.					

8.21	ABC is suited to the manufacturing sector only and is not relevant to a university setting.					
8.22	Enhanced overhead costing systems, such as, ABC systems are too complex and difficult to design.					
8.23	ABC is appropriate for assigning marketing and administration costs (non-academic costs) to cost objects.					
8.24	An enhanced costing system, such as, ABC would positively influence resource allocation in the university.					
8.25	ABC is appropriate for outsourcing decisions.					
8.26	There is uncertainty on the long-term benefits of ABC.					
8.27	ABC would facilitate more efficient financial management for universities under budgetary constraints.					
8.28	The benefits of a more enhanced system, such as, ABC, would not justify the high cost of implementing it.					
8.29	ABC is only necessary when other competitors or universities have also introduced it.					
8.30	Other factors facilitating or hindering the adoption and implementation of ABC (please specify) _____ _____					

9. Please use the space below to highlight any other information you would want to share with the researcher regarding the possibility of implementing an ABC system.

……
……
……
………………………………………………………………………………………

THANK YOU FOR COMPLETING THE QUESTIONNAIRE

APPENDIX C: INTERVIEW GUIDE

INTERVIEW GUIDE	

Topic: The adoption of an enhanced overhead costing system in a South African state university: the case of Durban University of Technology

Date:	
Time:	
Faculty/Office:	
Department :	
Venue:	
Respondent	

Objective 1

1. Can you please tell me about yourself?
   (Probe: Age, current designation/position, highest academic qualifications, experience before and at DUT)

2. Is cost information an essential component in planning, cost control and decision making within your department or the institution?

3. Please take me through your experience with the current cost and management system of overheads in your department/at DUT.
   (Probe: Its transparency, ability to make non-value adding activities visible to management, its usefulness in profitability and performance analysis of programmes/departments).

4. Are overhead costs, such as, depreciation, insurance, at DUT generally perceived as insignificant or a small percentage of total costs or is the opposite true?
   (Probe: Are they regarded as fixed and uncontrollable?)

5. Is there a need for an overhead costing system that does not assume that there is a proportional relationship between student numbers (FTE/ volume) and overhead costs?

6. In your own experience is there a need for an overhead costing system more detailed and not too aggregated/summarised?
   (Probe: e.g has multiple driver basis of apportioning overheads besides labour and student numbers?)

7. Does the proportion of cost distortions in the system warrant the adoption and implementation of a different overhead cost accounting system?
   (Probe: examples of cost distortions).

8. If given the opportunity, to what degree would you like to change the current costing system for overheads?
9. What is your opinion on the usefulness of the Activity Based Costing (ABC) as an alternative cost and management accounting system in a state university such as Durban University of Technology (DUT)?

Objective 2
1. Although ABC has been successful in other sectors, there are varied views on the adoption of this new and more enhanced costing system in universities. What is your opinion regarding the adoption of ABC at DUT?

2. Would ABC be coherent with the strategies and continuous improvement programs within the institution?

3. Are there sufficient internal resources (e.g financial resources, employee time, sufficient skills for designing and implementing ABC) and top management involvement to support the adoption and implementation of ABC?

4. Can ABC only be adopted and implemented at DUT after it has been initiated by the Ministry of Education or the regulatory environment?
(Probe: competitors, such as, other Universities of Technology)

5. Are cost activities in the university complex and interwoven, rendering the identification of appropriate cost drivers for assigning resources to activities, difficult?

6. Would ABC facilitate more efficient financial management for institutions under budgetary constraints?

7. Is there uncertainty on the long-term benefits of ABC in universities, which makes them think it is perhaps most suited to the manufacturing sector?

8. If adopted, would ABC influence the decisions regarding outsourcing (canteen, security, cleaning) of services as well as performance evaluation?

9. What other factors would you say are facilitating or hindering the adoption and implementation of ABC?

Objective 3: (Finance and library staff only)

There are specific questions an ABC project team would normally ask (Blocher *et al.* 2010: 131).

Would you please respond to the following questions on the DUT library:
- What work or key activities are carried out in the DUT library?
- How are these activities recorded and how much time is spent performing these activities?
- What resources are required to perform these activities? and
- What value does the activity have for the product, service, customer or organisation?

Thank you very much for your time.

APPENDIX D: LETTER OF INFORMATION AND CONSENT

LETTER OF INFORMATION

Title of the Research Study: The adoption of an enhanced overhead costing system in a South African state university: the case of Durban University of Technology

Principal Investigator/s/researcher: Annah Kudanga, BCom Honours, Mphil

Co-Investigator/s/supervisor/s: Professor L.J. Stainbank, C A; DCom and Mr Z.W. Nzuza, MTech: Cost and Management Accounting

Brief Introduction and Purpose of the Study: `

This study focuses on the adoption and implementation of an enhanced costing system, namely, Activity Based Costing (ABC) in a South African state university, using DUT as a case study. The research will seek to analyse the factors that influence the adoption and implementation of ABC as a cost management tool that is envisaged to give more accurate information on indirect costs, prices, effective allocation of resources and can also be used in making sound plans, decision making, cost control as well as performance evaluation in a state university. A cost system based on the ABC model would give a state university a more comprehensive understanding of the cost and value of overheads, out-sourced services and support services that are essential to control, in an environment characterised by escalating operational costs and stagnant revenues.

Outline of the Procedures:

The study is based on the mixed methods approach. The target population will consist of DUT's Finance Department staff in the Budgets section, academic Heads of Departments at DUT who handle budgets and selected full time academic staff. Online questionnaires and interviews will be used as data collection instruments. The Statistical Package for Social Sciences (SPSS) version 24.0 and NVivo software will be used for quantitative and qualitative data analysis, respectively.

Risks or Discomforts to the Participant: There is no risk that the study poses on the participant

Benefits: (To the participant and to the researcher/s e.g. publications)

The main benefit would be improved insight. It is also envisaged that at least one paper will be published in an accredited journal.

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Reason/s why the Participant May Be Withdrawn from the Study: (Non-compliance, illness, adverse reactions, etc. Need to state that there will be no adverse consequences for the participant should they choose to withdraw)

There will be no adverse consequences for the participant should they choose to withdraw.

Remuneration: (Will the participant receive any monetary or other types of remuneration?)

There will be no remuneration.

Costs of the Study: (Will the participant be expected to cover any costs towards the study?)

The participant will not be expected to cover any costs towards the study.

Confidentiality: (Description of the extent to which confidentiality will be maintained and how will this be maintained)

The responses from the participant will not be disclosed to other colleagues. No name and no individual particulars will be required. The questionnaire will be anonymous.

Research-related Injury: (What will happen should there be a research-related injury or adverse reaction? Will there be any compensation?)

The research does not pose adverse reactions or research-related injuries to the participant.
**Persons to Contact in the Event of Any Problems
or Queries:**

Please contact the researcher on 072 904 3424, my supervisor on 031 373 5836 **or** LesleyS@dut.ac.za; co- supervisor on 031 373 5351 or the Institutional Research Ethics Administrator on 031 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support. Prof S Moyo on 031 373 2577 or moyos@dut.ac.za

General:

Potential participants must be assured that participation is voluntary and the approximate number of participants to be included should be disclosed. A copy of the information letter should be issued to participants. The information letter and consent form must be translated and provided in the primary spoken language of the research population e.g. isiZulu.

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance
  Number: _____,

- I have also received, read and understood the above written information (Participant Letter of
  Information) regarding the study.

- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.

- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.

- I may, at any stage, without prejudice, withdraw my consent and participation in the study.

- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.

- I understand that significant new findings developed during the course of this research which may
  relate to my participation will be made available to me.

_____   _____   _____   _____

Full Name of Participant   Date   Time   Signature / Right Thumbprint

I, Annah Kudanga   (name of researcher) herewith confirm that the above participant has been fully
informed about the nature, conduct and risks of the above study.

___Annah Kudanga___   _____   _____
Full Name of Researcher   Date   Signature

_____   _____   _____
Full Name of Witness (If applicable)   Date   Signature

_____   _____   _____
Full Name of Legal Guardian (If applicable) Date   Signature

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Please note the following:

Research details must be provided in a clear, simple and culturally appropriate manner and prospective participants should be helped to arrive at an informed decision by use of appropriate language (grade 10 level - use Flesch Reading Ease Scores on Microsoft Word), selecting of a non-threatening environment for interaction and the availability of peer counselling (Department of Health, 2004)

If the potential participant is unable to read/illiterate, then a right thumb print is required and an impartial witness, who is literate and knows the participant e.g. parent, sibling, friend, pastor, etc. should verify in writing, duly signed that informed verbal consent was obtained (Department of Health, 2004).

If anyone makes a mistake completing this document e.g. a wrong date or spelling mistake, a new document has to be completed. The incomplete original document has to be kept in the participant's file and not thrown away, and copies thereof must be issued to the participant.

References:

Department of Health: 2004. *Ethics in Health Research: Principles, Structures and Processes*
http://www.doh.gov.za/docs/factsheets/guidelines/eth nics/

Department of Health. 2006. *South African Good Clinical Practice Guidelines*. 2nd Ed. Available at:
http://www.nhrec.org.za/?page_id=14

APPENDIX E: GATEKEEPERS LETTER/LETTER OF PERMISSION

DIRECTORATE FOR RESEARCH AND POSTGRADUATE SUPPORT

Directorate for Research and Postgraduate Support
Durban University of Technology
Tromso Annexe, Steve Biko Campus
P.O. Box 1334, Durban 4000
Tel.: 031-3732576/7
Fax: 031-3732946

3 November 2017

Ms Annah Kudanga
c/o Department of Cost and Management Accounting
Faculty of Accounting and Informatics
Durban University of Technology

Dear Ms Kudanga

PERMISSION TO CONDUCT RESEARCH AT THE DUT

Your email correspondence in respect of the above refers. I am pleased to inform you that the Institutional Research Committee (IRC) has granted full permission for you to conduct the research "The adoption of an enhanced overhead costing system in a South African state university: the case of Durban University of Technology" at the Durban University of Technology.

The DUT may impose any other condition it deems appropriate in the circumstances having regard to nature and extent of access to and use of information requested.
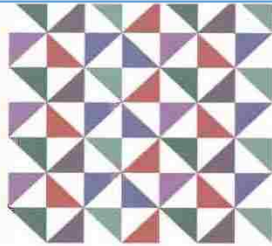
We would be grateful if a summary of your key research findings can be submitted to the IRC on completion of your studies.

Kindest regards.
Yours sincerely

PROF CARIN NAPIER
DIRECTOR (ACTING): RESEARCH AND POSTGRADUATE SUPPORT DIRECORATE

APPENDIX F: ETHICAL CLEARANCE

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

14 November 2017

IREC Reference Number: **REC 20/17**

Mrs A Kudanga
4 Arbor Mews
131 Sixth Avenue
Morningside
Durban
4001

Dear Mrs Kudanga

The adoption of an enhanced overhead costing system in a South African state university: the case of Durban University of Technology

The Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the IREC acknowledges receipt of your gatekeeper permission letter.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely,
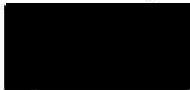
Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY

2017 -11- 1 4

INSITUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

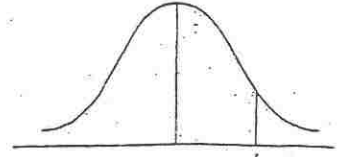# Areas under the standard normal curve

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0754
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998	0.4998