THE DIFFUSION OF MANAGEMENT ACCOUNTING INNOVATIONS: A STUDY OF THE FACTORS INFLUENCING THE ADOPTION, IMPLEMENTATION LEVELS AND SUCCESS OF ABC

MOHAMMED FAWAZ R. AL-OMIRI

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ABSTRACT

During the late 1980s considerable publicity was given to the criticisms of management accounting. In response to these criticisms new innovations emerged. The innovation that has attracted the greatest interest has been activity-based costing (ABC). This study gathers empirical data to examine various issues relating to ABC derived from an extensive review and synthesis of the relevant literature, including the contingency theory literature. The major aims of the study are to investigate the extent to which various contextual factors influence the adoption of ABC systems, to determine the reasons and factors which have discouraged firms from adopting ABC and to examine the impact of various factors in determining the success of ABC systems. Other objectives include examining the importance of specific motives for implementing ABC systems and examining the extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC systems.

A postal questionnaire was conducted using 1,000 UK manufacturing and non-manufacturing organisations with an annual sales turnover in excess of £50 million as the target population. Not-for-profit organisations were excluded from the population sample. The findings are based on 176 responses (a usable response rate of 19%).

Strong support was found for the intensity of the competitive environment, size, extent of the use of lean production techniques (including JIT techniques), importance of cost information, extent of the use of innovative/strategic management accounting techniques and corporate sector having a significant influence in the adoption of ABC systems. Using factor analysis, three factors were found to be significantly associated with ABC success. They were managerial understanding and the ability to use ABC information, positive attitudes by accounting staff towards ABC and adequate training for ABC and a clear understanding of its purposes. The dominant motives for implementing ABC related to the deficiencies of the existing system such as the existing system not providing useful information to management, it was necessary to update the existing costing information system and the existing costing system was not reliable. The most important reasons for not implementing ABC were that the perceived benefits did not justify the cost of implementing it, most of the indirect costs were fixed, the existing system was considered satisfactory for controlling overheads and the general lack of support from top management or individuals to act as champions.

A distinguishing feature of the study is that it overcomes the deficiencies of previous ABC studies that have used bivariate statistical tests. These studies have examined independently, without controlling for the impact of other variables in the model, whether the difference between ABC adopters and non-adopters are statistically significant in respect of each of the selected contextual variables. This study uses mutivariate binary logistical regression that systematically controls for the impact of the other explanatory variables that are likely to influence the adoption of ABC.

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Our Prophet said: " who doesn't thank people doesn't thank Allah".

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 Introduction

The aim of this chapter is to provide a general introduction to the thesis. It begins with a section that describes how the changing environment resulted in claims that management accounting had lost its relevance and the responses to these criticisms. The next section provides a brief justification for undertaking further ABC research. This is followed by a section that lists the major research objectives. In order to understand how the research objectives relate to previous management accounting research, the chapter contains a section that provides a brief description and classification of the whole field of management accounting research. The final section contains an outline of the thesis.

1.2 Background to the study

In recent years most organisations have faced dramatic changes in their business environment. Deregulation, increasing levels in global competition and reductions in product life cycles arising from technological innovations have intensified the challenges for managers. Considerable changes have also taken place within the manufacturing environment with the emergence of advanced manufacturing technologies that have resulted in greater automation and changes in cost structure involving direct labour costs being replaced by overhead costs. New management practices have also emerged, such as a just-in-time management philosophy, lean production techniques and total quality management practices.

Towards the late 1980s, considerable publicity was given to the criticisms of management accounting, particularly with the publication in 1987 of *Relevance Lost* authored by Johnson and Kaplan. The authors claimed that management accounting practices that were developed in the 1920s had remained unchanged and were still the dominant practices of the 1980s. They state:

> ' Given the radical changes in the competitive environment ...and rapid world-wide movement of technology and capital, it is unlikely that the cost accounting and management control systems devised for the 1925 environment can still be useful sixty years later '. (Johnson and Kaplan, 1987, p.205)

Johnson and Kaplan argued that a revolution in management accounting was required to match the revolution that has taken place in the manufacturing environment. Based on criticisms from many other commentators besides Johnson and Kaplan's, the view emerged that management accounting was in crisis. As a result of the various criticisms the Chartered Institute of Management Accountants commissioned an investigation to review the current state of management accounting and the various claims made about it. The findings were published in a report titled *Management Accounting: Evolution not Revolution,* authored by Bromwich and Bhimani (1989). The authors concluded that:

> The evidence and argument advanced by advocates of wholesale changes in management accounting were not yet sufficient to justify the wholesale revision of management accounting. Evidence of the benefits of new accounting techniques and the continued benefits of some conventional techniques is only beginning to emerge. No general crisis has been identified within the management accounting profession visa-vis a changing manufacturing environment and therefore no radical reforms are recommended at this stage.

Five years later Bromwich and Bhimani (1994) updated their report with a second report titled *Management Accounting: Pathways to Progress.* They reviewed the literature and research in intervening years and focused on the wider array of opportunities facing the management accountant. They concluded that in the UK no one school of opinion yet dominated the views on the nature of reforms which might be appropriate for management accounting. The case for wholesale reform has not been accepted in practice.

In response to the criticisms considerable attention was given during the 1990s to modifying accounting techniques and implementing new innovations that would enable management accounting to regain its relevance. In particular, changes have been made to provide managers with the information they need to compete in today's changing business environment. Recognition of the changes have been acknowledged by Kaplan (1994). He states:

> ' The past 10 years have seen a revolution in management accounting theory and practice. The seed of the revolution can be seen in publications in the early to mid 1980s .....that identified the failings and obsolescence of existing cost and performance measurement systems. Since that time we have seen remarkable innovations in management accounting; even more remarkable has been the speed with which the new concepts have become widely known, accepted and implemented in practice and integrated into a large number of educational programmes'. (Kaplan, 1994, p. 247)

The innovation that has possibly generated the greatest interest has been activity-based costing (ABC). ABC emerged in the late 1980s as a mechanism for providing more accurate product/service cost information to support strategic decisions. During the 1990's it has been extended as a tool to control and manage costs more effectively. Sometimes, the term activity based cost management (ABCM) is used to refer to cost management applications and ABC to refer to product costing applications. However, the latter term is often used to refer to both product costing and cost management applications. Widespread interest in ABC has been evident from the conference activity, management consultancy advocacy and the professional and academic publications it has engendered. According to Johnson (1990, p.15):

> '.... (ABC) certainly ranks as one of the two or three most important management accounting innovations of the twentieth century'.

The considerable amount of publicity given to ABC, the fact that its merits and deficiencies have been widely debated and the view by many that it represents the major management accounting innovation of the late twentieth century provided the motivation for the researcher to undertake research on this topic.

1.3 ABC research

A review of the management accounting journals indicates that ABC has been one of the most widely researched topics in management accounting. It is now a core part of management accounting textbooks and education programmes. A study by Bjornenak and Mitchell (2000) of the ABC publications in 15 UK and USA accounting journals indicated that there were approximately 355 published papers on this topic. Research has examined many aspects of ABC; for example, expositions of theoretical developments, characteristics of ABC systems, usage rates, ABC applications, factors influencing adoption, factors influencing success or failure, studies of ABC diffusion drawing off the diffusion of innovation literature and studies relating to the association between implementing ABC and improvement in financial performance.

In the mid-1990s ABC attracted a considerable amount of publicity and some commentators made extravagant claims regarding its benefits. Expectations were raised and it appeared that ABC would become widely diffused in practice. However, according to Chenhall and Langfield Smith (1998) the survey evidence suggests that over the last decade there has been an increasing interest in ABC, but the rate of implementation has been slow. Some researchers have reported that adopters have abandoned it after implementation. These developments provided further motivation for studying the topic.

Even though there has been a considerable amount of research relating to ABC, there were several factors that prompted further research on this topic. First, the term 'adoption' has been subject to different interpretations which has resulted in confusion in interpreting the findings of recent research. Second, questionable methods have been used to measure the variables relating to those studies that have examined the factors influencing the adoption of ABC. Third, weak simplistic statistical tests have sometimes been used. Fourth, there are some omissions in previous studies, such as little research being undertaken on the specific factors, that have discouraged firms from adopting ABC. Finally, some of the research findings are based on only one study and have been outside the UK. It is therefore appropriate to repeat such studies within a UK environment. A more detailed explanation of the factors that prompted the researcher to conduct further ABC research is presented in Chapter 6 (section 6.2).

1.4 Research objectives

The research aims to achieve the following specific objectives:

1. To examine the nature, content and purposes of costing systems operated by UK organisations;

2. To examine the importance of specific motives for implementing ABC systems; in particular the extent to which the four perspectives that are described in Chapter 4 (efficient choice, forced selection, fad and fashion perspectives) explain the diffusion of accounting innovations (with specific focus on ABC as the accounting innovation);

3. To determine the reasons and factors which have discouraged firms from adopting ABC;

4. To examine the extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC systems;

5. To investigate the extent to which the different potential explanatory variables influence the adoption of ABC systems;

6. To ascertain the views of the respondents on the degree of success or failure of ABC systems, and the impact of various factors on the determinants of that success.

1.5 Alternative approaches to management accounting research

To understand how the research objectives listed in the previous section and the literature review presented in chapters 2 - 5 relate to previous management accounting research, it is appropriate to provide a broad description of the whole field of management accounting research. The literature review relating to traditions in management accounting research indicated that a diversity of management accounting research approaches exists. Drawing off Scapens (1991) and Ryan *et al.* (2002), it is possible to classify management accounting research into the following categories:

1. Traditional (economic-based) management accounting research;

2. Behavioural accounting research;

3. Research drawing off organisational theory;

4. Research drawing off social theory;

5. Practice-oriented research.

As with any classification system, the above classifications represent broad general categories, so different views will exist between researchers as to the correct classification. There will be common agreement on the classification of some of the types of research but other research has the potential to be classified within more than one of the above categories.

1.5.1 Traditional (economic-based) management accounting research

Scapens (1984) indicates that, prior to the 1970s, management accounting research was mostly normative in nature and based primarily on neoclassical economics. The normative neoclassical economic framework was based on the assumptions of certainty and costless information, whereby the decision-maker had all of the required information available without any cost (Scapens and Arnold, 1986). It was also assumed that individual decision-makers could operate in isolation from other decision-makers within the organisation so that group decision-making was not considered. During the 1960s and 1970s researchers started to refine the normative models to incorporate uncertainty. However, information was still assumed to be available at zero cost.

Scapens (1991) indicates that during the 1970s researchers began to incorporate information economics into the models. He describes this as the 'costly truth' approach, whereby truth is assumed to vary from one situation to another, according to the cost and benefits of the information. This led to the belief that truth can be obtained and that a preferred accounting system does exist depending on the situation (Ryan *et al.*, 2002). Thus, under certain circumstances simplistic costing systems may be appropriate when the costs and benefits of information are considered.

The emergence of the 'costly truth' approach encouraged some researchers to focus on explaining observed management accounting practices. Scapens (1984) pointed out that, during the early 1980s anecdotal evidence suggested that there was a wide gap between the theory and practice of management accounting. There appeared to be little formal research of management accounting practices. For example, Anthony (1989, p.18), claimed that 'information about management accounting practices is abysmally poor' and that 'almost all the information is anecdotal.' He also argued for the need of survey information relating to management accounting practices and criticised statements made in the literature about the use of particular techniques when no statistical evidence was available relating to how many companies actually used the techniques.

These developments led to a change of emphasis and researchers became increasingly interested in developing positive theories that:

> 'encouraged researchers to develop theories that encompassed existing practices, rather than criticising practitioners for failing to implement the conventional wisdom'. (Ryan *et a.l*, 2002, p.75)

The positive theories were based on empirical data and focused on either explanation or prediction. Ryan *et al.* state that agency theory based on the separation of the decision-maker from the owner emerged as a mechanism for explaining observed accounting practices. It assumes that decision-makers are allowed to choose particular courses of action according to their desires, needs, preferences, etc., based on their understanding of how the world works (Jensen, 1983; Watts and Zimmerman, 1986). Agency theory became prominent in developing both normative and positive theories but its major limitation was that it still relied on a neoclassical economic framework.

Because of their dissatisfaction with approaches that relied entirely on neoclassical economics, some researchers in the late 1960s started to draw off behavioural science, psychology (behavioural research) and organisational theory to explain management accounting practices.

1.5.2 Behavioural accounting research

Behavioural accounting research is mainly concerned with the effects of accounting control systems, such as budgetary control techniques, and how they influence individual behaviour and organisational performance. This research attempts to identify variables that can be manipulated in the design of budget systems, such as budget targets, budget participation and the manner in which differences between budget and actual performance is dealt with. The aim was to understand the impact of the behaviour of these variables on performance to identify the design of appropriate budget systems to enhance performance. A major feature of behavioural accounting research is that it considers people to be an important element in influencing the operations of a budget system in organisations. According to Ryan *et al.*, (2002, p. 81) this interest in the effect of behaviour on organisations led to the focus on organisational theory and, in particular, contingency theory, for ideas in conducting management accounting research.

1.5.3 Research drawing off organisational theory

During the 1970s researchers began to draw off organisational theory to explain the organisational aspects of management accounting. Management accounting researchers sought to explain management accounting practices using different elements of organisational theory (e.g. contingency theory, systems theory, and organisational and behavioural decision theory). According to Otley (1984, p.138) much of this research consisted of "armchair theorising", which he defines as theorising based on concepts derived from a reading of the organisation theory literature, rather than using empirical data.

In response to Otley's criticisms, a considerable amount of work has been undertaken using a contingency theory framework to seek to explain observed management accounting practices. Contingency theory states that there is no one 'best' design for a management accounting information system, ' and it all depends' upon the situational factors (Drury, 2000, p.648). The situational factors represent the contingent factors or contingent variables. Prior to the emergence of the contingency theory approach, the literature generally implied that there was an optimal accounting system design applicable to most firms.

Research adopting a contingency theory framework has mostly focused on explaining observed practices in relations to different characteristics of management accounting control systems but it is now being applied to explaining product costing practices, defined as ABC or traditional costing systems. The contingency factors that have been widely used in previous research to explain observed differences in characteristics of management control systems include the nature of the external environment, the competitive strategies adopted, production technology, and business unit, firm and industry variables (e.g. firm size, organisational structure and industry variables).

Most of the contingency theory studies have been based on cross-sectional studies using data derived from questionnaire surveys. The studies have attempted to identify statistical relationships between aspects of management accounting control systems and the identified contingent factors.

1.5.4 Research drawing off social theory

The main impetus for using social theory for explaining accounting practices came from an article by Burchell *et al.*,(1980). The authors urged accounting researchers to incorporate insights from the social sciences, in particular the work of critical social theorists into their research. This resulted, in the 1980s, in a management accounting research theme that drew off the work of social theorists. According to Ryan *et al.* (2002), this research can be divided into two main strands: interpretive and critical research.

Ryan *et al.* state that interpretive research aims to understand the social world and the social nature of accounting practices. This research aims to interpret accounting practice within the context of wider social systems of which they are a part and understand management accounting as a social practice. Researchers adopting an interpretive approach adopt a holistic orientation in which accounting is studied as part of a unified social system and a picture is built up of the system's wholeness.

In contrast, critical research aims to go beyond just interpreting accounting practices within a social context by creating the conditions in which social change is made possible. Much of the research is based on the writings of Foucault who argues that it is possible to understand the development of modern society in terms of the power-knowledge relationship. Foucault's writings have been used by various researchers to re-interpret and explain accounting history (e.g. Cowton and Dopson, 2002).

Ryan *et al.* (2002, p.90) conclude that the impact of social theory on management accounting research as follows:

> The introduction of social theory has been a major development in management accounting research and has undoubtedly significantly extended our understanding of its broader organisational and social context. .... This research has re-evaluated the history of accounting, revealed its interested nature, challenged the claims to an inherent accounting rationality and neutrality, and provided alternative insights into the functions of accounting.

1.5.5 Practice-oriented research

Most of the research described in the previous sections draws off a particular theoretical framework to explain management accounting practice. However, Ryan *et al.* state that since the late 1980s a considerable amount of research has been undertaken that concentrates on describing management accounting practice without attempting to develop or test any existing theory. They classify research within this category as practice-oriented research and state that one of its distinguishing features is that it tends to be more practitioner-oriented. Much of this research consists of descriptive cross-sectional studies to determine the nature and form of management accounting practices and extent of use of new techniques. It initially emerged because of a lack of knowledge of practice and the reliance on anecdotal evidence. For example, Holzer and Norreklit (1991, p. 7) stated that 'Cost accounting practices in industry are difficult to verify since no reliable survey data is available.' Practice-oriented, research, therefore became important to obtain a general picture of management accounting practices and identify the extent of usage of new techniques and the purposes for which they were being used.

The enormous amount of publicity given to Johnson and Kaplan's (1987) criticisms of management accounting practice provided further motivation for undertaking practice-oriented research. Most of Johnson and Kaplan's criticisms were derived from either anecdotal evidence or observations from a very small number of companies. This prompted some researchers to undertake questionnaire surveys and interviews in order to assess the extent to which the criticisms were justifiable.

A further aspect of research falling within the practice-oriented category has been pioneered by Kaplan (1998) involving using case studies to identify and report innovative management accounting practices. Kaplan has urged researchers to adopt an action research approach, whereby the researcher becomes involved through case studies in refining observed innovative practices for more general use and developing new theories that should be the subject of later refinement and testing by other researchers. Another strand that has recently evolved is research that describes the problems and issues associated with introducing new management accounting techniques such, as ABC, the balanced scorecard and strategic management accounting techniques.

1.6 Relationship between research undertaken in this study and prior studies and the alternative management accounting research approaches

Various approaches have been adopted for researching ABC. Some of the research can be categorised within the traditional economic based management accounting research category. This has involved the use of mathematical modelling and econometric techniques to study cost driver behaviour and the conditions under which ABC systems provide relevant costs (e.g. Noreen, 1991). Other research within this category has compared the financial performance of ABC adopters with non-adopters. Some researchers have also adopted a contingency framework to examine the influence of various organisational and contextual factors on the adoption of ABC systems (e.g. Gosselin, 1997). Recently, some researchers have drawn off social theory to explain aspects of ABC. For example, Jones and Dugdale (2002) have drawn off Giddens' discussion of the dynamics of modernity to show how ABC has formed and reformed. Soin *et al.* (2002) have used institutional theory to study ABC and organisational change from an institutional perspective.

The majority of ABC research falls within the practice-oriented category. Cross-sectional descriptive studies have been undertaken to determine the characteristics of ABC systems, the specific applications of ABC and the view of users on its success (e.g.

Innes and Mitchell, 1995). Case studies have also been widely used to describe ABC characteristics and also describe the implementation problems, the use of ABC information and the factors influencing ABC success and failure (e.g. Friedman and Lyne, 1999). Finally, the various case studies authoured either individually or jointly by Kaplan and Cooper have reported ABC approaches as representing innovative management accounting practices. In their later writings they sought to refine these practices for more general use and develop theoretical explanations of the observed practices (see Chapter 3, section 3.8).

In terms of the recent study, the first objective (to examine the nature, content and purposes of costing systems) and the third (to determine the reasons which have discouraged firms from adopting ABC) can be classified as descriptive practice-oriented research. To achieve the final two objectives (to investigate the extent to which potential explanatory variables influence the adoption of ABC systems and the impact of various factors on the success of ABC), a contingency theory theoretical framework is adopted. The second and the fourth objectives contain elements of both descriptive and contingency theory research. Contingent variables are identified from the literature and appropriate statistical tests are undertaken to ascertain whether they do influence the adoption and success of ABC systems. To the extent that the second objective examines the influence of efficient choice, forced selection, fashion and fad perspectives on the adoption ABC systems, it can be viewed as falling within a contingency theory framework whereas the examination of the importance of specific individual motives can be classified as descriptive research. Similarly, the extent to which the adoption of other innovative management accounting practices is associated with the adoption of ABC systems implies a loose form of a contingency theory approach but it could also be considered to be descriptive research.

Because of its importance to this study, the contingency theory theoretical framework is discussed in more detail in the final chapter (section 10.4). Particular emphasis is given in this chapter to discussing its limitations but it should be noted at this stage that most of them relate to the difficulty in applying the framework rather than the underlying framework. The basic idea that there is no universally optimal accounting information system and that 'it all depends' upon the situational factors is intuitively appealing and explains why researchers continue to seek to find a match between contingent variables and characteristics of accounting information systems. The conclusion by Otley (1980, p.425) is still appropriate today:

> A contingency theory of management accounting has a great deal of appeal. It is in accord with practical wisdom and appears to afford a potential explanation of the bewildering variety of management accounting systems actually observed in practice.... There thus appears to be a *prima facie* case for the development of a contingency framework of management accounting.

1.7 Outline of the structure of the thesis

This thesis contains ten chapters. In chapter 1 the background to the emergence of ABC and the motivations of the study are discussed. A summary of the research objectives is also provided. The alternative management accounting research approaches are described and classified.

Chapters 2 – 5 represent the literature review to support the study. Chapter 2 contains a description the purpose of cost and management accounting systems and the different types of costing systems. The major features of traditional and modern ABC systems are compared and the criticisms relating to traditional costing systems are described. The chapter concludes with an explanation of the factors influencing the emergence of ABC systems. The focus of chapter 3 is on ABC systems. It provides a detailed description of the design, operation and applications of ABC systems. The theoretical developments that have occurred from its inception in the late 1980s to the current time are also discussed. Because ABC represents a major accounting innovation it is appropriate to be aware of the theories derived from the adoption and diffusion of innovation literature. The aim of Chapter 4 is to provide a brief review of this literature and also to review some of the studies that focus on accounting innovations. The final chapter, relating to the literature review (Chapter 5), focuses on previous empirical ABC studies. Most of the studies reviewed are those that have either adopted a contingency theory framework or a descriptive practice oriented research approach. Other empirical studies that have drawn off social and critical theory are not reviewed since these theories do not underpin this research.

The remaining chapters are concerned with aspects relating to the research findings. Given that ABC has been extensively researched, Chapter 6 provides a justification for the researcher undertaking further research on this topic. This is followed by the development of the research hypotheses that have been formulated to achieve the final two objectives listed in section 1.4. The research design, the methodology and data collection methods and the population and sampling frame are described in Chapter 7. In addition, information relating to the response rate and tests for non-response bias are explained. The chapter concludes with a discussion of the statistical tools that are used to analyse the data. Chapter 8 provides a general description of the questionnaire responses and presents the findings relating to four of the six objectives listed in section 1.4 of this chapter. The fifth and sixth objectives are addressed in Chapter 9 which presents the statistical results relating to the hypotheses that were developed in Chapter 6. Finally, Chapter 10 contained a description the distinguishing features and findings of the study and also discusses its limitations and addresses areas for further research.

CHAPTER 2

TRADITIONAL COSTING SYSTEMS AND THE NEED FOR CHANGE

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2.1 Introduction

The aim of this chapter is to describe traditional costing systems and the factors influencing the need for them to be changed. The chapter begins with a description of the purposes of cost and management accounting systems. This is followed by a description of the different types of costing systems. Next, the major features of traditional and modern ABC systems are compared and the criticisms relating to traditional costing systems are explained. The major reasons why a cost accumulation system is required for generating relevant cost information for decision-making are also discussed. Finally, the factors influencing the emergence of ABC systems are explained.

2.2 The purposes of cost and management accounting systems

According to Drury (2000), a cost and management accounting system should generate information for meeting the following requirements:

1. Allocating costs between cost of goods sold and inventories for internal and external profit reporting;

2. Providing relevant information to help managers make better decisions;

3. Providing relevant information for planning, control and performance measurement.

The first item above is required primarily for meeting external financial accounting requirements. Most organisations produce internal profit statements for their business units at monthly intervals (Drury and Tayles, 1995) for management purposes. Thus, the first requirement is necessary for both financial and management accounting purposes.

Many service organisations, however, do not hold inventories, so they do not need to allocate costs between goods sold and inventories.

Routine and non-routine financial reporting is required for meeting the second requirement. Routine information is required at periodic intervals relating to the analysis of the profitability of products/services to ensure that only profitable products/services are marketed. Non-routine financial information is also required for those strategic decisions that are made at infrequent intervals such as the introduction of new products or services and the negotiation of long-term contracts with customers. Accurate cost information is required for decision-making since inaccurate costs can lead to incorrect decisions such as the discontinuation of profitable products and the continuation of marketing unprofitable products. Less accurate information relating to product costs may suffice for meeting the first requirement above (profit measurement for a company or business unit) since the aim is to allocate costs between inventories and cost of goods sold at the aggregate level rather than the individual product level.

Management accounting information also plays a crucial role in the annual budgeting, long-term planning, cost control and performance measurement processes. The control process involves the accounting function preparing responsibility centre performance reports at periodic (often monthly) intervals comparing budgeted and actual costs. Deviations from budget are pinpointed and remedial action is required to eliminate adverse variances or alter the targets if the feedback indicates that the budget is no longer attainable.

2.3 Types of product costing systems

Costing systems vary in terms of which costs are assigned to cost objects and their level of sophistication. Drury and Tayles (2000) classify cost systems as follows:

1. Direct/variable costing systems whereby only direct/variable costs are assigned to products/services;

2. Traditional absorption costing systems;

3. Activity-based absorption costing systems.

Because direct costing systems assign only direct or variable costs to cost objects they report only contributions to indirect costs/fixed costs and profits. They are partial costing systems in the sense that they do not accumulate either indirect or fixed costs. Thus, only contributions are reported within the routine periodic profit reporting system. For decision-making the reporting of negative or low contribution items is highlighted for more detailed studies relating to their economic viability. At this stage an estimate of those indirect and fixed costs that are relevant for decision-making must be incorporated into the analysis. The disadvantage of direct/variable costing systems is that systems are not in place to measure or assign indirect costs to cost objects, so that any attempt to incorporate them within more detailed studies is likely to be based on guesswork and arbitrary apportionments.

The major limitations of this system is that it considers only direct costs or short-term variable costs and does not assign those avoidable indirect fixed costs that are relevant for decision-making. Drury and Tayles (2000), therefore, suggest that such costing systems are only appropriate where indirect fixed costs are a low proportion of an organisation's total costs. It should also be noted that, because variable/direct-costing systems represent a partial costing system, they cannot be used for external reporting. The external financial reporting regulations in most countries specify that absorption costing systems should be used for meeting financial accounting requirements.

Absorption costing systems (also known as full costing systems) assign both variable costs and fixed manufacturing costs to products. Non-manufacturing costs are not assigned to products and, thus, are not included in the inventory valuation. Instead, they are treated as period costs and the total amount incurred during a period is charged directly to the profit statement. The use of the terms 'variable' and 'absorption costing' generally relate to the issue of inventory valuation within manufacturing organisations. However, service organisations can also choose to assign only direct cost to services (direct costing) or assign both direct and indirect costs. For the latter situation the term 'full costing' is often used instead of 'absorption costing'.

The assignment of direct costs to cost objects does not cause any problems because they can be directly traced to their respective products or services. Assigning indirect costs, however, causes problems because they cannot be directly measured. They consist of the cost of joint resources and are usually common to several objects. Cost allocation bases, or cost drivers, are used as substitutes to measure resource consumption and allocate costs to cost objects. Ideally, cause-and-effect allocation bases (i.e. where allocation bases/cost drivers are the significant determinants of costs) should be used to measure accurately the resources by cost objects. Inaccurate cost assignment will occur if, arbitrary allocation methods that are used are not the significant determinants of costs. Thus, the cost assignment process should minimise the use of arbitrary allocations if resource consumption is to be measured accurately and cost distortion avoided.

Absorption/full costing systems can assign indirect costs to cost objects using either traditional or activity-based costing (ABC) systems. The main features of these systems are described in the next section.

2.3.1 Traditional and ABC systems

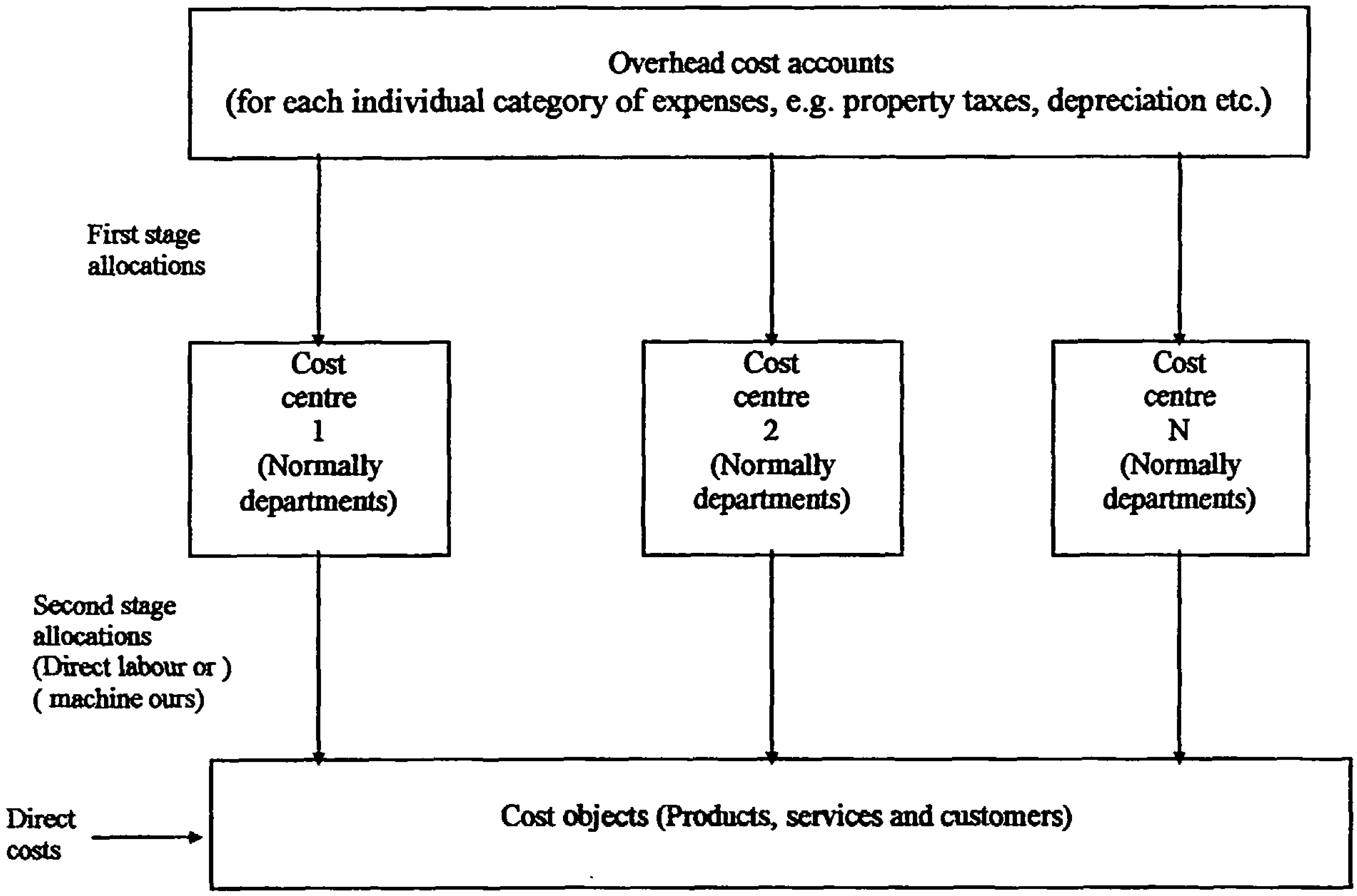
Figure 2., Extracted from Drury (2000), illustrates the major differences between traditional and ABC systems. Both systems rely on what has become known as the two-stage allocation process. In the first stage traditional costing systems assign indirect costs to cost centres (normally departments), whereas ABC systems assign costs to each major activity centre rather than departments. Therefore, the first distinguishing feature between the two systems is that ABC systems assign costs to a greater number of first-stage cost centres (i.e. cost pools).

The second stage allocates costs from the cost centres to cost objects (e.g. products/services). Traditional costing systems allocate indirect costs to cost objects using a small number of allocation bases/cost drivers that tend to vary directly with volume produced. Direct labour hours/cost and machine hours are the allocation bases that are mostly used by traditional costing systems. In contrast, ABC systems use many second-stage cost drivers including drivers that do not vary directly with volume produced. Examples include the number of production runs and the number of purchasing orders for allocating the costs of production scheduling and purchasing to cost objects respectively.

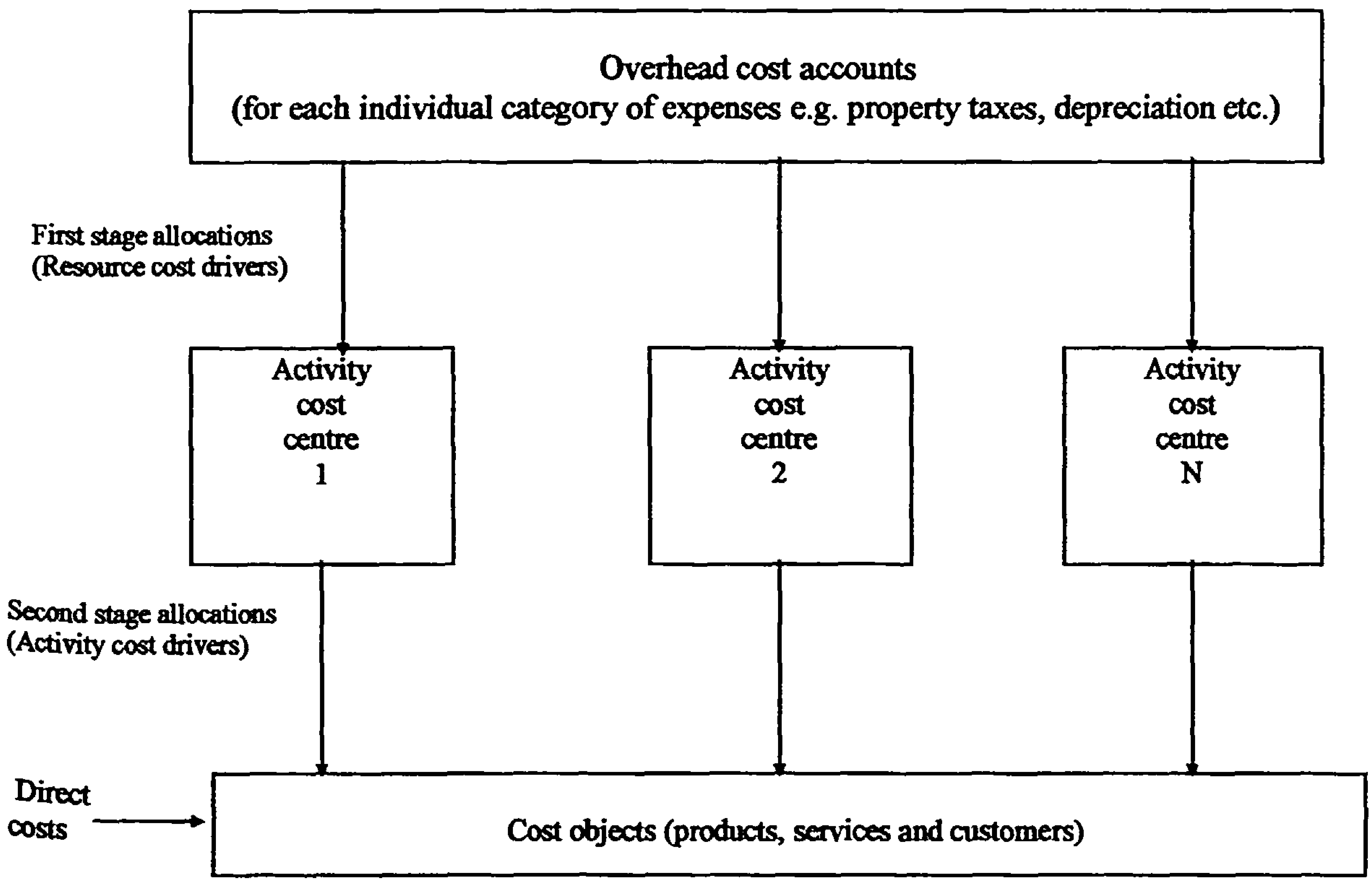
Therefore, the major distinguishing feature of ABC systems is that they rely on a greater number of cost centres and different types of second stage cost drivers. By using a greater number of cost centres and cost drivers that are desirably based on cause-and-effect allocations, ABC systems should report more accurate product/service costs. Traditional cost systems are likely to report less accurate costs because, in the first stage, they often allocate costs to only a very small number of cost centres (sometimes a single cost centre for the whole business unit) and make extensive use of arbitrary allocations in the second stage of allocating indirect costs to cost objects.

Figure 2.1 An illustration of the two-stage allocation process for traditional and activity-based costing systems

(a) Traditional costing systems



(b) Activity-based costing systems



Source: Drury and Tayles, 2000

2.4 Criticisms of traditional product costing systems

The criticisms of traditional product costing systems relate mainly to the reporting of inaccurate costs for decision-making. Traditional product costing systems are considered to be sufficiently accurate for financial accounting and profit measurement purposes. This is because it may not be necessary to measure accurately the resources consumed by individual products. The objective of the costing system here is to provide a reasonably accurate analysis of the total costs incurred during a period between cost of sales and inventories. Cooper and Kaplan (1988, p.22) argue that most organisations use traditional costing systems, designed primarily for meeting financial inventory valuation requirements, to generate cost information for decision-making requirements. They claim that such costs are accurate enough for financial accounting, but are mostly totally inadequate in terms of accuracy for decision-making.

In recent years many researchers have drawn attention to the fact that traditional costing systems are unable to cope with the developments which have occurred in business environments. By the mid-1980s, the prominent critics of traditional costing systems (Kaplan, 1985; Cooper and Kaplan, 1987) were highlighting their deficiencies in terms of the methods used to allocate indirect costs to products/services. They assert that direct labour or other volume-based costs drivers fail to measure the consumption of non-volume based activities accurately and, hence, result in providing distorted product or service costs. Using purely volume-based cost drivers tends to over-cost high volume products and services and under-cost low volume products or services.

Kaplan (1985) and Cooper and Kaplan (1987) claim that all costs become variable in the long-run and they argue that, to avoid cost distortion, there is a need to include those joint resource costs that fluctuate in the long-term according to their demand for them. Thus, direct costing or variable costing systems are inappropriate. The authors also state that the cost of joint resources (i.e. the indirect costs) should be allocated using cause-effect relationships between the activities needed to produce the products or services and the consumption of the activity resources by products.

2.4.1 The use of inappropriate cost drivers

The traditional costing systems depend on a limited number of cost, drivers to allocate costs to products/services. The first criticism concerns the cost drivers used in the traditional models which no longer portray the overhead cost behaviour of modern manufacturing facilities. Typically, volume-bases, such as direct labour hours or machine hours, are used as cost drivers but it is claimed that these drivers do not explain the long-term changes in overhead spending.

For a production engineer to prove that a process innovation reduces cost he has to do so usually by showing that the innovation reduces at least one of the allocation bases used to allocate the costs. If there is no cause-and-effect relationship between the allocation base and the costs incurred, then the allocation base and the cost allocation to the cost object will be reduced but the overhead spending by the organisation will remain unchanged. For example, this can lead to the rationalization effort being concentrated on reducing the direct labour or machine time input required for products even when overhead costs are unrelated to these items. Furthermore, the costs of direct labour and machine time frequently constitute only an unimportant fraction of total manufacturing costs today. For example Thomson, and Graefe (1989, p. 290) reported that direct labour accounted for 5-8% of total production cost.

2.4.2 Distorted product /service costs

Using cost drivers, such as direct labour hours/cost and machine hours, traditional costing methods, assumes that all costs are volume-driven. Where this is not the case, one arrives at a false cost number. For example, if a firm produces low-volume customised products and large-volume standardised products, traditional systems will overburden the large-volume products/services to the advantage of the low-volume products (Cooper and Kaplan, 1987; Cooper and Wruk, 1988). If overheads are allocated on the basis of volume measures, the overheads cost absorbed by the low -volume products are likely to be less than the actual overhead costs needed to support these products. Conversely, the overheads absorbed by the large-volume products will more than cover the actual overhead costs. The problem of cross-subsidisation arises. This problem becomes particularly pressing if the revenues from the large -volume products do not cover their assigned costs. Based on the reported costs, a firm could decide to abandon a profitable large-volume product line and to retain a loss-making low-volume customized product business because the costing system mistakenly reports that the former is unprofitable and the latter is profitable. Even when such a far-reaching decision is not on the programme the accounting model does not provide any clues as to where an improvement of manufacturing activities might be most promising because of the failure to correctly capture indirect cost behaviour.

A further problem with using direct labour volume-driven allocation bases is that it has become a decreasing allocation base resulting in ever increasing overhead rates. Thus, a slight variation in the usage of the allocation base can lead to huge changes in the indirect costs that are allocated to cost objects.

2.5 The need for change

Over the past 15 years traditional costing systems have been extensively criticized. Johnson and Kaplan (1987) argued that traditional cost accounting systems were developed during the early years of the twentieth century and had not kept pace with the innovations that have occurred in the manufacturing environment. They suggest that conventional (volume-based) cost accounting systems may have been appropriate in the past when labour was a significant portion of product costs but the declining direct labour base together with the rise of automation, competition and multi-product lines have rendered these systems obsolete. Many other writers have expressed similar concerns to those expressed by Johnson and Kaplan. For example, Brimson (1991) asserts that traditional cost accounting systems ignore important differences between products, services, markets and customers that incur different overhead costs. Also, they do not adequately deal with the impact of enterprise activities such as engineering, field support and purchasing that are not directly related to production volume, even though they represent significant costs. Brimson concludes that relying on traditional costing systems leads to distortions in the decisions made by management, particularly product mix, discontinuation and pricing decisions. Some products or customers may be overcharged while others are subsidised. To compound the problem further, Brimson points out that these inaccurate product costs may often force management to adopt inadequate strategies that, in the long term, could be detrimental to a firm's competitive posture.

Turney (1991) explains that inappropriate cost systems can negate the benefits to be gained from world-class product design. He notes that often the information obtained from traditional cost systems is counter intuitive for the engineer and can sabotage the decision making process. Engineers may not be motivated to design low cost products. Marketing may fall prey to the death spiral (the sequential dropping of products in response to inaccurate cost information) and production managers may incur excessive cost while being led to believe that costs are being cut.

According to Turney, the world-class firm needs information that

- Shows what matters to customers;
- Reveals how profitable or unprofitable its customers and products are;
- Identifies opportunities for improvement;
- Encourages actions that enhance meeting customer needs profitability.

Many researchers agree with the portrayal of conventional cost systems as instruments of deception, masking problems and failing to identify opportunities especially in the modern environment. For example, Howell and Soucy (1987, 1988), Kaplan (1990), Dhavale (1989), Drury (1989), Raffish (1991) and Johansson (1990) echo the concerns of Johnson and Kaplan concerning the mismatch between the current manufacturing environment and traditional cost systems.

Cooper and Kaplan (1988a, 1988b) and Shank and Govindarajan (1988) provide insightful demonstrations of how traditional costing systems generate distorted product cost information and, on the other hand, how ABC can be used to prevent the occurrence of misguided strategic signals. Product costing, based strictly on volume related cost drivers, can result in cross-subsidisation of product costs. These studies demonstrate how product costing under ABC leads to the reporting of different costs compared with traditional costing systems.

2.6 The role of the cost systems in generating relevant cost information for decision-making

There are three major reasons why a cost accumulation system is required to generate relevant cost information for decision-making (Drury, 2000, p. 336).

1. Many indirect costs are relevant for decision-making.

2. An attention-directing information system is required to identify those potentially unprofitable products that require more detailed special studies.

3. Product decisions are not independent.

2.6.1 Indirect costs are relevant for decision-making

There is a risk that only those incremental costs that are uniquely attributable to individual products will be classified as relevant and indirect costs will be classified as irrelevant for decision-making. Direct costs are transparent and how they will be affected by decisions is clearly observable. On the other hand, how indirect costs will be affected by decisions is not clearly observable. In the past there has been a tendency to assume that these costs are fixed and irrelevant for decision-making. In many organisations, however, these costs have escalated over the years and, thus, cannot be assumed to be fixed or irrelevant for decision-making.

The cost of many joint resources fluctuates in the long-term according to the demand for them. The cost of support functions falls within this category. They include activities such as materials procurement, materials handling, production scheduling, warehousing, expediting and customer order processing. The costs of these activities are either not directly traceable to products, or would involve such detailed tracing that the cost of doing so would far exceed their benefits. Product introduction, discontinuation, redesign and mix decisions determine the demand for support function resources. For example, if a decision results in a 10% reduction in the demand for the resources of a support activity, then in the long-term, some of the costs of that support activity would be expected to decline by 10%. Therefore, to estimate the impact that decisions will have on the support activities (and their future costs), a cost accumulation system is required that assigns indirect costs, using cause-and-effect allocations, to products.

2.6.2 The need for an attention-directing reporting system

It can be argued that the relevant costs for decision-making need only be ascertained when the need arises. For example, special studies need only be undertaken at periodic intervals to make sure that each product/service is still profitable. Estimates could be made only when undertaking a special study of those relevant costs that would be avoided if a product /service was discontinued. This approach may be appropriate for highly simplified situations where an organisation only produces a few products/services and where all relevant costs are uniquely attributable to individual products/services. However, most organisations produce hundreds of products/services and the range of potential decisions to explore undertaking special studies is enormous and unmanageable. For example, Kaplan (1990) considers a situation where a company has 100 products and outlines the difficulties of determining which product, or product combinations, should be selected for undertaking special studies. He states:

> First how do you think about which product you should even think about making a decision on? There are 100 different products to consider. But think about all the combinations of these products: which two products, three products or groupings of 10 or 20 products should be analysed? It's a simple exercise to calculate that there are 2^{100} different combinations of the 100 products... so there is no way to do an incremental revenue/incremental analysis on all relevant combinations.

To cope with the vast number of potential product combinations, organisations need attention-directing information to highlight those specific products/services, or combination of products/services, that appear to be questionable and which require further detailed special studies to ascertain their viability. Periodic product profitability analysis meets this requirement. A cost accumulation system is, therefore, required to assign costs to products for periodic profitability analysis.

2.6.3 The interdependency of product-related decisions

The third reason for using a cost accumulation system is that many product-related decisions are not independent. Joint resources shared by most products fluctuate in the longer-term according to the demand for them. If we focus only on individual products and assume that they are independent, decisions will be taken in isolation of decisions made on other products. For joint resources the incremental/avoidable costs relating to a decision to add or drop a single product may be zero. Assuming that 20 products are viewed independently in this manner then the sum of the incremental costs will be zero. However, if the 20 products are viewed as a whole there may be a significant change in resource usage and incremental costs for those joint resources that fluctuate according to the demand for them.

Cooper (1990b) also argues that decisions should not be viewed independently. He states:

> The decision to drop one product will typically not change 'fixed' overhead spending. In contrast, dropping 50 products might allow considerable changes to be made. Stated somewhat tritely, the sum of the parts (the decision to drop individual products) is not equal to the sum of the whole (the realisable savings from having dropped 50 products). To help them make effective decisions, managers require cost systems that provide insights into the whole, not just isolated individual parts.

Thus, where product decisions are not independent the multiplication of product costs, that includes the cost of joint resources, by the units lost from ceasing production (or additional units from introducing a new product) may provide an approximation of the change in the long-term total company costs arising from the decisions. The rationale for this is that the change in resource consumption will ultimately be followed by a change in the cash flow pattern of the organisation because organisations make product introduction or abandonment decisions for many products rather than for just a single product.

Based on the previous discussion it can be argued that direct/variable costing systems fail to consider indirect costs and that there is a need for a costing system that accurately measures resource consumption by cost objects. It is claimed by Cooper and Kaplan (1992) that ABC systems are models of resource consumption that seek to measure resources accurately consumed, whereas traditional systems are not resource consumption models and focus on measuring the resources supplied rather than the resources consumed. These issues will be discussed further in Chapter 3 (section 3.8.3).

2.7 Criticisms of traditional systems relating to cost control

So far this chapter has concentrated mainly on product costing. Traditional costing systems have also been strongly criticised because of their failure to provide relevant information for controlling and reducing costs. Traditional control systems are suited mainly to controlling those activities whose costs vary proportionately with the volume of the final output of products or services. In other words, they are most suited for controlling variable costs. They are not particularly helpful in controlling indirect costs and support activities where there are no clearly defined input-output relationships, and the consumption of resources does not vary with the final output of products or services. For these activities traditional budgeting tends to act only as authorization levels for certain levels of spending for each budgeted item of expense so that performance reporting tends to represent nothing more than checking whether the budget has been exceeded.

Traditional budgeting adopts an incremental approach for preparing budgets for indirect costs and support activities resulting in the current budget allowance for existing activities being the starting point for preparing the next annual budget. The base is then adjusted for incremental changes that are expected to occur during the next budget period. The disadvantage of this approach is that the costs relating to the 'base level' activity become fixed so that past inefficiencies and waste are incorporated into the budgeted costs. Traditional control systems then focus on comparing actual results with the budget, identifying and analysing variances and taking remedial action to ensure that future outcomes conform with budgeted outcomes. Drury (2000, p. 889) concludes that traditional control systems tend to be based on the preservation of the *status quo* and the ways of performing existing activities are not reviewed. The emphasis is on cost containment rather than cost reduction.

Traditional accounting systems are not particularly helpful in providing information on opportunities for cost reduction. As a result many organisations have resorted to cost reduction by top management issuing instruction to their managers to reduce costs by a fixed amount or a fixed percentage without any identification of where opportunities exist for cost reduction that do not inhibit the long-term success of the organisation. There is a danger with this approach that discretionary costs, such as expenditure on training, research and development and developing new products and markets, will be reduced to boost short-term profits at the expense of long-term profits. To manage costs more effectively, activity-based product costing was extended to activity-based cost management during the early 1990s.

2.8 Costing systems in service organisations

Most of the discussion so far has focused on the criticism relating to traditional costing systems in manufacturing organisations. Kaplan and Cooper (1998, p.229) have argued that the deficiencies of traditional costing systems are greater in service companies than manufacturing companies because most costs in service organisations are indirect and unlikely to be accurately assigned using traditional costing systems. Hence, there is a greater need to allocate the higher proportion of indirect costs accurately to services to avoid any service cost distortion.

The authors emphasise that most costs in service organisations are indirect and fixed in nature, whereas, in manufacturing organisations, it is possible to trace direct materials and direct labour costs to individual products. Also, because the indirect cost composition in service organisations is much larger, as compared to manufacturing organisations' traditional accounting control systems such as standard costing and variance analysis, tend to be inappropriate because there is less likelihood that costs will be based on clearly defined input-output relationships. Thus, the deficiencies relating to traditional costing systems described in the previous section relating to cost control tend to be even more prominent in service organisations. Kaplan and Cooper (1998) conclude that service companies are ideal candidates for ABC, even more than manufacturing companies.

2.9 The emergence of ABC systems

It was not until the mid 1980s that the limitations of traditional product costing systems began to be widely publicised. The failure to highlight these deficiencies earlier was due to several factors. Traditional systems were designed many years ago at a time when most companies manufactured only a narrow range of products, and direct labour and materials were the dominant factory costs. Overhead costs were relatively small and the distortions arising from overhead arbitrary allocations were not significant. Information processing costs were also extremely high and it was, therefore, difficult to justify more sophisticated overhead allocation methods.

By the mid 1980s companies were producing a wide range of products; direct labour had become only a small fraction of total costs and overhead costs were of considerable importance. It became recognized that simplistic overhead allocations using a declining direct labour base could not be justified, particularly as information processing costs were no longer a barrier to introducing more sophisticated cost systems. Furthermore, the intense global competition of the 1980s had made decision errors due to poor cost information more probable and more costly. Over the years the increased opportunity cost of having poor cost information, and the decreased cost of operating more sophisticated cost systems, increased the demand for more accurate product costs (Holzer and Norreklit, 1991).

With regard to service organisations, cost measurement did not pose a problem for many of them in the past because they were government owned and regulated. As such, there was no need for firms to cost their services to make decisions as all losses were taken care of by the regulatory bodies (Atkinson et al., 1997). However, recent developments in competition and deregulation have resulted in the need for these service organisations to be aware of their service costs, to be able to make decisions relating to service mix and profitability and to control their costs more effectively.

The above developments resulted in the emergence of ABC but it is not a recent innovation. Fifty years ago Goetz (1949) advocated ABC principles but it was not until the early 1980s that costing systems resembling the ABC type systems were first observed in a few firms in the USA. In a series of articles in the late 1980s based on observations of innovative ABC type systems, Cooper and Kaplan (1987, 1988) conceptualised the ideas underpinning these systems and coined the term ABC. These articles generated a considerable amount of publicity and consultants began to market and implement ABC systems before the end of the decade. In a survey of UK companies, Innes and Mitchell (1991) reported that approximately 10% of the surveyed companies had implemented, or were in the process of implementing, ABC.

2.10 Summary/conclusion

This chapter has described three purposes of a cost and management accounting system. They were to provide information firstly for inventory valuation and profit measurement, secondly for decision-making and thirdly for planning, control and performance measurement. The criticisms of traditional costing systems were described. Traditional costing systems were considered to be satisfactory for inventory valuation and profit measurement at the aggregate level and the criticisms were applicable only to the information generated for decision-making and the planning and control of costs.

Three different types of costing systems were described: direct/variable, traditional absorption and activity-based absorption costing systems. The criticisms relating to traditional costing systems were described for both manufacturing and service organisations. The chapter concluded with an outline of the factors influencing the emergence of ABC systems. The main features and developments of ABC systems will be described in the next chapter.

CHAPTER 3

ACTIVITY-BASED COSTING

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ACTIVITY-BASED COSTING

3.1 Introduction

In the previous chapter it was pointed out that costing systems resembling ABC type systems were first observed in a few firms in the USA in the early 1980's (Kaplan and Cooper, 1998, p.3). In a series of articles between 1988-1992 Kaplan and Cooper conceptualised the ideas underpinning these systems and invented the term ABC. However, the underlying principles of ABC are not new. As indicated in the previous chapter, Goetz (1949) advocated ABC principles approximately 50 years ago and in 1950 the Committee of the American Accounting Association stated 'overhead cost allocation should be related in a logical manner to the basic activities which give rise to these costs' (Brummet, 1957, p. 58).

ABC was initially developed as a mechanism for producing more accurate product costs but, by the mid-1990s users began to recognize that it could be extended beyond purely product costing to a range of cost management applications. Also, during the 1990's ABC theory was refined. According to Drury and Tayles (2000), proponents of ABC, and ABC consulting organisations, initially exaggerated the benefits of early ABC systems. These exaggerated claims resulted in criticisms of ABC theory, particularly from academics, and these criticisms provided the impetus for the refinements and developments in ABC theory.

The aim of this chapter is to examine some of the issues discussed in the previous chapter in more depth and provide a summary of the ABC literature and the developments that have occurred from its inception in the late 1980s to the current time. The distinction between traditional and ABC systems is examined and the costs versus benefits arising from implementing ABC systems are described. This is followed by a detailed description of the stages involved in designing and operating ABC. Several developments in the theory of ABC systems that occurred during the early 1990s are described. In addition, ABC has been extended beyond product costing to a range of cost management applications. In this chapter the range of cost management applications is discussesed. Finally, the limitations of ABC systems are examined.

3.2 Definitions of ABC systems

There is no clear or universal definition of an ABC system. The Official Terminology of the Chartered Institute of Management Accountants (CIMA) defines ABC as:

> An approach to the costing and monitoring of activities which involves tracing resource consumption and costing final outputs. Resources are assigned to activities and activities to cost objects based on consumption estimates. The latter uses cost drivers to attach activity costs to outputs (CIMA, 1996, p. 20).

Horngren *et al.* (1999) define ABC as:

> An approach to costing that focuses on activities as the fundamental cost objects. It uses the cost of these activities as the basis for assigning costs to other cost objects such as products, services or customers.

Finally, Hansen and Mowen (2000) use the following definition:

> A cost assignment approach that first uses direct and driver tracing to assign costs to activities and then uses drivers to assign costs to cost objects.

All of the above definitions relate to the two-stage allocation process described in the previous chapter (section 2.3.1) with costs being assigned to activities in the first stage and then activity costs to cost objects (typically products, services or customers) in the second stage. Although not explicitly stated, the definitions imply that costs are assigned to activities in the first stage, and cost objects in the second-stage, using cause-and-effect cost drivers. In contrast, traditional costing systems assign costs to cost pools in the first stage that are departmental based rather than activity based and, in the second stage, uses volume-based cost drivers that are often not based on a cause-and-effect relationship to assign costs to cost objects.

3.3 Distinguishing between traditional and ABC systems

In practice it can sometimes be difficult to classify some costing systems as activity-based or traditional. In the first-stage of the two-stage allocation process many departments are often established on the basis of the activities undertaken for taskes such as machining, assembly, etc. In other words, most of the departments within an organisation may have identical activities. Cost system designers may also claim that there may be a cause-and-effect relationship between volume-based drivers and the incidence of overhead costs. Although such a costing system is a traditional costing system, it could be argued that it broadly fits the requirements of the previously given definitions of ABC. It can be concluded that classifying costing systems as traditional or ABC can sometimes be problematic.

The difficulties that apply in distinguishing between ABC systems and non-ABC systems may account for some of the differences in the reported usage of ABC systems. For example, two USA surveys in the mid-1990s reported widely different usage rates. A study by Hrisak (1996) reported that 53% of the respondents were using ABC, whereas Shim and Sudit (1995) reported a usage rate of 27%. The usage rates are likely to be influenced by the definitions or criteria that are used by researchers to classify ABC systems. For example, a survey by Innes and Mitchell (1995) reported that 14 companies were using ABC for stock valuation. Dugdale and Jones (1997) contacted 12 of the 14 users and concluded that four did not use ABC, five could only be identified as using ABC if a weak definition was applied and only three actually used ABC for stock valuation.

Dugdale and Jones identified a weak definition to cover cases where a first stage of activity analysis is conducted to trace overheads to manufacturing cost centres but, in the second stage, traditional volume overhead absorption bases are used. Their strong definition applies to companies identifying cost pools and then using activity analysis to attribute overheads to products on the basis of consumption of activities traced through cost drivers. In other words, the strong definition uses cause-and-effect cost drivers to assign costs to products, whereas non-cause-and-effect overhead allocation absorption bases are used by weak systems. Dugdale and Jones's observations suggest that ABC systems can vary from weak or a hybrid of ABC/traditional systems to strong or 'pure' ABC systems.

Kaplan and Cooper (1998, p.99) provide an indication of what might constitute the starting point for classifying a cost system as a pure ABC system. They suggest that relatively simple ABC systems have 30-50 activity cost pools and many different types of second-stage cost drivers. This implies that most of their writings assume that ABC systems will contain these features. Sophisticated traditional costing systems that contain more than 50 first-stage cost pools have been used by some firms for many years but they tend to rely only on a maximum of two second stage volume-based cost drivers (typically direct labour cost/hours and machine hours). A major distinguishing feature of pure ABC systems is, therefore, that they use many different types, and a diverse range of second stage cost drivers, that better measure the consumption of activity resource costs by cost objects. Typical non-volume based cost drivers used by ABC systems include the number of production runs, number of inspections performed, number of material movements, the number of purchase orders processed and the number of customer orders processed.

3.4 Cost allocations, cost drivers and allocation bases

Costing systems use cost allocations to assign indirect costs to cost objects. Drury (2000, p. 46) defines a cost allocation as the process of assigning costs when a direct measure does not exist. Cost allocations involve the use of surrogate rather than direct measures. The surrogate measures that are used to assign indirect costs to cost objects are described as cost drivers or allocation bases. The term 'allocation base' was used prior to the emergence of ABC systems but, with the emergence of ABC systems, it was replaced by the term 'cost driver'. Therefore, cost drivers tend to be associated with ABC systems and allocation bases with traditional costing systems but there is now a tendency for some writers to use the term 'cost driver' when discussing cost allocations for both traditional and ABC systems.

Horngren *et al.* (1999) define a cost driver as:

> Any factor that affects total costs. That is, a change in the cost driver will cause a change in the level of the total cost of the related cost object.

Raffish and Turney (1991, p. 53) distinguish between resource cost drivers and activity cost drivers. The former refers to assigning costs to activities in the first stage and the latter to assigning costs from activities to cost objects in the second stage of the two-stage allocation process.

Cost drivers should be the significant determinants of costs. In other words, they should, be based on cause-and-effect relationships so that a change in the cost driver should ultimately, cause a change in the associated indirect costs. In contrast, because traditional costing systems rely only on a small number of second stage allocation bases, there is a danger that they will not be the significant determinants of the costs.

3.5 Decision-making implications arising from using inaccurate product costs

If the cost drivers/allocation bases are not the significant determinants of costs, there is a danger that distorted costs will be reported and that incorrect decisions will be made. For example, if the cost of processing purchase orders is strongly influenced by the number of purchase orders processed (the cost driver), then the cost of processing orders will be allocated to products based on the number of purchase orders required for each product. If 30% of the total number of orders processed for a period were required for a particular product then 30% of the total cost of processing orders will be assigned to the product. Assuming that the product was discontinued, and not replaced, ABC systems presume that action will be taken to reduce the resources required for processing purchase orders by 30%.

Traditional systems, however, mostly use direct labour hours or machine hours as the allocation base. If the above product was not a labour intensive product and required only a small proportion of labour hours (say 5%), the traditional system, using direct labour as the allocation base, would assign only 5% of the cost of processing purchase orders to products. This implies that the cost of processing purchase orders will decline by 5% if the product is discontinued but if the number of orders processed is the true cost driver then cost should decline by 30%. Based on using the true cause-and-effect cost driver the product may be unprofitable but using a non-cause-and-effect allocation base, such as direct labour, the product might mistakenly be reported as profitable. The product profitability analysis will, therefore, motivate management to make the wrong decision and retain the unprofitable product.

Kaplan and Cooper (1998, p. 82) claim that traditional costing systems overcost high volume products and undercost low volume products. They illustrate this by considering two hypothetical plants (Simple Factory and Complex Factory) that make pens. The factories are the same size and have similar capital equipment. Every year Simple Factory makes 1 million blue pens. Complex Factory also makes 1 million pens, but of many different colours, sizes and varieties. In a typical year this factory produces 2,000 different types of pens ranging from speciality low production volume pens to standard high production volume pens.

Although both factories make the same basic type of product, Complex Factory requires many more resources relative to the Simple Factory. It would have a much larger production support staff to schedule machines and production runs, perform set-ups, inspect items after set-up, move materials, despatch orders, negotiate with suppliers and order, receive and inspect incoming materials. Assuming all pens have approximately the same complexity they will require the same materials and number of labour and machine hours. However, Complex Factory would have much higher indirect and support costs (i.e. overhead) because of its more varied production and volume mix and complex production tasks. In other words, many of the higher overhead costs in the Complex Factory are not volume-related but arise from product and volume-diversity

For the Simple Factory a simplistic traditional costing system will be appropriate since all pens consume the same resources per unit. However, if a traditional costing system is used in the Complex Factory departmental/cost centre overheads will be assigned to products on the basis of volume-related allocation bases (cost drivers), such as direct labour hours, machine hours or units produced. On a per unit basis, high volume standard pens will require approximately the same quantity of the allocation base as the low volume speciality products resulting in Complex Factory overhead costs being assigned to products proportionately to production volumes. Assuming that support overheads are £2 million and that one of the high volume standard pens represents 10% of the plant's output, overheads of approximately £20,000 (10% of the plant's total overheads) would be allocated to them. In contrast, a speciality low volume product, representing say 0.1 of 1% of the plant's output, would be allocated with 0.1% (i.e. £2,000) of the plant's overheads. Based on the total output of 1 million pens, 100,000 standard pens and 1,000 speciality pens would be produced. Thus, on a per unit basis each pen would be assigned with £2 overheads. Therefore, the traditional costing system would report virtually identical product costs for both standard and speciality products, irrespective of their production volumes.

However, lower volume pens place considerably higher demands on the support activities (on a per unit basis) than the high volume standard pens. A traditional costing system will, therefore, significantly underestimate the cost of resources required for low volume speciality products and overestimate the resource cost of high volume standard products. In other words, traditional costing systems tend to over cost high volume standard products and under cost speciality low volume products. This distortion between the reported costs of standard and speciality products can only be avoided with traditional costing systems if standard and speciality pens are manufactured on separate machines in different cost centres.

Kaplan and Cooper also claim that direct costing systems do not solve the problem because the standard and speciality products will have the same direct and variable costs and, thus, fail to report the greater relative consumption of the support resources per unit by the speciality pens. Assuming that the selling prices for speciality products are marginally higher than the standard high volume products, the speciality products will have higher profit margins. The message from both the traditional and direct costing systems will be to de-emphasise the sales of high volume products and expand the market for the low volume speciality products. This strategy is likely to be disastrous since the high volume standard products are cheaper to make and replacing the lost output with the low volume speciality products will further increase the overheads relating to the support activities.

To capture the differences in resource consumption of the support activities by products· Kaplan and Cooper advocate that an ABC system is required that uses many different types of second stage cost drivers (i.e. volume-related and non-volume-related cost drivers).

3.6 Determining optimal costing systems

From the previous discussion it can be concluded that traditional costing systems are more likely to result in the reporting of inaccurate costs and, as a result, managers are more likely to make incorrect decisions. This may result in a high cost of errors. In contrast, ABC systems are likely to minimise the cost of errors but they are more expensive to operate than traditional costing systems. Cooper (1988) points out that an optimal costing system is not necessarily the most accurate costing system. Improvement should be made to a costing system up to the point where the marginal cost of an improvement equals the marginal benefit from the improvement (i.e. the 'costly truth' approach described in Chapter 1).

The optimal costing system is different for different organizations. A traditional costing system may be appropriate for an organization whose indirect costs are a low percentage of total costs and which also has a fairly standardized product range, all consuming organizational resources in broadly similar proportions. In this situation traditional costing systems may report reasonably accurate product costs. In contrast, an ABC system is likely to be optimal for an organization with a high proportion of indirect costs, whose outputs consist of a highly diverse range of high volume and low volume products all consuming resources in different proportions.

3.7 A detailed description of an activity-based product costing system

Drury (2000) identifies the following four stages for establishing and operating an ABC system:

1. identifying the major activities that take place in an organization;
2. assigning costs to cost pools/cost centres for each activity;
3. determining the cost driver for each major activity; and

4. assigning the cost of activities to products according to the product's demand for activities.

The first two items relate to the first stage, and the final two to the second stage, of the two-stage allocation process shown in Figure 2.1(b) in Chapter 2.

3.7.1 Identifying activities

Drury (2000, p. 342) states that activities consist of the aggregation of units of work or tasks and are described by verbs associated with tasks. For example, purchasing of materials might be identified as a separate activity. This activity consists of the aggregation of many different tasks, such as receiving a purchase request, identifying suppliers, preparing purchase orders, mailing purchase orders and performing follow-ups.

Hansen and Mowen (2000) suggest that the following interview questions should be used to identify activities:

1. How many employees are in your department? (Activities consume labour)
2. Please describe what they do (Enables activities to be identified)
3. Do customers outside your department use any equipment? (Activities consume resources in addition to labour)
4. What resources are used by each activity? (e.g. labour, materials, equipment, energy)
5. What are the outputs of each activity? (Helps identify activity drivers)
6. Who or what uses the activity output? (Identifies the cost object)

When all of the activities have been identified they are recorded in an activity dictionary that lists and defines every major activity performed for in the business unit.
Drury (2000. p. 343) states that:

> the activities chosen should be at a reasonable level of aggregation based on costs versus benefits criteria. For example, rather than classifying purchasing of materials as an activity, each of its constituent tasks could be classified as separate activities. However, this level of decomposition would involve the collection of a vast amount of data and is likely to be too costly for product costing purposes. Alternatively, the purchasing activity might be merged with the materials receiving, storage and issuing activities to form a single materials procurement and handling activity. This is likely to represent too high a

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

Kaplan and Cooper (1998) point out that some of the early ABC systems defined activities at a very micro level, in some cases at the individual task level, resulting in hundreds of separate activity cost centres being established. Recent studies suggest that between twenty and thirty activity centres tend to be the norm for product costing purposes. Drury (2000) suggests that the final choice of activities must be a matter of judgement but it is likely to be influenced by factors such as the total cost of the activity centre (it must be of significance to justify separate treatment) and the ability of a single driver to provide a satisfactory determinant of the cost of the activity. Where the latter is not possible, further decomposition of the activity will be necessary.

3.7.2 Assigning costs to activity cost centres

The next task is to determine how much it costs to perform each activity. Many resources are directly attributable to activity centres but other resources will be shared by several activities. Resource cost drivers, based on cause-and-effect relationships, should be used to assign the joint costs to individual activities.

3.7.3 Determining the cost driver for each major activity

Cost drivers at this stage are called activity cost drivers. The objective at this stage is to select cost drivers that link activity costs to the organizations' cost objects (e.g. products, services and customers). Drury (2000) suggests that several factors must be considered when choosing a suitable cost driver. First, it should provide a good explanation of costs in each activity cost pool. Second, a cost driver should be easily measurable, the data should be relatively easy to obtain and be identifiable with products. The costs of measurement should, therefore, be taken into account.

Kaplan and Cooper (1998, p. 96) identify three types of activity cost drivers:

1. Transaction drivers
2. Duration drivers
3. Intensity drivers

Transaction drivers, such as the number of purchase orders processed, number of customer orders processed, number of inspections performed and the number of set-ups undertaken, all count the number of times an activity is performed. Transaction drivers are the least expensive type of cost driver but they are also likely to be the least accurate because they assume that the same quantity of resources is required every time an activity is performed. Where the variation in the amount of resources required by individual cost objects is not great, transaction drivers are likely to provide a reasonably accurate measurement of activity resources consumed. If this condition does not apply then duration or intensity cost drivers should be used.

Duration drivers represent the amount of time required to perform an activity. Examples of duration drivers include set-up hours and inspection hours. For example, simple products may require short set-up times, whereas complex high precision products may require much longer set-up times. Using set-up hours as the cost driver will more accurately measure activity resource consumption than the transaction driver (number of set-ups) which assumes that an equal amount of activity resources are consumed by both simple and complex products. Using set-up hours in these circumstances as the cost driver will result in the reporting of more accurate product costs, but this will result in higher measurement costs.

Intensity drivers directly charge for the resources used each time an activity is performed. Whereas duration drivers establish an average hourly rate for performing an activity, intensity drivers involve direct charging based on the actual activity resources committed to a product. Intensity drivers are the most accurate activity cost drivers but they are also the most expensive to implement and maintain.

3.7.4 Assigning the costs of activities to products

The final stage involves assigning costs of activities to products in proportion to their usage of activities, as measured by activity drivers. This involves computing a pre-determined cost driver rate for each activity and multiplying this rate by the products' actual usage of the activity cost driver.

3.8 Developments in the theory of ABC systems

Several developments in the theory of ABC systems occurred during the early 1990s. According to Drury and Tayles (2000), some commentators initially exaggerated the benefits of early ABC systems. For example, they claimed that ABC systems reported true product costs and that decisions based on ABC reported profits/profits would be immediately accompanied by corresponding future cash flow changes. The theoretical developments described in this section emerged as a response to the criticisms of early ABC systems.

3.8.1 Hierarchical classification of activities

The first theoretical development was reported by Cooper (1990). He described a hierarchy of activities (unit-level, batch-level, product-level and facility level). Classifying activities into different categories for product costing represented an attempt to explain product cost behaviour and highlight that cost behaviour differs depending on the activity hierarchy. However, within each level of the hierarchy costs will vary with the same category of activity drivers (e.g. unit-level activity drivers, batch-level activity drivers and product-level activity drivers).

Unit-level activities are those performed each time a unit of product or service is produced. For example, machining and assembly are activities performed each time a unit is produced. Direct labour, direct materials and energy costs are also included within the unit-level category. The costs of unit-level activities vary with the number of units produced. Traditional costing systems assume that all costs are unit-related and therefore, rely only on unit-related cost drivers such as direct labour hours, machine hours and units of output. Traditional costing systems are therefore only appropriate for assigning the costs of unit-level activities to cost objects.

Batch-level activities are performed each time a batch of goods is produced. The costs of batch-level activities vary with the number of batches, but they are fixed with respect to the number of units within each batch. For example, set-up resources are consumed when a machine is changed from one product to another. As more batches are produced, more set-up resources are consumed. It costs the same to set-up a machine for 10 or 1000 items and the demands for the set-up resources are independent of the number of units produced. Other examples of batch-related costs include resources devoted to production scheduling, purchase order processing, first-item inspection and materials handling. Traditional costing systems treat batch-related expenses as fixed costs.

Product-level-sustaining activities are those performed to support the various products produced by a company. These activities consume inputs that develop products or allow products to be produced or sold. Examples of product-sustaining activities provided by Kaplan and Cooper (1998) include maintaining and updating product specifications and the technical support provided for individual products and services. Other examples include engineering changes, the development of product-testing procedures, marketing a product, expediting and the resources required to perform product enhancements. The costs of these activities are incurred irrespective of the number of units of output or the number of batches processed. Instead, their costs tend to increase as the number of different products increases and ABC uses product level bases such, as number of active part numbers and number of engineering change notices, to assign these costs to products.

The final activity category is facility-sustaining (or business-sustaining) activities. They are performed to support the facility's general manufacturing process and include general administrative staff, plant depreciation, plant management and property costs. They are incurred to support the organization as a whole and are common and joint to all products manufactured in the plant. It is not possible to identify how individual activities consume these resources. According to Drury (2000) there would have to be a dramatic change in activity, resulting in an expansion or contraction in the size of the plant, for facility-sustaining costs to change significantly. Such events are unlikely in most organizations. Therefore, these costs should not be assigned to products since they are unavoidable and irrelevant for most decisions. Instead, they should be regarded as common costs to *all* products made in the plant and deducted as a lump sum from the total of the operating margins from *all* products. However, there is evidence that companies adopting ABC systems usually implement a full costing approach and prefer to allocate facility-sustaining costs to individual products (Cooper, 1990).

More recently, Kaplan and Cooper (1998) have incorporated other activity categories that should not be traced to individual products or customers. They include brand or product-line sustaining activities that support an entire brand or product-line (e.g. product development and advertising). The expenses associated with these activities should be assigned directly to the individual product brands and/or product lines but they should not be allocated down to the individual products within these categories.

In developing an ABC cost hierarchy, Kaplan and Cooper (1998) state that they have sought to assign all organizational expenses to a particular hierarchical or organizational level where cause-and-effect relationships can be established. In an ABC system they state that every cost assignment to an activity or cost object should be transparent and traceable, via cause-and-effect relationships, to the demand for the resources by the cost object. Arbitrary allocations should be avoided since no cause-and-effect relationship can be established.

3.8.2 ABC profitability analysis and attention-directing information

The second theoretical development was first highlighted by Kaplan (1990) and Cooper and Kaplan (1991). They stress that reported product costs do not provide information that can be used directly for decision-making. Instead, they report attention-directing information by highlighting those products or services that require more detailed special studies. Cooper (1997) has stressed that a major role of ABC is to develop profitability maps (i.e. periodic profitability analysis by cost objects) that are used to focus managerial attention.

Cooper's (1997) analogy of the profitability maps is the geological maps, which are used to determine the most likely site of oil. However, the maps are not precise, so there is a high risk that oil will not be found. Seismic surveys are ,therefore, conducted to see if oil is likely to be present. If the seismic survey is positive, a test hole is drilled. There is still a risk of drilling a dry hole because seismic surveys are not perfect but the risk is far less than drilling based solely on the use of a geological map. A map is used because it is less expensive than performing numerous seismic surveys at random. Seismic surveys are used because they are cheaper than drilling numerous test holes. Thus, the process of oil exploration reflects a series of cost-benefit trade-offs between the cost of a process and the probability of finding oil.

According to Cooper, the profitability maps are similar to the geological maps, in that they are used to identify the most likely place to find ways of improving profits. For example, identifying groups of products that might be dropped or groups of products whose selling prices might be decreased to increase sales volume and thus overall profitability. He states that the profitability map acts to focus management attention on a limited range of potential decisions. Generally, the number of potential decisions to explore at random is unmanageable. The author quotes an example whereby a company with only 100 products has a potential of 2^{100} product mix decisions to evaluate.

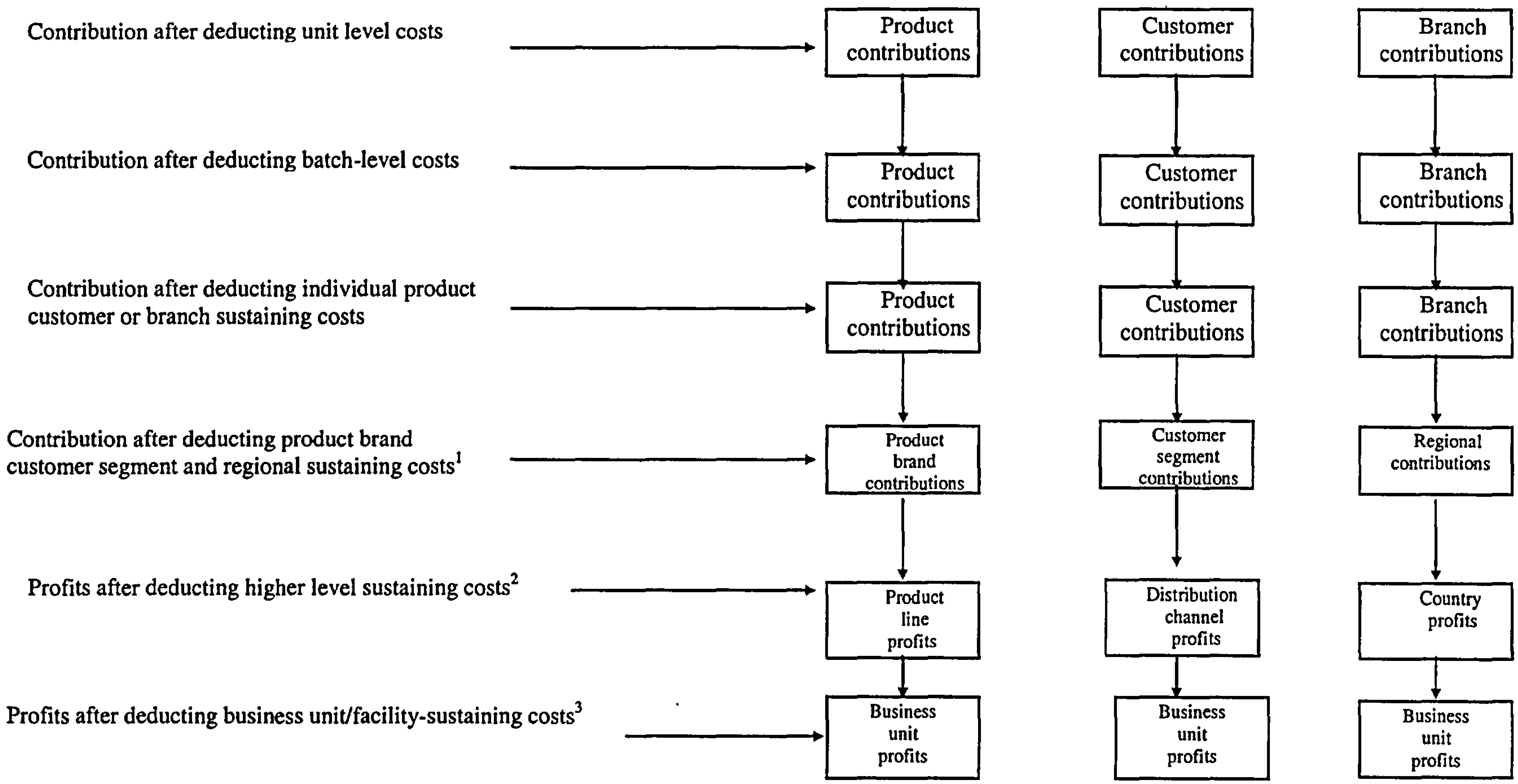
After potential profit improving projects have been identified using a profitability map, Cooper suggests that special studies can be conducted to explore the potential cash flow implications of each potential decision. The purpose of a special study is to convert the profitability map that that reflects resource usage to a cash flow map that reflects more precisely the changes in resource supply and revenues. Special studies thus play the same role as the seismic surveys in the geological example.

Cooper argues that, because the cost of special studies is high, the number performed has to be carefully controlled; hence, the need for good attention-directing information. The greater accuracy arising from using information derived from using ABC systems increases the probability that, when special studies are undertaken, their findings will support the message conveyed by the profitability analysis. That is, further investigations will confirm that unprofitable products are indeed unprofitable. In contrast, traditional cost systems often result in inaccurate profitability analysis resulting in special studies being at odds with the message sent by the cost system resulting in the possibility of the cost system being ignored.

Kaplan and Cooper (1998) extended cost hierarchies to develop activity-profitability maps by different cost objects (e.g. products, customers, locations). The general principles of activity profitability maps is illustrated by Drury (2000) using Figure 3.1. This approach categorises costs according to the causes of their variability at different hierarchical levels. Hierarchies identify the lowest level to which cost can meaningfully be assigned without relying on arbitrary allocations. In Figure 3.1 the lowest hierarchical levels (shown at the top of the diagram) are product, customer and facility contributions and, ignoring the business unit level, the highest levels (shown at the bottom of the diagram) are product lines, distribution channels and country profits.

The aim of ABC hierarchical profitability analysis is to assign all organizational expenses to a particular hierarchical or organizational level where cause-and-effect cost assignments can be established so that arbitrary allocations are non-existent. The hierarchical approach helps to identify the impact on resource consumption by adding or dropping items at each level of the hierarchy. For example, Kaplan and Cooper point out that, if a brand is dropped, activities at the brand level and below (i.e. above the brand profits row in Figure 3.1) which are uniquely associated with the brand will be affected, but higher level activities (i.e. at the product line level) will be unaffected. Similarly, if a product within a particular brand is dropped then all unit, batch and product-sustaining uniquely associated with that product will disappear but the higher level brand and product line level activities will be unaffected.

Figure 3.1 An illustration of hierarchical profitability analysis



Note
[1] Consists of expenses dedicated to sustaining specific product brands or customer segments or regions but which cannot be attributed to individual products, customers or branches.
[2] Consists of expenses dedicated to sustaining the product lines or distribution channels or countries but which cannot be attributed to lower items within the hierarchy.
[3] Consists of expanses dedicated to the business as a whole and not attributable to any lower items within the hierarchy.

3.8.3 Resource consumption models

According to Drury and Tayles (2000), the third, and possibly the most important, theoretical advance in ABC systems was reported by Cooper and Kaplan (1992) in a paper which emphasized that ABC systems are models of resource consumption. They point out that ABC systems attempt to measure the cost of using resources and not the cost of supplying resources and highlight the critical role played by measuring the cost of unused capacity. Kaplan (1994) used the following equation to explain the relationship between activity resources supplied and activity resources used for each activity:

Cost of resources supplied = Cost of resources used + Cost of unused capacity (3.1)

The left hand side of the above equation indicates that the amount of expenditure on an activity depends on the cost of resources supplied rather than the cost of resources used. Cooper and Kaplan (1992, p.1) state that periodic financial accounting statements measure the expenses incurred to make resources available (i.e. the cost of resources supplied), whereas ABC systems measure the cost of resources used for individual products, services or customers. The difference between the cost of activity resources supplied and the cost of resources used represents the cost of unused capacity.

Unused capacity arises because the supply of some resources (such as the acquisition of equipment or the employment of non-piecework labour) has to be acquired in discrete amounts in advance of usage such that the supply cannot be continually adjusted in the short-run to match exactly the usage of resources. The expenses of supplying these resources are incurred independently of usage in the short run and this independence has led to them being categorized as fixed costs but Kaplan and Cooper (1998) argue that such resources are better described as 'committed resources'. They use the term 'flexible resources' to describe those other types of resources whose supply can be continually adjusted to match exactly the usage of resources. Hence, the cost of supplying these resources will generally equal the cost of resources used and the resources will have no unused capacity. Examples of flexible resources provided by Kaplan and Cooper include materials, casual labour and the supply of energy for running machinery that can be continually adjusted to match the exact demand. Flexible resources have, traditionally, been categorized as variable costs.

Cooper and Kaplan (1992, p.1) illustrate the difference between the cost of resources supplied and the cost of resources used with the following example:

> Consider a purchasing department in which the equivalent of 10 full-time people (the resource supplied) are committed to processing purchase orders (the activity performed). If the monthly cost of a full-time employee is $2,500, the monthly cost of the activity, 'Process Purchase Orders,' equals $25,000. Assume that each employee, working at practical capacity, can process 125 purchase orders per month, leading to an estimated cost of $20 for processing each purchase order. Thus, the organisation, each month, spends $25,000. This expenditure provides a capability to process up to 1,250 purchase orders (the activity availability) during the month. During any particular month, the department may be asked to process fewer purchase orders, say only 1,000. At an estimated cost of $20/purchase order, the ABC system would assign $20,000 of expenses to the parts and materials ordered by the purchasing department that month. The remaining $5,000 of monthly operating expensesrepresents the cost of unused capacity in the purchase order processing activity.

In the above example the cost of resources supplied is $25,000, the cost of resources used is $20,000 and the difference of $5,000 represents the cost of unused capacity. The cost of unused capacity should be measured for each organizational activity, defined by the ABC system. Kaplan and Cooper (1992) also stress that, for ABC, the denominator volume used to compute the cost driver rate must always be the practical capacity of the activity supplied (1,250 orders in the above example) and not the anticipated volume (1,000 orders).

Drury (2000) illustrates the application of the resource consumption model by pointing out that managers make decisions (for example, changes in output volume and mix, process changes and improvements and changes in product and process design) that result in changes in activity resource usage. Where such decisions result in a decline in the demand for activity resources, the first term on the right hand side of Equation 3.1 will decline (the cost of resources used) but the cost of unused capacity (the second term on the right hand side of the equation) will increase to offset exactly the lower resource usage cost. To translate the benefits of reduced activity demands into cash flow savings management must remove the unused capacity out of the system by reducing spending on the supply of the resources. Thus, to make a resource variable in the downward direction requires two management decisions: first, to reduce the demand for the resource and, second, to lower the spending on the resource.

Decisions to introduce new products, expand output and create greater product variety will increase demands for activity resources. Such decisions are likely to result in situations where the demand for activity resource usage exceeds the supply of resources, thus requiring a decision to increase the spending on the supply of resources.

The ideas described above are considered by Kaplan and Cooper (1998, p.122) to be of such vital importance that they conclude that managing used and unused capacity is 'the central focus of ABC'.

3.9 ABC in service organizations

Most of the ABC literature has adopted a manufacturing focus. Kaplan and Cooper (1998, p.229) state that service companies are ideal candidates for ABC, even more than manufacturing companies, because most costs in service organizations are indirect and unlikely to be accurately assigned using traditional costing systems. Hence, service organisations have a greater need to allocate the higher proportion of indirect costs accurately to avoid any service cost distortion.

The authors emphasize that most costs in service organizations are indirect and fixed in nature, whereas, in manufacturing organizations, it is possible to trace direct materials and direct labour costs to individual products. Also the indirect cost composition in manufacturing organizations is much lower than in service organizations.

The difficulty in service cost measurement did not pose a problem in the past as most of these service organizations were government owned monopolies or operated in a highly regulated, protected and non-competitive environment. These organisations were not subject to any great pressures to improve profitability by identifying and eliminating non-profit making activities. Often cost increases could be absorbed by increasing the prices of services to customers. Little attention was, therefore, given to developing cost systems that more accurately measured the costs and profitability of individual services.

However, privatisation of government owned monopolies, deregulation and developments in competition have recently resulted in the need for service organizations to be aware of their service costs to be able to make proper decisions.

3.10 Activity-based product costing in JIT organizations

Because JIT manufacturing systems result in the establishment of production cells that are dedicated to the manufacturing of a single product, or a family of single products, many of the support activities can be directly traced to the product dedicated cells. Thus, a high proportion of costs can be directly assigned to products. Therefore, the benefits from implementing ABC product costing may be lower in JIT organizations (see section 5.7 in Chapter 5 and section 6.5.7 Chapter 6).

3.11 Activity-based management (ABM)

ABC was initially developed as a mechanism for producing more accurate product costs to enable better decisions to be made. Towards the mid-1990s users began to recognize that it could be extended beyond purely product costing to a range of cost management applications. A UK survey by Innes and Mitchell (1995) examined the applications of ABC systems. They reported that the cost management applications outweighed the product costing applications that were central to ABC's initial development. In particular, they observed that the cost reduction and cost control applications proved to be the most popular applications in those firms that had adopted ABC. They partly attribute the popularity to the recessionary environment of the early 1990's and the pressures which this brought for cost reduction.

Kaplan and Cooper (1998) provide a broad definition of ABM and describe it as referring to the entire set of actions that can be taken with activity-based cost information. They state that ABM enables an organization to accomplish its outcomes (e.g. revenues) with fewer demands on organizational resources. ABM accomplishes its objective through two complementary approaches which Kaplan and Cooper describe as operational and strategic ABM. Operational ABM takes the demand for organizational activities as given and attempts to meet this demand with fewer organizational resources.

It attempts either to increase capacity (to enable additional revenues to be generated from existing resources) or to lower spending (so that fewer resources are required to maintain sales revenues). Strategic ABM attempts to alter the demand for activities to increase profitability by shifting the mix of demands for activities away from unprofitable applications to profitable applications, in other words, seeking to find the most profitable product mix.

It would appear that Cooper and Kaplan view strategic ABM as the use of ABC product cost information, described earlier within this chapter, for strategic product-related decisions. Thus, strategic ABM could be considered to be equivalent to activity-based product costing applications. They also state that strategic ABM also includes decisions about product design and product development that reduce demands for organizational resources.

Most other writers view ABM as being equivalent to operational ABM. Drury (2000, p.897) describes ABM as relating to the cost management (or cost reduction) applications of ABC. It requires only three of the four stages described in section 3.7. They are :

1. identifying the major activities that take place in an organization;
2. assigning costs to cost pools/cost centres for each activity; and
3. determining the cost driver for each major activity.

Thus, firms can omit the final stage of assigning activity costs to products and adopt ABC solely for operational cost management without activity-based product costing. Another distinguishing feature between activity-based product costing and ABM is that cost management is usually facilitated by having activity cost information at a disaggregated level. Thus, several hundred activity cost pools may be required to generate information for ABM, whereas Kaplan and Cooper (1998) suggest that 20-60 activity pools are likely to be the norm for activity-based product costing. This is because all activities that have the same cost driver and the same consumption ratios by products (i.e. products consume activities in equal proportions) can be combined to create a homogeneous set of activities for product costing purposes.

ABM focuses on managing activities as a mechanism for managing the costs in the long term. The aim of ABM is to enable customer needs to be satisfied while making fewer demands on organizational resources. ABM analyses costs by activities and, thus, provides management with information on why costs are incurred and the output from the activity (in terms of cost drivers). It gives greater visibility to the cost of undertaking the activities that make up the organization and raises issues for management action that are not highlighted by the traditional analysis. Johnson (1990) suggests that knowing costs of activities is a catalyst that eventually triggers the action necessary to become competitive. For example, the ABC system may report that £1 million was spent on the activity 'Resolving customer problems.' Attention-directing information such as this is important for managing the cost of the activities since it prompts management to investigate why such a large amount of expenditure is required for undertaking an activity which may be avoidable. Drury (2000, p.897) illustrates a situation where salespersons, as a result of costing activities, are informed that it costs £50 to process a customer's order. They, therefore, become aware that it is questionable to pursue orders with a low sales value. By eliminating many small orders, and concentrating on larger value orders, the demand for customer-processing activities should decrease and future spending on this activity should be reduced.

Drury (2000, p.898) concludes that, prior to the introduction of ABM, most organizations had been unaware of the cost of undertaking the activities that make up the organization. A major benefit of ABM is that, by providing information on the cost of activities, management are made aware of those activities with the highest cost. These activities can be prioritized for detailed studies to ascertain whether they can be eliminated or performed more efficiently. To identify and prioritize the potential for cost reduction many writers initially advocated the classification of activities as either value-added or non value-added. A value-added activity is defined as an activity that customers perceive as adding usefulness to the product or service they purchase or an activity that supports the primary objective of producing outputs. Thus, painting a car would be described as a value-added activity in an organization that manufactures cars.

In contrast, a non-value-added activity is defined as an activity where there is an opportunity for cost reduction without reducing the product's service potential to the customer. Inspecting, storing and moving raw materials are common examples of non-value-added activities. The cost of these activities can be reduced without reducing the value of the products to the customers. Taking action to reduce or eliminate non-value-added activities should, therefore, be given top priority because, by doing so, the organization permanently reduces the cost it incurs without reducing the value of the product to the customer.

Kaplan and Cooper (1998) criticize the classification of activities as value-added and non-value-added categories because of the difficulty of defining precisely what constitutes a value-added or non-value-added activity. For example, they discuss whether the activity of setting up a machine is value-added or non-value added. One view is that customers do not perceive performing set-ups as adding usefulness to products and the activity is non-value-added. However, without set-ups a plant can only produce single products. If customers value customized or diverse products, changing machine settings from the ability to produce different product varieties creates value for customers.

Instead of classifying activities as value added or non-value added, Kaplan and Cooper advocate the following five point classification of activities:

1. Highly efficient, with little (less than 5%) apparent opportunity for improvement;
2. Modestly efficient, some (5 - 15%) opportunity for improvement;
3. Average efficiency, good opportunities (15-25%) for improvement;
4. Inefficient, major opportunities (25-50%) for improvement;
5. Highly inefficient, perhaps should not be done at all; 50-100% opportunity for improvement.

By identifying the cost of activities that make up their organization and classifying them into the five identified categories, Kaplan and Cooper state that opportunities for cost reduction can be prioritized. Cost reduction can be achieved either by eliminating the activities, performing them more efficiently with fewer organizational resources or by redesigning them so that they are performed in an entirely different and more cost efficient way.

Organizations can reduce future costs by using their activity-based costing systems to influence future costs at the design stage within the target costing process. According to Berliner and Brimson (1988), approximately 80% of a product's costs are committed during the planning and design stage. In contrast, the majority of costs are incurred at the manufacturing stage, but they have already become committed or locked-in at the planning and design stage and are difficult to alter. Cost management can be most effectively exercised during the planning and design stage and not at the manufacturing stage when the product design and processes have already been determined and costs have been committed.

Kaplan and Cooper (1998) illustrate how Tektronix Portable Instruments Division identified the number of part numbers as its key cost driver to implement the chosen strategy of standardizing and reducing parts, simplifying the manufacturing process and decreasing manufacturing costs. The company wanted to encourage design engineers to focus their attention on reducing the number of part numbers, parts and vendors in future generations of products. The company assigned material support expenses using a single cost driver - number of part numbers so that product costs increased with the number of parts used and with the number of non-standard parts used. The cost system motivated engineers to design simpler and less costly products requiring less development time because they had fewer parts and part numbers.

The survey of activity-based costing applications by Innes and Mitchell (1995a) indicated that many organizations used cost driver rates (that is, dividing the activity costs by the cost driver volume) as a measure of cost efficiency and performance for the activity concerned. Using cost driver rates to assess efficiency will encourage managers to reduce the rates. For example, the cost of performing a set-up can be reduced by performing more quickly and more cheaply. Cost driver rates can also be used for monitoring trends and benchmarking activity costs either internally or externally.

3.12 Activity-based budgeting (ABB)

To manage costs more effectively organizations that have implemented activity-based costing (ABC) have also adopted activity-based budgeting (ABB). ABB aims to authorize the supply of only those resources that are needed to perform activites required to meet the budgeted production and sales volume. ABB is the reverse of ABC product costing. With ABC, product costing, resources are assigned to activities and activity cost drivers are used to assign activity costs to cost objects (such as products, services or customers). In contrast, with ABB, cost objects are the starting point. Their budgeted output determines the necessary acitivities which are then used to estimate the resources that are required for the budget period. ABB involves the following stages:

1. Estimate the production and sales volume by individual products and customers;

2. Estimate the demand for organizational activities;

3. Determine the resources that are required to perform organizational activities;

4. Estimate for each resource the quantity that must be supplied to meet the demand; and

5. Take action to adjust the capacity of resources to match the projected supply.

The first stage is identical to conventional budgeting. In the second stage ABB estimates the quantity of activity cost drivers required for each activity. Standard cost data incorporating a bill of activities is maintained for each product indicating the different activities and the quantity of activity drivers that are required to produce a specified number of products. The resources that are required for performing the quantity of activity drivers demanded is estimated in the third stage. For example, if the number of customer orders to be processed is estimated to be 20,000 and each order takes 15 minutes processing time, then 5,000 labour hours of the customer processing activity must be supplied.

In the fourth stage the estimate of the resources demanded in the third stage is converted into an estimate of the total resources that must be supplied for each type of resource used by an activity. For flexible resources, where the supply can be matched exactly to meet the quantity demanded, the quantity of resources supplied will be identical to the quantity demanded. However, customer processing labour is likely to be a step cost function. Assuming that each person employed is contracted to work 1,500 hours per year, then 3.33 persons (5.000/1 500) is the quantity of resources required but, because resources must be acquired in lumpy amounts, four persons must be employed.

The final stage compares the estimates of the quantity of resources to be supplied for each resource with the quantity of resources that are currently committed. If the estimated supply of a resource exceeds the current capacity, additional spending must be authorised within the budgeting process to acquire the additional resources. Alternatively, if the demand for resources is less than the projected supply, the budgeting process should result in management taking action to either redeploy or reduce those resources that are no longer required.

With conventional budgeting the budgeted expenses for the forthcoming budget for support activities are normally based on an incremental approach and support costs are considered to be fixed in relation to activity volume. Thus, past inefficiencies are continued. In contrast, ABB provides a basis for understanding the amount of resources that are required to achieve the budgeted level of activity. The survey of UK organizations by Innes and Mitchell (1995) reported that 20% of the respondents used ABC. An activity-based approach for budgeting was used by 59% of the ABC users. For those respondents using ABB, 76% rated the ability to set more realistic budgets as the most important benefit from ABB.

3.13 Limitations of ABC systems

The proponents of ABC have written much of the ABC literature and little attention has been given to its potential limitations. Drury (2000, p. 355) points out, that where unit costs are calculated, ABC systems suffer from the same disadvantages as traditional cost systems by suggesting an inappropriate degree of variability. For example, to calculate unit product costs he states that batch level activity costs are divided by the number of units in the batch and product sustaining costs are divided by the number of products produced. This unitising approach is an allocation which yields a constant average cost per unit of output which will differ depending on the selected output level. Thus, great care is needed in interpreting ABC unit cost information. To overcome this problem Cooper (1997) advocates reporting total product costs rather than unit costs and distinguishing between unit, batch and product-sustaining costs.

A further problem identified by Drury relates to the concept of managing unused capacity. He states that the concept is more appropriate for human resources but it does not have the same impact for physical resources, such as the acquisition of plant and equipment. Human resources are more flexible and can be adjusted in small increments so that the supply of resources can more easily be adjusted to the usage of resources. Physical resources normally must be acquired or removed in lumpy amounts and large increments. According to Drury, if resources are supplied to cover a wide range of activity usage, there would have to be a dramatic change in activity for the supply to be changed. Therefore, changes in resource usage would tend not to be matched by a change in supply of resources and spending would remain unchanged. Care mus,t therefore, be taken to ensure that the cost of human and physical resources are not merged when costs are assigned to activity cost centres within the first stage of the two-stage allocation process.

Drury states that, if the changes in physical resource usage arising from potential decisions does not have future cash flow consequences, there is unlikely to be a link between resource usage and spending. In these circumstances, the future cash flow impacts for most decisions will be zero and the cost of resource usage would be treated as fixed and unavoidable for most decisions. This will be identical to how these costs would be treated adopting traditional costing systems. Traditional costing systems also accurately trace the cost of unit-level activities to products and facility-sustaining costs cannot accurately be assigned to cost objects by any costing system. Drury concludes that, for many organizations, the proportion of costs that can be more accurately assigned to cost objects by ABC systems and that can be expected to have a future cash flow impact, might be quite small. For such organizations, this would imply that appropriate cost information extracted from simplistic costing systems may be sufficiently accurate for decision-making purposes.

3.14 The different phases in the development of ABC

This chapter has provided a summary of the developments in the literature relating to the clarification of ABC. Jones and Dugdale (2002) provide an interesting interpretation of these developments. They describe two phases of ABC – a first-wave and a second-wave. Key actors identified during the first-wave are Kaplan, Cooper, Johnson and Computer-Aided Manufacturing International (CAM-I). During this first-wave Kaplan and Cooper advocated ABC as a mechanism for producing more accurate unit product costs, Johnson as a method of reducing costs by attacking overheads and CAM-I as a means for improving operations management. Cooper and Kaplan (1988) state that ABC is about all costs (not just factory costs) and virtually all costs can be related to a product apart from excess capacity and research and development costs.

Jones and Dugdale state that the 'second-wave ABC' emerged as a result of challenges to ABC, most notably by Goldratt's theory of constraints. In this second wave there was a remarkable change resulting in a new form of ABC. During this period the distinction between resources supplied and resources used (see section 3.8.3) was seen as crucial but this represented an attempt to elaborate rather than change the direction of ABC. The development of the cost hierarchy (see section 3.8.1) represented a more profound change. Kaplan and Cooper (1991, p.130) state:

> ABC is a powerful tool – but only if managers resist the instinct to view expenses at the unit level ... Managers must refrain from allocating all expenses to individual units and instead separate the expenses and match them to the level of activity that consumes the resources.

Whereas, in 1988 only two costs were excluded as relevant to product costs (excess capacity and research and development), by 1991 the list of exclusions had grown dramatically. Batch and product-level costs were not to be assigned to products at the unit level and only unit-level costs were to be assigned. In addition, Kaplan and Cooper (1991) stated that facility-sustaining costs were not to be allocated to the products at all. Thus, Jones and Dugdale (2002, p.141 state:

> This is an extraordinary change. ABC was originally advanced (in 1988-1989) as a superior costing system..... The superiority of ABC was demonstrated through the unit costs it generated. By 1991, ABC was not to be used to derive more accurate unit-level product costs. Instead, activity analysis should be employed in order to better understand the hierarchy of costs in the organisation, identify relevant revenues and costs, and inform decision-making.

A further shift in the writings of Kaplan and Cooper is reflected in their initial dismissal of marginal costing. Kaplan and Cooper (1988a) state that not only had firms resisted it for over 60 years but the new manufacturing environment had made it obsolete. Later Kaplan (1992) stated that once the hierarchical structure had emerged, it became apparent that ABC was really a contribution margin approach, not an attempt to get more accurate fully-allocated unit costs. Jones and Dugdale state:

> By the early 1990s a second wave ABC has been constructed which is very different from its predecessor. Gone is the fully allocated costing system with allocations that are more accurate in determining unit costs; in its place is a marginal contribution analysis with two categories of resources (supplied and used) and an hierarchical cost structure – a model in which unit product cost is marginalized. Many of the earlier trappings of ABC are now an embarrassment and those who took the original pronouncements at face vale have to be persuaded that this was misinterpretation and a new understanding must be achieved ..... By the early 1990s there were two, dissimilar, ABC systems in circulation, and both continued to circulate for the rest of the decade. Many members of the CAM-I network, management consultants and authors of articles and textbooks remained faithful to first-wave ABC, whilst Kaplan and Cooper generally distanced themselves from this (mis)understanding of ABC. Since surveys of adoption in organizations do not make a distinction between the two forms of ABC, it is difficult to be certain about which form managers claimed to be implementing. However, the heavy emphasis on product cost applications gives the firm impression that it was the first-wave form (p.144, 159).

In common with all of the previous surveys undertaken, no attempt is made in this research to distinguish between the two forms of ABC but this area merits future research.

3.15 Summary/conclusion

This chapter has provided a summary of the ABC literature and the developments that have occurred from its inception in the late 1980s to the current time. In particular, the technical and theoretical aspects of ABC have been described and a range of ABC applications examined. This chapter has, therefore, provided the foundations for examining the factors that influnece firms to adopt or reject ABC. It is apparent from the content of this, and the previous chapter, that ABC represents a major innovation. To understand why and how innovations, such as ABC, diffuse across firms it is necessary to examine the diffusion process within a broader context. To meet this requirement the next chapter will examine the diffusion of innovation literature.

CHAPTER 4

DIFFUSION OF INNOVATION

4.1 Introduction

4.2 The need for management accounting innovations

4.3 Definition of innovation and the diffusion of innovation

4.4 The diffusion of innovation literature

4.5 Types of innovations

4.6 The different perspectives applied to innovation research

4.7 Alternative explanations of innovation diffusion

4.7.1 The efficient-choice perspective

4.7.2 The forced-selection perspective

4.7.3 The fashion perspective

4.7.4 The fad perspective

4.8 The supply side of the diffusion process

4.9 Diffusion of accounting innovations research

4.10 Diffusion of innovation literature applied to ABC empirical studies

4.11 Factors influencing the process of change in management accounting

4.12 Summary/conclusion

CHAPTER 4

DIFFUSION OF INNOVATION

4.1 Introduction

Recent years have seen the emergence of the swift transfer of up-to-date information and ideas in national and international situations. There has also been intense national and global competition arising from the growing interconnectedness of economies and businesses and large advances in global communication. The diffusion of innovation processes plays a major part in creating this modernisation and development. The diffusion of information involves the transfer or imitation of management principles, management techniques, accounting approaches, technologies and scientific ideas.

With respect to research relating to the adoption, non-adoption and implementation of management accounting innovations (such as ABC systems) it is important to be aware of theories derived from the adoption and diffusion of innovation literature. Insights into how and why innovations diffuse across firms provide an insight into factors influencing the adoption, implementation and diffusion of ABC systems. The aim of this chapter is to provide a brief review of the diffusion of innovation literature and also to review some of the studies that focus on accounting innovations.

4.2 The need for management accounting innovations

Since the end of the 1980s many commentators have expressed a concern that traditional costing systems are out of date and obsolete. Kaplan (1986, p.175) claims that these obsolete systems provide information which is too aggregated, too distorted and too late to be relevant for decision makers. Kaplan's criticisms are based on the belief that innovation in accounting systems and practices have lagged behind manufacturing technologies. According to Kaplan, this "accounting lag" has created crises for some firms and has had an adverse impact on their competitiveness.

Johnson and Kaplan (1987) claim that traditional costing systems were developed in the late 1800s and early 1900s during the industrial revaluation and the scientific management era. The information needs of modern manufacturers differ considerably from those of the 1920s who operated with mature products, long production runs, standard products and large inventories. They conclude that these differences cause the information that is provided by traditional systems to be irrelevant for current environment management decisions.

Given the change in manufacturing environment, particularly in both products and process, they argue that decision makers need information to assess the internal efficiency, quality timeliness and flexibility on a real time basis to help them to correct problems as they occur. Johnson and Kaplan question why accounting techniques were not innovated to meet the changing requirement and conclude that that the lack of innovation since the 1930s was due to an overemphasis on financial accounting information to manage operations. They argue that the "revolution of origination and technology of production processes" calls for a similar revolution in cost accounting systems

One of the motivations for this study is to examine why firms have not adopted new management accounting systems, such as ABC systems. To provide insights for the answers to this question there is a need to focus on two aspects. First, why innovation in management accounting systems has not kept pace with manufacturing and technological innovation. There have been many management accounting innovations during the last two decades, such as the balanced scorecard, economic value-added and strategic management accounting, but there is little evidence to suggest that they have been widely adopted. It would appear that there is a gap between actual management accounting innovations and their use in practice. This raises the question of why firms have been reluctant to adopt these innovations and what factors affect their adoption. For example, are there particular factors that encourage innovation in general and, in particular, management accounting innovations?

The second question concerns how management accounting innovations are affected by the adoption of other innovations, such as total quality management, just-in-time and lean production techniques, and what the relationship is between management accounting innovation and other innovations.

4.3 Definition of innovation and the diffusion of innovation

Bradford and Kent, (1977) defined **innovation** as the successful introduction of ideas, perceived as new, into a given social system. It is important to note that, as long as an idea is perceived as new, it may be viewed as an innovation. Thus, the ideas themselves need not actually be new. For example, Firth (1996) states that an innovation may be viewed as the use of a new idea, or the adoption of an old idea in a new context, or in a new setting. Damanpour (1987,1991) states that the term 'innovation' may be viewed as the adoption of an idea which may relate to a device, system, process, policy, program, plan or service that is new to the organisation at the time of adoption. It can be concluded that innovation may be viewed as a process to create new ideas or renew ideas which already exist.

The element of "perceived as new" is the distinguishing feature between an innovation and the related concept *change*. For example, Zaltman *et al.* (1973) argue that:

> 'although [all] innovations imply change, not all change involves innovations since not everything an organization adopts is perceived as new'. (Zaltman *et al.*1973, p.158)

In relation to accounting, Kelly-Newton (1980) described the current value accounting debate during the 1970-1980s and pointed out that many current value accounting methods were developed in the early 1960s. Nevertheless, when these ideas were developed during the 1970s and early 1980s, they were regarded as a significant innovation in company financial reporting.

In contrast, **diffusion** is the process whereby an innovation is spread or disseminated (Bjornenak, 1997). It is appropriate here to shed light on the diffusion process. Webster (1971) emphasises the social process by viewing diffusion as the social process by which an innovation spreads through a social system over time. It can be concluded that the diffusion process is the way in which innovations are made known and applied in practice.

4.4 The diffusion of innovation literature

The literature on innovation extends over many decades and is widely dispersed over many different areas. According to Wolfe (1994), 6,244 articles were published and 1,336 dissertations were produced on the topic of innovation between 1989 and 1994. In addition, 1,299 journal articles and 351 dissertations were completed on the topic of organisational innovation in the same period.

Organisational theorists have investigated how management practices have diffused over time (e.g. Teece,1980). The diffusion of innovation has been studied across many disciplines at individual, organisational and societal levels. Researchers have attempted to answer questions about the pattern of adoption (Abrahamson, 1991) and the characteristics of early and late adopters (Rogers, 1985) and the characteristics which differentiate between those innovations that are widely adopted and those that are not widely adopted (Mohr, 1982).

Studies have also focused on the adoption and implementation processes. Adoption research refers to the intermediate step in the process between creating the innovation and its implementation. Researchers have focused mainly on two questions:

1. What are the adoption processes? This facet of the inquiry examines the steps that have been taken by an individual or organization in deciding to adopt an innovation. The research shows that there are many stages within the adoption process, such as initiation and awareness.

2. The individual, organisational and contextual factors that facilitate the adoption process. Theorists propose that individual, structural, contextual and leadership factors affect organizational innovation (Damanpour, 1991).

Studies relating to the implementation process have investigated how an innovation is used in comparison to its potential, how implementation is handled and the role of users in the process. This research has been applied to ABC implementation by Krumwiede (1998) and Fuller and Swanson (1992).

4.5 Types of innovations

Many organisational theorists have advocated the importance of distinguishing between different types of innovation (Evan, 1966; Knight, 1967). Damanpour (1992) states that past research has indicated that not all types of innovation have identical attributes (Tornatzky and Klein, 1982), that their processes of adoption are not the same (Daft, 1978), and that they do not relate equally to the same predictor variables (Aitken *et al.* ,1980; Zmud, 1984).

Evan(1966) differentiated between technical and administrative innovations. Technical innovations relate to products, services and production process technologies. In other words, they are related to the basic work activity of the organization. Administrative innovations involve organizational structure and administrative processes. They are indirectly related to the basic work activities of the organisation and more directly related to its management. Most of the studies of the diffusion process tend to focus almost entirely upon the diffusion of technological innovation even though improvements in management techniques and the organisation of economic activity may be just as important in terms of their productivity enhancing characteristics.

Evan also claimed that administrative innovations lagged behind technical innovations. According to Aiken *et al.* (1980) the rate of technical innovation was triple that of administrative innovation adoption. Daft (1978) also found that technical innovations exceeded administrative innovations and Damanpour and Evan (1984) also concluded that the rate of technical innovation adoption exceeded the rate of administrative adoption.

Other types of innovations that have been categorised in the literature include product, process, radical and incremental innovations. Product innovations refer to the introduction of new products or services to meet market needs. Process innovations refer to the introduction of new elements in the organisation's production and service operations such as input materials, task specifications and information used to produce a product or render a service (Utterback and Abernathy, 1975). Finally, radical innovations are those that produce fundamental changes in the activities of the organization and represent clear departures from existing practices, while incremental innovations result in a lesser degree of departure from existing practices (Dewar and Dutton, 1986).

4.6 The different perspectives applied to innovation research

Innovation diffusion has been studied in a variety of contexts and from many perspectives. Research on the diffusion of innovations relating to medical drugs (Coleman *et al.*, 1966) and new teaching methods (Carlson 1965) indicated that many innovations diffuse in similar patterns.

Wolfe (1994) reviewed the organisational innovation literature and concluded that, although it tends to be described in monolithic terms, the literature is composed of three discernible streams which developed somewhat sequentially. These three streams are concerned with the general phenomenon of organisational innovation. They have a different focus as each addresses different questions. The three streams of research are:

1. Diffusion of innovation research (DI);

2. Organizational innovativeness research (OI), and.

3. Process theory research (PT).

The objective of DI is to address, explain or predict rates and patterns of innovation adoption over time and/or space. The research question is "What is the pattern of diffusion through a population of potential adopter organizations?" Outcomes of DI research include:

1. The identification of innovation attributes which supposedly influence innovation (e.g. relative advantage, compatibility and complexity), and

2. The classification of adopters that are presumed to have different characteristics and tendencies to adopt such as innovators, early adopters, early majority, late majority and laggards (Tornatzky and Fleischer, 1990).

DI research typically involves using empirical data to fit a mathematical model of the diffusion process over time using various explanatory variables. Cumulative adoption over time has often been depicted by an S-shaped curve (Abrahamson, 1991; Rogers, 1985). The number of adopters increases slowly at first, due to uncertainty about the innovation. This is followed by a steep 'take off' which has been attributed to a substantial drop in the price of the new technology, causing a surge in demand (Attewell, 1992). A contagion effect takes hold and the number of adopters increases rapidly, resulting in a relatively steep curve. In the final stage the market for the innovation saturates, the number of new adopters tapers off and the curve flattens, being representative of the upper plateau on the 'S'.

DI focuses on innovation at the aggregate level. It sheds no light on the individual firm's adoption decision and, hence, fails to provide a behavioural explanation of why some firms are quicker to adopt than others (Jensen, 1982). In contrast, the objective of OI research is to discover the determinants of an organisation's propensity to innovate. The unit of analysis is the organization. The research question is, "What determines organizational innovativeness?" Early adopters are contrasted with late adopters to generate a list of factors that relate to early adoption.

Most OI research studies have relied on a regression model that aims to explain the variance in the dependent variable (Mohr, 1982). Organizational innovativeness, the dependent variable, has generally been operationalised as a composite score based on the number innovations adopted by an organisation. Firm size, profitability of an innovation, innovation champions inside the firm, production type, degree of centralisation, proportion of specialists and intensity of competition have been linked to innovation adoption (Abernathy and Utterbank, 1978; Davies, 1979; Kimberly and Eviansko, 1981; Tornatzky and Fleischer, 1990).

The process theory (PT) research of organisational innovation investigates the nature of the innovation process. The research question is "What are the processes organizations go through in implementing innovations to determine organisational innovativeness?" The focus is on how and why innovations emerge, develop, grow and possibly terminate. The unit of analysis of PT research is the innovation process itself.

Wolfe (1994) identified two generations of PT research. The first is called 'stage model research' and conceptualises innovation as a series of stages that unfold over time. The purpose is to determine whether the innovation process involves identifiable stages and, if so, what they are and what their order is. The second generation is simply called process research. This involves in depth, longitudinal, research that is conducted to describe fully the sequences of, and the conditions which determine, innovation processes. This research often involves theory building and qualitative data collection.

To obtain a greater insight of the innovation adoption process several studies have sought to understand the stages of the implementation process. Cooper and Zmud (1990) used a stage model to describe the specific case of IT adoption and implementation. They identified the stages for implementing IT innovation : initiation, adoption, analysis, acceptance, action and infusion. The following discussion applies the stage model to ABC.

- **Initiation:** The initiation process begins when there is pressure on the firm to change an existing system or function and involves analysing organisational problems and possible solutions to cope with modern development. Firms do not consider changing their costing system very easily or very often, so they treat any change with special care. Generally, someone from upper management drives the change because of a belief that an information need is not being met. The initiation may also come from someone lower in the organisation who may be more familiar with system limitations or possible solutions. Assuming that there are good reasons for a firm to desire a better costing system, there must also be a sense of urgency to go through the effort and expense of making a change. This stage probably includes three sub- stages, firstly, ABC not considered/ABC has not been seriously considered. Secondly, ABC is being considered and implementation is possible but it has not yet been approved. Finally, ABC may be considered then rejected, meaning that ABC has been considered but without being implemented and was later rejected as a cost assignment method. This stage may be the result of management trying to reduce product cost distortions, to improve decisions on product lines and customer relationships, to provide activity information which can be used to manage activities, or to support cost reduction efforts. But, unless firms perceive that their costs are significantly distorted or their decisions could be materially affected by more accurate cost information, they will generally not progress much past the initiation stage.

- **Adoption:** After the initiation stage, and when agreement is reached that ABC is a possible solution for a firm's costing needs, the next step is getting approval for implementation and the resources for implementing the system. In this stage, a campaign is initiated to obtain approval for the resources needed to implement the actual change. According to the earlier discussion, this stage might be viewed as approval has been granted to implement ABC and to devote/spend the necessary resources, but analysis has not yet begun.

- **Analysis:** When the resources are approved, ABC implementation enters the analysis stage. In this stage, the implementation team studies the resource costs and links them to activities and then to cost objects (e.g., products, services, customers, etc.). The team's focus is on identifying the root causes, or drivers, for overhead costs. At the same time the team works to try to identify the activities that occur and produce process maps to show the sequence of activities. They then work together to identify cost drivers, performance metrics and ways for improving or eliminating activities. Clearly defining the objectives and scope of the ABC project early in the analysis is an essential factor for implementation success.

- **Acceptance:** The needs of decision-makers play the main role for the acceptance stage. The goal is to get the key decision-makers to agree that ABC information should be used in their decisions. Acceptance will not occur if these individuals do not understand or agree with the ABC information. The ABC team should focus on (1) explaining why the traditional costing methods were inadequate, (2) discussing how ABC cost information is collected and reported, (3) explaining why the ABC model is better than the old cost allocation methods and (4) highlighting how ABC information will lead to better decisions. This stage is critical since any of the following outcomes can occur.

1. Analysis is complete and the ABC model has project/implementation team support, but ABC information is not yet used outside accounting department for decision-making.

2. Implemented then abandoned: ABC was implemented and analysis performed but was not pursued.

3. Total success of implementation of ABC: clear success occurs, either when substantial proportions of the initial objectives have been met, or where significant benefits from the use of the ABC have been recognized.

4. Total failure of ABC implementation: clear failure occurs where all or the great majority of the initial objectives have not been met. For example, no significant benefits have arisen and all further attempts at implementation have ceased.

5. Success with some failure: occurs when parts of the project have failed, particular objectives were not met, the potential from ABC that was not realized and adverse consequences arose, but the implementation process is still achieving some success.

6. Failure with some success: most of the parts of the project have failed, particular objectives were not met, the potential from ABC was not realized and adverse consequences occurred. It appears that the implementation process will cease.

- **Action**: This stage occurs when the ABC system finally starts making an impact in an organisation. The cost model is accepted by at least a few key decision-makers who begin to consider it a normal part of the company's management information system. An important indicator of this stage is that individuals outside the finance department begin to use the expanded information for decisions identified in the analysis stage. Modifying the financial reporting and budgeting process to incorporate the ABC cost drivers is a good way to increase their usage. If all costs are reported and budgeted based on activities, managers will pay more attention to ABC information and be more likely to use it in their decision-making.

- **Infusion:** In this stage most IT innovations end at the routinisation stage where it represents the high level of usage. Occasionally, however, a new system is implemented that has an immense impact on organisational effectiveness. Instead of just doing the old level of work faster or more efficiently, higher levels are achieved as the new system is used in an integrated and comprehensive manner and, when this stage is reached, the innovation is infused in the organisation. For ABC, the ABM or infusion stage means that activity information is used by management to improve profits and obtain a competitive advantage. The focus is expanded beyond product costing to the planning, execution and measurement of basic activities. Non-value-added activities are identified and ABC performance measures are used to achieve continuous improvements.

The stage model developed by Cooper and Zmud has been adapted by Anderson (1995) and Krumweide (1998) to examine the adoption and implementation of ABC systems. These models will be discussed in more detail in Chapter 5 (section 5.7)

Wolfe (1994) concludes that diffusion of innovation research provides an understanding of how and why an innovation diffuses over time. In contrast, organisational innovativeness contributes to identifying the differentiating characteristics that distinguish between early and late adopters and process theory research helps to discern the stages and processes involved in organizational innovation.

4.7 Alternative explanations of innovation diffusion

Abrahamson (1991) argues that the dominant perspective in the diffusion of innovation literature contains pro-innovation biases. Pro-innovation biases are presumptions that innovations will benefit organisations. These biases suggest an obvious answer to the question: Why does innovation diffuse or disappear? Innovations diffuse when they benefit organizations adopting them and they disappear when they do not. Abrahamson concludes that it, therefore, makes little sense to ask what processes drive or counter the diffusion of innovations, when do these processes take hold and to what extent do these processes cause the diffusion or rejection of innovations. It makes even less sense to ask whether certain processes diffuse non-beneficial innovations or cause the rejection of beneficial ones.

Rogers (1985) argues that the dominant perspective in the diffusion of innovation literature reinforces pro-innovation biases because it relies on a model of choice in which adopters make independent, rational choices guided by goals of technical efficiency. In other words, the general assumption in the innovation diffusion literature is that adopters of an innovation are rational and make independent, technically efficient choices. This efficient-choice perspective reinforces pro-innovation biases because it suggests that a rational adopter never decides to adopt a technically inefficient administrative technology or reject a technically efficient administrative technology.

According to March (1978) the efficient-choice perspective is based on two major assumptions. First, organisations within a group can freely and independently choose to adopt an administrative technology. Second, organisations are relatively certain about their goals and their assessment of how efficient technologies will be in attaining these goals. As a result, organisational choices can be rational and can lead to the selection and retention of technically efficient administrative technologies.

Abrahamson (1991) develops counter-assumptions for each of the two previously identified assumptions to reject the efficient-choice perspective. If organisations outside the group, such as regulatory bodies or consulting firms, influence choices made by organisations within this group they can drive the diffusion of administrative technologies that are technically inefficient for organisations within the group. A similar rationale can be used to reject efficient technologies when it is in the outside organisations' interest to do so. To counter the second assumption made by March, Abrahamson argues that organisations have unclear goals and high uncertainty about the technical efficiencies of administrative technologies. Hence, they cannot rationally choose technically efficient administrative technologies because they would not be able to assess technical efficiency. Also, because they do not have clear goals they cannot decide which type of technical efficiency matters in attaining organizational goals. Based on these counter- assumptions Abrahamson concludes that organisations imitate other organisations : they base their decisions on which administrative technology to use on the decisions of other organisations (DiMaggio and Powell, 1983).

Abrahamson identified four perspectives to indicate when organisations will imitate other organisations' decisions to accept technically inefficient administrative technologies or imitate other organisations decisions to reject technically efficient technologies. The four perspectives are:

- Efficient-choice;
- Forced-selection;
- Fashion; and
- Fad.

4.7.1 The efficient-choice perspective

Explanations guided by the efficient-choice perspective assume that little uncertainty exists about the goals of an organisation or the measurement of the technical efficiency of an innovation. In these circumstances organisations will rationally choose the innovation that will allow them to attain their goals.

Theories attributing innovation diffusion to the efficient choice perspective build on the idea of performance gaps. Performance gaps are discrepancies between an organisation's goals and what it can attain (Abrahamson, 1991, p. 592). Environmental changes create similar performance gaps across an organisation. Organisations with similar aims tend to react to the performance gaps by adopting the same efficient administrative technology. Organisations which do not experience these gaps, or have different aims, will not adopt these technologies. Innovations are diffused when they help to reduce performance gaps created by environmental change (Malmi, 1999), or when they help to fulfil the management's needs. According to theories based on the efficient-choice perspective organisations determine the diffusion and rejection of innovations themselves. Hence, their behaviour is not imitative.

4.7.2 The forced-selection perspective

According to the forced-selection perspective, a number of organisations control sufficient power to dictate which administrative technologies will diffuse across organisations. These powerful organisations may have an interest in forcing a technically inefficient administrative technology to diffuse or an efficient technology to be rejected, despite organisations' resistance to adopting or rejecting this technology. Theorists building on the forced-selection perspective have argued that the legitimate power of government bodies allows them to force the diffusion of innovations. Examples of the forced-selection perspective include accountancy professional bodies setting standards on how product costs should be calculated for inventory valuation and income measurement or government defence departments specifying methods that should be used to derive product costs for pricing purposes. Malmi (1999) concludes that forced selection assumes that adopting organisations face a situation of no choice; their motives play no role in explaining the diffusion and rejection of innovations.

4.7.3 The fashion perspective

Perspectives that assume conditions of uncertainty relating to goals and technical efficiency of innovations suggest that, under these conditions, organisations will tend to imitate other organisations. According to such perspectives, organisations' decisions are more concerned with which organisations they should imitate rather than which technology they should adopt. The fashion perspective assumes that, under conditions of uncertainty organisations in a group imitate administrative technologies promoted by 'fashion setting' organisations outside the group, such as consulting firms, business school and business mass media (e.g. publications of popular business books). Fashion setters do not have coercive power to force organisations to follow them. Instead, their power to influence stems from their capacity to inspire organisations to trust their choice of technologies and imitate them. The administrative technologies promoted by fashion setting organisations may or may not be efficient. Thus, they may promote the diffusion of efficient technologies and rejection of inefficient ones. Alternatively, they may select only those that they believe they can market profitably, regardless of how technically efficient they can be in organisations.

4.7.4 The fad perspective

The fad perspective assumes that diffusion of innovation occurs when organisations within a group imitate other organisations within that group, whereas the fashion perspective assumes that organisations imitate other organisations that reside outside the group. Organisations imitate other organisations in order to appear legitimate by conforming to emergent norms (DiMaggio and Powell, 1983; Meyer and Rowan, 1977) or to avoid the risk that competitors will gain a competitive advantage by using the innovation (Abrahamson and Rosenkopf, 1990). Explanations of the fad process state that organisations that are low on certain characteristics will imitate the adoption decisions of organisations that have reputations higher than their own (DiMaggio and Powell, 1983). Another explanation is that organisations within a group may experience 'bandwagon pressures.' Bandwagons are "diffusion processes whereby organisations adopt an innovation, not because of their individual assessment of the innovation's efficiency or returns, but because of a bandwagon pressure caused by the sheer number of organisations that have already adopted the innovation" (Abrahanson and Rosenkof, 1993; Tolbert and Zuker (1983).

Some researchers (e.g. DiMaggio and Powell (1983), Tolbert and Zuker (1983) and Abrahanson and Rosenkopf (1993) expressly recognise two phases in a fad. In the first phase rational decision-making will dominate. An assessment of the technical efficiency of the innovation is made. The real 'bandwagon effect' unrolls in the second phase. As more organisations in the collectivity (i.e. a group of organizations that compete with each other) have adopted the innovation the value to a specific non-adopter will increase. In other words, the fact that a rather large number of organisations have adopted the innovation makes it efficient to a non-adopter to adopt the innovation after all.

This is closely linked to the pressure of stakeholders like customers, suppliers and shareholders. A high degree of diffusion of an innovation gives it the appearance of rationality. Stakeholders associate adoption with rational decision-making. Non adoption can give rise to the conjecture that management of the firm does not set adequate targeted goals and is not able to find ways to reach these goals efficiently (Meyer and Rowan, 1977). This can cause them to stop their contribution to the organisation, with all the negative consequences.

Malmi (1999) states that, although the terms 'fads' and 'fashions' have negative connotations and imply irrational behaviour, they do have the potential to set organisational forces in motion that force people to examine critically the core assumptions underlying the current mode of operation. Similarly, Abrahamson and Rosenkof (1993) conclude that innovation adoption within a collectivity does not necessarily take the form of a fad. Possibly, over the course of time, information is revealed from early adopters that enable late adopters to take an economically rational decision in a technical economic sense.

4.8 The supply side of the diffusion process

The discussion so far within this chapter has concentrated only on the demand side of the diffusion process. However, the diffusion process is also dependent on the supply side. Bjornenak (1997) points out that most adopters need persuasion to accept an innovation; that is, awareness and demonstration. For example, the first set of adopters or consultants may take on active role as drivers of the diffusion process. Bjornenak also draws attention to the importance of the infrastructure in the diffusion of an accounting innovation. Media, such as articles, books, seminars and conferences, may be used to inform and convince potential adopters.

Abrahamson (1996) suggests that the impact of management fashions on the innovation adoption decision could be studied by comparing the temporal frequency of articles on innovation in the mass media with the innovation diffusion curve. A theoretical relationship requires that an increase in the number of publications should precede and accompany the take-off of an innovation.

Finally, it should be noted that studies by Bjornenak (1997) and Malmi (1999) relating to ABC diffusion sought to incorporate both the demand and the supply side to explain the diffusion process.

4.9 Diffusion of accounting innovations research

Research into the diffusion process for accounting innovations, when compared with other areas, especially information technology, would appear to be lacking. There are relatively few studies examining the diffusion of management accounting techniques and practices (Firth, 1996). Foster and Ward (1994) state that a review of the accounting literature reveals few empirical studies addressing the adoption of accounting innovations. Kaplan (1986, p.175) stated that a reason for this lack of empirical research is because:

> our current paucity of knowledge of the accounting and control systems used by innovative firms precludes such a well structured model of inquiry.

Much of the accounting diffusion of innovation literature has addressed the adoption of financial accounting concepts and has, typically, examined one procedure per study, for example, the adoption of the LIFO method (Firth, 1996). In addition, some of these studies have focused on research falling within the forced-selection area. They have examined mandated accounting procedures where firms had little or no choice in adopting accounting methods. These studies typically examined managers' reactions to the new standards. Examples of these studies include accounting changes for tax benefits (Tritschler, 1970), LIFO financial reporting (Copeland and Shank, 1971; Nash, 1971), inflation accounting (Hussein, 1981), the instalment methods for recognising sales revenues (Comiskey and Groves, 1972) and replacement cost accounting disclosures (Kelly-Newton, 1980b).

The accounting literature also reveals that accounting innovations are often subject to resistance (Bouwens, 1998). Kaplan (1984) suggests that changes in accounting systems are often not made even if they would obviously improve decision-making. According to Scapens and Roberts (1993), one reason for the failure of accounting innovation can be attributed to the fact that it was unclear to managers who were to be held responsible for decision outcomes They concluded that the different jargons of accountants and managers accounted for innovation failure. Cooper *et al.*, (1992) identified a similar problem in their explanation of accounting innovation failure. Burns (1987) concluded that failure to adopt accounting innovations could be attributed to the fact that cost accounting systems are part of a larger system and are, therefore, unlikely to be changed. He also suggests that managers may have too little financial knowledge to benefit from a new cost accounting system. Kaplan (1986) also attributes the low change rate of accounting systems to a lack of support provided by senior managers. The study by Innes and Mitchell (1991) attributed resistance to change to the technical difficulty of implementing a new accounting system, like ABC.

Factors external to the firm, such as increased competition, increased costs and new technologies, can force, or entice, firms to adopt innovative products, production techniques, etc. Since the early 1980s global competition and new technologies led to dramatic changes in production methods. Kaplan (1986, p.175) asserted that, when manufacturing operations experience substantial changes, "management accounting systems must also change if they are to provide relevant information for managerial decision and control".

Kaplan (1984a, 1986) investigated innovation adoption by the production and accounting departments of manufacturing firms. However, this research was non-empirical, consisting of general observations (1984a) and discussions with production managers and controllers (1986). In this primary study concerning innovation adoption, Kaplan (1986) visited the production and accounting departments of four innovative firms that had implemented just-in-time inventory systems or computer integrated manufacturing processes. Kaplan's findings did not match his expectations. He stated (1986, pp.192-193):

> I had hoped to be able to document the incidence and value of innovative accounting and control systems for the new industrial competition,. ...Instead I found that changes in accounting procedures lag far behind changes in the real production phenomena they are supposed to represent.

Kaplan (1986, p.198) speculated on the reasons for this lack of innovation and suggestd they include the prevalence of computer-based systems with extensive traditional accounting programs and the emphasis on financial accounting even with management accountants. However, he concluded the most important reason for the lack of management accounting innovations was that:

> senior company management have not emphasised the need to improve the relevance and responsiveness of management accounting systems.

Bruns (1987) conducted a field study, observing an attempt to change a long-established cost accounting system of a manufacturing firm. The company had innovative production techniques due to external factors of competition and the decline of corporate performance. Managers and accountants both recognized the need for an improved cost accounting system. However, the firm experienced little success in modernizing the cost accounting system. Like Kaplan (1986), Bruns particularly noted that top management did not aggressively support the project to update the cost accounting system. According to Bruns (pp.116-117):

> The embedded nature of cost accounting systems and the inexperience of managers at changing them may be the reason we find so few up-to-date systems in use, even though the need for better systems seems so obvious to many managers and outside observers alike.

The decision to adopt and implement an innovation, especially an accounting innovation, has more than one dimension, because the decision involves several stages (for example, the aims of the innovation; the economic assessment; the possibility of applying the innovation). After an innovation in accounting has come to light firms must decide whether or not they will adopt it. Managers' tasks are to assess the economic rationality of adoption.

Decision-makers must assess the degree of efficiency with which accounting innovations can reach the targeted aims. In short, a professional controller will have to identify goals and be able to gather insights into casual means-end relationships in order to assess technically the economic rationality of the innovation (Vosselman, 1998).

It can be questioned whether the decision-making processes in organisations can develop along the lines of technical-economic rationality. This question is applicable to all kinds of decisions, in production systems as well as information systems. There is, however, a significant difference: an economic justification of the adoption of accounting systems innovation is even more difficult than the economic justification of an investment in the production system of a firm. A casual relationship with the economic performance of the entire firm can hardly be found. Therefore, the potential technical efficiency of the accounting innovation is difficult to ascertain.

Dunk (1989) attempted to explain why accounting innovations lag behind production innovations, by using Evan's (1966) concept of organizational lag to accounting. Evan (1966, p. 52) stated that administrative innovations lag behind technical innovations because managers in industrial organizations perceive technical innovations to be more tangible and more closely related to profitability than administrative innovations. According to Evan, potential benefits from administrative innovations are less certain than potential benefits from technical innovations. Also, organisations will probably need more time to realize a recognizable gain from administrative innovations than technical innovations. Dunk hypothesized that causes of organizational innovations lag apply to accounting innovations because accounting is an administrative function. Hence, it is suggested that the perceived relative attributes of accounting compared with technical innovations are likely to be the general cause of accounting lag, whether in manufacturing or other organisational settings (Dunk, 1989, p. 152). Moreover, Foster and Ward (1994) stated in their study that accounting innovations are more difficult to adopt than technical innovations. Furthermore, accounting innovations are likely to face more resistance than other administrative innovations.

The literature generally assumes that management accounting innovations are radical administrative innovations (Dunk, 1989; Foster and Ward, 1994; Shields, 1995).

However, Van de Ven (1986, 1993) remarks that most innovations involve new technical, as well as administrative, elements and that the implementation of some particular innovation in general leads to the implementation of a number of other, related (technical or administrative) innovations. In this context, the adoption and implementation of the innovation itself will lead to some technical (for example new software), as well as the support function to make the administrative innovation work. Some writers have questioned whether management accounting innovations can be classified as pure administrative innovation. For example, Gosselin (1997) considers ABC to be an innovation with multiple levels, of which two are basically technical innovations which contain activity analysis and cost drivers analysis, and only activity based costing represents an administrative innovation.

4.10 Diffusion of innovation literature applied to ABC empirical studies

Recently a few researchers have drawn off the theories described in this chapter to examine the diffusion of ABC. Malmi (1999) examined the extent to which the diffusion of ABC in Finnish firms could be explained in terms of the four perspectives identified by Abrahamson (1991): the efficient-choice, forced selection, fad and fashion perspectives. Malmi examined the rate of ABC adoption during the period 1986–1995 and identified three phases according to the diffusion curve: the initial phase (1986–1990), the take-off phase (1991–1992) and later phases representing the period after 1992. A postal questionnaire survey was used and the respondents were asked to indicate the extent to which nine motives influenced the decision to adopt ABC. The nine motives included six efficient-choice motives, one forced selection motive and two fashion and fad motives.

Malmi found that, in the initial phase, the motives within the efficient-choice category were the most frequently cited. He also examined the supply side and found that consultants played almost no role in the initial phase. ABC was not taught at that time in Finland and no courses or seminars on ABC were available. Furthermore, there was no suitable software for ABC, no local companies to imitate and a lack of awareness of ABC being used in overseas companies. Thus, the fashion or fad perspectives did not explain the adoption behaviour in the early phase. There was also no evidence to suggest that the adoption decisions were, somehow, forced by outside organisations. Malmi concluded that the efficient-choice perspective had the strongest explanatory power in explaining adoption behaviour in organisations in the initial stage of innovation diffusion of ABC. He also concluded that the driving force for innovation diffusion during this phase was inside the group of adopting organisations.

For the take-off period phase approximately two thirds of the respondents referred to the fashion-related motives, although the 'rational' motive still dominated during the entire period. In terms of the supply side, interviews with the respondents suggested that some of the adoption decisions were influenced by consultants. Malmi also reported an increase in the number of articles in 1990 when ABC took off in Finland. Little evidence was found to support either the forced selection or fad perspectives. Malmi concluded that the efficient choice and fashion perspectives both explain adoption behaviour during the take-off phase of innovation diffusion of ABC and that the driving force for innovation diffusion during this phase comes from outside the group of adopting organisations.

For the subsequent phase beyond take-off (1993–1995), a number of units cited a suggestion from headquarters as their motive for adoption. In addition, at this time there were sub-units of Finnish-based multinationals in which ABC had been applied earlier in some other units. Thus, it appears that learning in one unit leads to its wider applications in other sub-units in some organisations, suggesting that decisions to apply ABC further are more a result of efficient-choice than imitation. Another feature of this phase was that in 1993 and 1994 the first PC applications appeared. The existence of suitable software for PC use was given as one of the reasons for the timing of ABC adoption. It appeared that such firms had considered ABC and realised its demands on data collection and processing. Adoption as a consequence of the lower cost of implementation suggests that the decision falls within the efficient-choice category.

Malmi states that, although the data does not provide clear signals as to which perspective explains diffusion after the take-off phase, previous research provides some clues. First, fashion-setting firms may be able to influence adoption decisions in a fairly limited time-frame. This is partly because companies start to obtain information on other projects, both positive and negative, enabling uncertainty to be reduced and thus making the decision more rational. However, DiMaggio and Powell (1983) suggest that organisations imitate each other (instead of fashion-setting organisations). Malmi concludes that efficient choice and fad perspectives both explain adoption behaviour in organisations subsequent to the take-off phase and, that, the driving force for the ABC innovation comes from inside the group of adopting organisations.

Other researchers besides Malmi have drawn off Abrahmson's four perspectives. In a study of the application of ABC in the UK's largest financial institutions, Innes and Mitchell (1997) conclude that for one of the banks studied, although there may have been instrumental reasons for using ABC information to increase cost-consciousness, the specific choice of ABC did seem to be influenced by the imitation of other banks together with the easy availability of ABC packages. Based on interviews in 23 large Greek firms, Ballas and Venieries (1996) found evidence that four of the firms were using, or phasing in ABC following the influence of multinational parent companies. Kennedy and Affleck-Graves (2001) found evidence to indicate that ABC adopting firms listed on the London Stock Exchange had significantly higher financial performance measures compared with non-adopting firms and concluded that this may represent a rational value enhancing choice when adopting ABC[1]. They concluded that their findings provided some support for the efficient choice perspective. It is apparent from the above discussion that no consistent picture emerges linking Abrahmson's four perspectives to ABC adoption.

Several researchers have drawn off process theory innovation research to classify ABC adopters and non-adopters in terms of terms of adopting ABC as an innovation. Gosselin (1997) points out that the innovation process is usually described as comprising four distinctive stages: adoption, preparation, implementation and routinisation. During the adoption stage the need for change is recognised and the organisation makes the decision to adopt or reject the innovation. Once the decision to adopt the innovation has been made, an infrastructure must be developed to support the innovation. This represents the

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[1] A description of the research by Kennedy and Affleck-Graves is presented in Chapter 5 (section 5.9)

preparation stage. The implementation stage consists of introducing the innovation and evaluating its impact. During the last stage, routinisation, the innovation becomes part of daily practice.

Based on the above stages, some researchers have defined ABC adoption as consisting of wishing to implement ABC or adopting ABC as an idea (e.g. Bjornenak, 1997; Booth and Giacobbe, 1998), whereas others have classified ABC adoption as representing ABC implementation (e.g. Malmi, 1999) and others have examined the different stages of ABC adoption (e.g. Gosselin, 1997). Gosselin suggests that, at the adoption stage, firms initially make the decision whether or not to adopt an activity management approach (consisting of either activity analysis or activity costing). During the preparation process the firm has the opportunity to re-examine the decision made during the adoption stage (Rogers, 1985) and not to implement an activity-based approach, limit itself to activity management or implement a full ABC system that also incorporates product costing.

Gosselin reported that 122 out of the 161 organisations (76%) in his study had adopted an activity management approach at the adoption stage. Further analysis beyond this stage indicated that, of the 122 adopting organisations, 18 did not implement an activity-based approach, 46 implemented an activity-based management approach and 58 implemented a full ABC system. Therefore, as a percentage of the total respondents (N = 161), 36% implemented ABC and 29% implemented an activity-based management approach.

Gosselin hypothesised that strategy plays a key role in the innovation process and that the necessity to innovate is influenced by the strategy of the business unit. According to Gosselin, prospectors are organisations that face a more unpredictable and uncertain environment than organisations following a defender strategy. They need to have better information on activities and their related costs. Also, prospectors have structures that enable them to facilitate and co-ordinate numerous and diverse operations and their need for information covers a much broader range than defenders. Thus, the adoption of innovations is easier for prospectors than defenders. Therefore, Gosselin hypothesised and found ($p < .01$) that a prospector strategy is positively associated with the adoption of an activity management level.

Gosselin also examined how organisational structure influences the capability of an organisation to implement an innovation successfully drawing off the work of Damanpour (1991). Gosselin argued that activity analysis and activity costing should be classified as technical innovations because they focus mainly on processes and activities, whereas, if an organisation goes beyond these levels and installs ABC, the innovation becomes more administrative than technical. ABC is an administrative innovation because its implementation may lead to new administrative procedures, policies and organisational structures. According to the empirical studies within the diffusion of innovation literature (e.g. Damanpour, 1987; 1991), mechanistic characteristics facilitate the adoption and the implementation of administrative innovations, whereas technical innovations are easier to adopt and implement in organic organisations. Gosselin hypothesised that, among organisations that adopt an activity management approach, a mechanistic structure is positively associated with organisations that *adopt* ABC.

To test the above hypothesis Gosselin divided the 122 business units that adopted an activity management approach into two groups, the first consisting of 45 units that decided to pursue activity analysis or activity costing and 77 units that adopted ABC. Only vertical differentiation was significant and centralisation, formalisation and size were not significant in distinguishing between the two groups. Gosselin points out that vertical differentiation is a critical determinant in the mechanistic/organic model since it captures how bureaucratic the decision process is in an organisation. The selection of an administrative innovation like ABC is facilitated in business units that have a higher level of vertical differentiation because this type of innovation is much more formal. Thus, when a mechanistic organisation decides to innovate in the cost management area, it prefers to select an administrative innovation like ABC.

To test a third hypothesis, Gosselin divided the 77 organisations that adopted ABC into two groups; 28 organisations decided to pursue ABC but finally implemented only activity analysis or activity costing or did not implement any activity management approach. The second group was made up of the 49 business units that had both adopted and implemented ABC. According to Rogers (1985), the initiation of innovations is easier in organic organisations while implementation is facilitated in mechanistic organisations. Drawing off these ideas, Gosselin hypothesises that organic organisations that adopt ABC may be more tempted to limit the innovation process to the activity analysis or activity costing level, whereas mechanistic organisations that adopt ABC would prefer to pursue ABC all the way.

Gosselin found that centralised and formal organisations that *adopt* ABC are more likely to *implement* ABC than decentralised and informal organisations. The results also suggested that decentralised and less formal organisations have greater flexibility to stop the ABC implementation process at the activity analysis or activity costing level if they feel that it is relevant to do so. There was no significant evidence of an association between vertical differentiation and the probability of implementing activity analysis or activity costing instead of ABC. Gosselin concludes that vertical differentiation may have more impact on the adoption decision than on the implementation process. When mechanistic units make the decision to adopt an innovation such as ABC, they carry through with the overall process without stopping at an earlier activity at management level because they rely on formal systems.

In summary, Gosselin's research indicates that the strategy that an organisation selects establishes the need for an innovation in the activity management area. Organisational structure influences the capability of an organisation to implement innovations. Organic organisations are more likely to implement activity analysis and activity costing while mechanistic organisations are likely to be more successful in the implementation of ABC.

4.11 Factors influencing the process of change in management accounting

Although it was pointed out at the beginning of this chapter that the concept of change is not necessarily equivalent to the concept of innovation, a study by Innes and Mitchell (1990) of the factors influencing the process of change in management accounting is relevant to the content of this chapter. In a study involving seven firms, the authors observed that change in management accounting practice was associated with a specific set of circumstances which they termed facilitators, motivators and catalysts.

Facilitators represented a set of conditions that were conducive to management accounting change which were necessary but not conducive, in themselves, for the change to occur. Examples included the availability of adequate accounting staff and computing resources and the authority attributed to the accounting function within the organisation. The second set of factors (motivators) were those considered to be influencing the observed changes in a general manner. Examples included the competitiveness of the market, production technology and the product cost structure. The final set of factors (catalysts) were those directly associated with the changes with their occurrence correspondingly closely to the timing of the change. Examples included the loss of market share, the arrival of a new accountant or a deterioration in profitability.

Management accounting change occurred through the interaction of each of the factors. The motivators and catalysts acted positively to generate change but could only become effective where suitable facilitating conditions existed. Innes and Mitchell conclude that it is the existence of an interaction of the above three factors, which promote and determine the nature of practical developments in management accounting.

4.12 Summary/conclusion

To derive a better understanding of factors influencing the adoption, non-adoption and implementation of management accounting innovations (such as ABC systems), it is important to be aware of theories derived from the diffusion of innovation literature. This chapter has provided a brief summary of the diffusion of innovation literature. The different categories of innovation have been described. This was followed by an overview of the different perspectives that can be adopted to classify diffusion of innovation research. Next, alternative explanations for the acceptance or rejection of efficient/inefficient innovations were described. Finally, empirical research relating to the application of the diffusion of innovation literature to accounting innovations was described. In the next chapter, other empirical studies relating to ABC usage and applications that do not directly draw off the diffusion of innovation literature will be examined.

CHAPTER 5

A REVIEW OF THE EMPIRICAL STUDIES

5.1 Introduction

5.2 A brief overview of the ABC literature

5.3 Studies relating to adoption rates and characteristics of ABC systems

5.4 Studies relating to ABC applications

5.5 Studies relating to factors influencing the success of ABC systems

5.6 Studies relating to factors influencing the failure of ABC systems

5.7 Studies relating to factors influencing the adoption of ABC systems

5.8 Studies relating to the association between ABC and improvement in financial performance

5.9 Summary/conclusion

CHAPTER 5

A REVIEW OF THE ABC EMPIRICAL STUDIES

5.1 Introduction

This chapter, and chapters 2 – 4, provide a literature review to support this thesis. Chapter 2 presented a general description of the current views relating to the different purposes of management accounting systems. The criticisms that have been made of traditional management accounting systems and the factors leading to the emergence of ABC systems were also discussed. The third chapter concentrated on the literature relating to the exposition of ABC theory. In addition, the change of emphasis from ABC representing a mechanism for generating more accurate product costs for decision-making to it also being used as a strategic cost management tool was described. To derive a better understanding of factors influencing the adoption, non-adoption and implementation of ABC systems Chapter 4 focused on the diffusion of innovation literature. This chapter represents the final literature review chapter. It aims to provide a summary of the ABC empirical studies.

5.2 A brief overview of the ABC literature

A study of the development of the ABC journal literature by Bjornenak and Mitchell (2000) indicated that there were approximately 355 published papers on this topic over the period from 1987 to 1998. Further analysis indicated that three specialist practitioner management accounting journals (the UK Management Accounting and USA Management Accounting journals and the USA Journal of Cost Management) accounted for 80% of the 355 published papers. Jones and Dugdale (2002) undertook an analysis of the publications in the UK and USA management accounting journals. Their analysis is presented in Table 5.1. The table shows that expositions of ABC theory dominate in both journals and cases studies also predominate in the USA Management Accounting journal. Surveys represent only a small proportion of the publications in both journals.

Table 5.1 Summary of articles published in the UK and USA *Management Accounting* journals

a) UK Management Accounting Journal

Year	Expo.	Case	Report	Survey	Crit.	All	*Specific*	*General*
1988	1	-	-	-	-	1	*1*	-
1989	2	1	-	-	1	4	*3*	*1*
1990	4	1	-	-	1	6	*5*	*1*
1991	2	-	-	1	1	4	*4*	-
1992	2	1*	1	1	1	6	*4*	*2*
1993	5	3*	4	-	1	13	*7*	*6*
1994	6	2	3	-	-	11	*8*	*3*
1995	18	3	4	2	1	28	*24*	*4*
1996	4	4	2	1	-	11	*9*	*2*
1997	7	1	1	-	-	9	*6*	*3*
1998	6	-	1	1	-	8	*4*	*4*
All	57	16	16	6	6	101	*75*	*26*

b) USA Management Accounting Journal

Year	Expo[a]	Case[b]	Report[c]	Survey[d]	Crit[e]	All	*Specific*[f]	*General*[g]
1988	1	-	-	-	-	1	*1*	-
1989	2	-	-	-	-	2	*2*	-
1990	8	4	-	-	-	12	*8*	*4*
1991	7	2	-	-	1	10	*10*	-
1992	8	4	-	-	1	13	*11*	*2*
1993	5	10	8	1	-	24	*16*	*8*
1994	8	6*	3	2	-	19	*13*	*6*
1995	6	5	2	1	-	14	*9*	*5*
1996	2	9*	1	2	-	14	*11*	*3*
1997	-	9*	1	-	-	10	*10*	-
1998	10	7	4	1	-	22	*14*	*8*
All	57	56	19	7	2	141	*105*	*36*

Note:
a= Exposition=ABC/ABM theory, general reviews of developments, student examples;
b= single or multiple case studies (* = includes one case which is seen as "failure" of ABC or where an alternative approach is advocated);.
c=reports-meetings, SMAs, book review (US), research grants (UK);
d= postal questionnaire or survey interview research of ABC/ABM practice/teaching;
e=critiques of ABC/ABM essentially opposed to theory or practice;
f=item which or predominantly concerned with ABC/ABM; and
g= item which discusses a range of issues with ABC/ABM given significant weighting.

Bjornenak and Mitchell provide further insights by restricting the analysis to the ten academic research journals that were included in the analysis. They identified 53 ABC publications (UK and USA) and classified them as follows:

- Surveys (11)
- Case/field studies (8)
- Technical theory developments (10)
- Analytical/mathematical modeling (10)

- Analytical/mathematical modeling (10)
- Econometric based studies (7)
- Reviews (7).

The above list, and Table 5.1, indicate that the publications include a wide range of research methods and, assuming no duplications, 24 surveys and 80 case studies have been published between 1987 and 1998.[1] It would be impossible to summarise and discuss all of the empirical studies that have been undertaken. Therefore the studies described in this chapter represent those which are considered best to provide the background and foundation for undertaking the research presented in this thesis.

5.3 Studies relating to adoption rates and characteristics of ABC systems

Since the beginning of the 1990s many surveys have been undertaken in different countries to ascertain the ABC usage rates. A summary of these studies is presented in Table 5.2. The survey evidence suggests that, over the last decade, there has been an increasing interest in ABC, but the rate of implementation has been fairly slow. The UK surveys in the early 1990s reported varying adoption rates. For example, a mail survey by Innes and Mitchell (1991) of 187 British management accountants found that 52% of the firms for which the respondents worked had not considered using ABC, while 33% were currently considering whether to use it. Of the 15% of firms that had decided to use it, 9% had subsequently rejected it and 6% were still using it. In other words, 60% of the 15% that had implemented it had subsequently stopped using it. The conclusion of the survey was that

> ABC is clearly at an early stage in its development in the UK, practical experience is still the exception and although short-run feedback from those using it is predominantly favourable, a long -run assessment will have to wait for a few years ... a strong need is apparent for a continuing research effort and the dissemination of information, particularly about particular experiences with ABC.

[1] The number of surveys and case studies published represent the sum of Bjornenak and Mitchell's list and the publications listed in Table 5.1.

A considerably different usage rate was reported by a UK survey undertaken by Bright *et al.* (1992). They reported a usage rate of 32% but they indicated that they were sceptical about the observed high rate and believed that the level of actual usage was much lower. However, in the early 1990s similar UK usage rates to the Innes and Mitchell study were reported by Nicholls (1992) and Drury *et al.* (1993). Nicholls undertook a survey of 62 organisations of which 10% had implemented ABC and 62% were assessing its suitability. The Drury *et al.* study indicated that 13% of the 303 surveyed UK manufacturing companies had implemented, or were in the process of implementing, ABC.

A later and far more comprehensive study by Innes and Mitchell (1995), undertaken in 1994 and based on 251 responses (a 25.1% response rate), identified:

- 49 organisations (19.5%) using ABC;
- 68 (27.1%) currently considering its adoption;
- 33 (13.2%) rejecting ABC after assessment, and
- 101 (40.2%) having given no consideration to adopting ABC.

There were no significant differences between manufacturing and non-manufacturing organisations, whereas a significantly higher usage rate was apparent in the larger firms surveyed. The average age of the ABC systems since adoption was 3.5 years and in-house accountants were by far the most common participants in establishing ABC being involved in 46 of the 49 adoptions. This was followed by consultants who were involved in participating in 20 out of the 49 adoptions. With regard to the software used 65% of the users reported that their ABC systems were based on a spreadsheet or database package and 29% had acquired a specialised ABC package. Only 18% had developed in-house software.

Reasons for rejection by the 33 firms rejecting ABC were sought. The high level of resourcing required (36%), the difficulty in identifying benefits (27%) and a variety of other factors (33%), such as high direct cost content, the existence of few product lines and the general unsuitability to the respondents' business, were cited as reasons for non-adoption. For those firms not considering the adoption of ABC (n = 101) the most important reasons were lack of appropriateness to the respondents' type of business (36%), satisfaction with the existing costing system (19%), lack of time to make an assessment (13%) and a lack of knowledge of ABC (7%).

In order to assess how the adoption of ABC has progressed over time Innes and Mitchell replicated their 1994 survey in 1999[1]. Based on 177 responses (a usable response rate of 23%) Innes *et al.* (2000) reported a marginal decline in the proportion of users and those currently considering ABC adoption, both having fallen from 21% and 29.6% to 17.5% and 20.3%, respectively. In addition, a slightly higher proportion (15.3% compared with 13.3%) had rejected ABC after assessment. Statistical tests indicated that there were no significant differences between the aggregate rate of ABC adoption and the distribution between the three categories for the two periods in time. However, the proportion of respondents that had given ABC no consideration was significantly larger (46.9% in 1999 compared with 36.1% in 1994). Given that it is logically impossible to 'un-consider' ABC, Innes *et al.* attribute the apparent anomaly to either the different companies responding to both surveys or to changes in structures to the companies occurring between the surveys. In terms of overall adoption and the pattern of adoption Innes *et al.* conclude that adoption positions on ABC have not changed significantly over the period, either in total or by sector. Firms in the financial sector and larger firms continue to have significantly higher adoption rates.

The 1999 survey also indicated that in-house accountants retained their dominant position in participating in system design (90% of users in 1999 compared with 89% in 1994) but there was an increasing involvement by consultants (48% in 1999 compared with 31% in 1994). There was a significant increase in the proportion of adopters using specialised commercial packages (58% in 1999 compared with 24% in 1994). The average number of cost pools and activity cost drivers used in 1999 were, respectively, 22 (10 in 1994) and 14 (10 in 1994). As expected, the average experience of ABC

[1] The Innes and Mitchell (1995) results reported were based only on responses from non-financial companies. A survey relating to only non-financial companies was published separately in Innes and Mitchell (1997). For the comparison of the 1994 survey with the 1999 survey (Innes and Mitchell, 2000) the non-financial responses (Innes and Mitchell, 1997) were added to the results reported in Innes and Mitchell (1995) to derive the total 1994 responses. Therefore the results reported in this thesis relating to the 1995 publication are nor directly comparable to the 2000 publication.

implementation was longer for the 1999 survey being 5.4 years compared with 3.7 years for the 1994 survey.

Around a similar time to the Innes *et al.* (2000) study, Drury and Tayles (2000) undertook a survey relating to cost system design and profitability analysis in UK companies. They reported that 15% of the organisations had implemented a full ABC system, 5% indicated partial implementation and a further 3% were actually in the process of implementing it. They also reported that the usage rates were significantly higher in financial and commercial and larger organisations. The details relating to the number of different types of cost driver rates and cost pools were as follows:

- 50% used more than 10 separate types of cost driver rates;
- 27% used between 7-10 separate types of cost driver rates;
- 23% used between 4-6 separate types of cost driver rates;
- 50% used more than 50 cost pools;
- 27% used between 21 and 50 cost pools, and
- 23% used between 11 and 20 cost pools

Apart from the survey by Bright *et al.* similar usage rates have been reported by the UK studies. It would appear that, in the early 1990s the usage rate may have been approximately 10% but, by the late 1990s it had increased to approximately 20%. However, usage rates were higher in larger organisations and organisations operating in the financial sector.

Clarke *et al.* (1999) examined the adoption of ABC in Irish companies. Their survey of 204 companies indicated that 12% had implemented ABC, 20% were assessing it, 13% had rejected it and 55% had not considered adoption. Studies undertaken in mainland Europe report usage rates of 19% in Belgium (Bruggeman *et al.*, 1996) and 6% in Finland in 1992, 11% in 1993 and 24% in 1995 (Virtanen *et al.*, 1996). The study of Finnish companies by Malmi (1999) reported a usage rate of 2%. Low usage rates have been reported in Denmark (Israelsen *et al.*, 1996), Sweden (Ask *et al.*, 1996) and Germany (Scherrer, 1996). Surveys indicate that prior to the mid-1990s activity-based techniques do not appear to have been adopted in Greece (Ballas and Venieris, 1996), Italy (Barbato *et al.*, 1996) and Spain (Saez-Torrecilla *et al.*, 1996).

Studies outside Europe indicate a usage rate of 14% in Canada (Armitage and Nicholson, 1993). In the USA several surveys have examined the adoption of ABC in firms and report a range of results. For example, Green and Amenkhienan (1992) claimed that 45% of manufacturing firms using advanced technologies used ABC to some extent. Shim and Sudit (1995) claimed that 27% of the manufacturing firms surveyed had fully or partially implemented ABC. In another survey, the Cost Management Group of the Institute of Management Accounting (1993) reported that 36% of responding USA firms had implemented ABC. Also, in a later study by the same group (1996) they reported that 41% of the firms had adopted ABC. Other studies by Hrisak (1996) and Shim and Stagliano (1997) respectively reported usage rates of 53% and 27%.

To ascertain the relative past and future usage of various management accounting techniques and their relative benefits, Chenhall and Langfield-Smith (1998) conducted a postal questionnaire of Australian companies. Based on a response rate from 78 companies the respondents ranked all of the activity-based techniques (ABC, ABM and activity based budgeting) within the lowest third category (out of 42 listed techniques) in terms of their relative past use, future emphasis and past benefits.

5.4 Studies relating to ABC applications

In their 1994 and 1999 surveys referred to in the previous section, Innes and Mitchell (1995) and Innes *et al.* (2000) examined the extent to which ABC was used for different applications and the respondents' views on the importance and success of each type of application. Their findings are reported in Table 5.3. It can be seen that cost reduction, pricing, performance measurement/cost improvement and cost modelling were the most widely used applications for both the 1994 and 1999 surveys. Stock valuation attracted the lowest application but this is not surprising since stock valuation is not an issue for most non-manufacturing companies. Similarly, the high application rate of ABC for pricing is surprising given that many companies are likely to be price-takers and not involved in making pricing decisions. According to Innes *et al.* (2000) there were no statistically significant changes in the application rates or importance ratings between the 1994 and 1999 surveys. Apart from the 'other applications' category the four highest importance ratings were cost reduction, product/service pricing, performance measurement/improvement and budgeting for both surveys. In terms of the success rating for the applications, customer profitability attracted the highest rating and stock valuation the lowest in the 1994 survey. For the 1999 survey stock valuation had the highest and new product/service design success rating. For both surveys there was little dispersion in the mean success ratings for the different applications but statistically significant increases in the ratings were reported for stock valuation and output decisions.

The overall impression derived from Table 5.3 is that ABC is widely used and considered important for both product costing (e.g. product pricing and customer profitability analysis) and cost management applications (e.g. cost reduction and budgeting). It appears that ABC has been extended from its initial implementation objectives of product costing to becoming firmly established as a cost management tool.

Table 5.2 Adoption rates for ABC in different surveys

Date	Author	Country	Population	Actual usage of ABC	Comments
1991	Innes and Mitchell	UK	British management accountants	6%	33% of the companies were dealing with ABC under considering
1992	Ask&Ax	Sweden	Engineering industry	2%	6.7% of companies stated that they were currently running ABC pilot study.
1992	Bright *et al.*	UK		32%	They indicated that they were sceptical about the observed high rate and believed that the level of actual usage was much lower
1992	Green &Amenkhienan	USA	Manufacturing Industry	45%	They claimed that manufacturing firms using advanced technologies used ABC to some extent.
1992	Innes and Mitchell	UK	British management accountants	7%	The invsitgation for the companies that had indicated that they were considered in study 1991; 20% still considering ABC.
1992	Nicholls	UK	Annual sales £15 –100m	10%	10% had implemented ABC and 62% were assessing its suitability.
1993	Armitage & Nicholson	Canada	Manufacturing industry	14%	
1993	Cobb, Innes & Mitchell	UK	Manufacturing industry; Financial services	6%	
1993	Cost Management Group of the Institute of Management Accounting	USA		36%	
1993	Drury *et al*	UK	Manufacturing Industry	13%	
1993	Szendi &Elmore	USA	Controllers attending seminars	8%	
1993	Laitinen In(Bhimani ,1998)	Finland	Manufacturing Industry	11%	
1994	Andersen&Rohd In(Bhimani ,1998)	Denmark	800 largest firms	4%	
1994	Ernst& Young	Belgium	Belgian Companies	19.5%	49.5% planned to change to ABC
1994	Sorensen &israelsen	Denmark	Danish manufacturing	10%	
1994	Hauer In(Bhimani ,1998)	Germany	Manufacturing industry	3%	
1995	Friedman and Lyne	UK	11 Companies	19.5%	27% are currently considering ABC adoption
1995	Innes & Mitchell	UK	The largest 1000 companies	19.5%	19.5% using ABC; 27.1% considering and 13.2% rejecting.
1995	Malmi	Finland	Engineering industry	14%	8% currently being implemented
1995	Virtanen et al	Finland	Manufacturing Industry	24%	The last survey in a series of three that reported (Virtanen et al,1996)
1996	Corrigan (1996)	Australia	Manufacturing industry	12%	
1996	Cost Management Group of the IMA	USA		41%	
1996	Hrisak	USA		53%	
1996	Lukka&Granlund	Finland	Manufacturing Industry	0%	6% currently being implemented
1997	Bjõrnenak	Norway	Manufacturing Industry	40%	Of 75 companies 30 of them were considered adoption includes companies that plan to adopt ABC
1997	Shim & Stagliano	USA	Manufacturing Industry	27%	They had fully or partially implemented ABC
1998	Chenhall &Langfield-Smith	Australia	Manufacturing Industry	56%	
1998	Cost Management Group of IMA Krumwiede	USA	Members of IMA	34%	49% "adopters". 70% implemented or decided to implement ABC
1999	Clarke et al	Ireland	Manufacturing industry	32%	12% had implemented ABC, 20% were assessing it and 13% had rejected
1999	Groot	Holland	Food industry	12%	
1999	Malmi	Finnish		2%	
2000	Drury & Tayles	UK	Members of CIMA	23%	15% full ABC ;5% Partial ABC and 3% ABC in progress
2000	Innes & Mitchell	UK	The largest 1000 companies	17.5%	A follow-up to the (1995) survey
2001	Bescos et al	Canada	500 biggest companies	23%	14% rejection
2001	Dahlgren et al	Sweden	Manufacturing Industry	16%	

Table 5.3: ABC applications (adapted from Innes and Mitchell, 2000)

Purpose	Adopters		Importance rating		Success rating	
	% of ABC users for 1999 (n = 31)	% of ABC users for 1994 (n = 74)	Average (SD) 1999	Average (SD) 1994	Average (SD) 1999	Average (SD) 1994
Cost reduction	90.3	89.2	4.4 (0.8)	4.5 (0.6)	4.0 (0.8)	3.8 (0.8)
Product/service pricing	80.6	68.9	4.4 (0.9)	4.3 (0.9)	4.1 (0.8)	3.8 (0.8)
Performance measurement/improvement	74.2	60.8	4.3 (0.6)	4.3 (0.7)	3.9 (0.8)	3.7 (0.8)
Cost modelling	64.5	62.2	4.3 (0.6)	4.1 (0.8)	4.0 (0.8)	3.7 (1.1)
Budgeting	54.8	56.8	4.4 (1.07)	4.2 (0.7)	3.9 (1.0)	3.7 (0.9)
Customer profitability analysis	51.6	51.4	4.5 (1.0)	4.1 (1.1)	4.2 (0.8)	3.9 (0.7)
Output decisions	51.6	47.3	4.1 (0.9)	3.8 (1.2)	4.2 (0.8)	3.7 (0.8)
New product/service design	41.9	35.1	4.2 (1.08)	3.8 (1.2)	3.8 (1.1)	3.8 (0.9)
Stock valuations	16.1	24.2	3.9 (1.8)	3.2 (1.5)	4.6 (0.5)	3.6 (1.0)
Other applications	16.1	9.5	5.0 (0.0)	4.8 (0.4)	N/A	N/A
Overall success					3.9 (0.8)	3.8 (0.7)

The use of ABC for both product costing and cost management purposes has also been reported in other studies. In a study of 117 food manufacturing and retail companies in Holland, Groot (1999) observed that the most popular uses of ABC were cost reduction, calculating product profit margins, improving production process, planning and budgeting, and performance evaluation. However, studies in the early 1990s tended to emphasise the product costing applications. The UK study by Nicholls (1992) indicated the dominance of product costing with 65% of the respondents citing the most important reason for implementing ABC being the need to obtain a better understanding of product costs. Malmi (1996) observed that a variety of people used ABC information for different purposes in Finnish companies. It was used as a decision-making device by the production function for production/process development and pricing decisions, while the marketing function used it for product mix and pricing decisions. Also, in another Finnish study involving a questionnaire, responses from 135 manufacturing units, Lukka and Granlund (1996) reported that the most common benefits of ABC product costing methods were the provision of more timely, accurate and relevant information for decision support and product profitability.

Friedman and Lyne (1995) carried out an extensive review of ABC applications involving case studies of 11 UK companies. They reported that ABC information was widely used for make-or-buy and product range decisions, negotiations with customers, preparing bids and non-value-added activity analysis and costing. They found in the companies they visited that many decisions made after using ABC data had been thought of prior to the production of ABC information. In some cases the decisions had already been made but the subsequent availability of ABC information increased confidence in the decision. They noted that most of the companies had introduced ABC initially for product costing and pricing purposes, but it had not been implemented exactly in the ways outlined in the widely publicised Harvard Business School case studies, such as 'Schrader Bellows' (HBS 186-050). Companies used the basic concepts of ABC systems to suit their own needs. They observed that companies went on to make new uses and develop the original uses of ABC. They also noted that the majority of companies had multiple uses for ABC. The greatest effect of ABC was in companies that regularly bid for work, produce non-standard products, or are regularly asked to produce non-standard products connected to a standard product range.

Recent support for ABC being used for cost management purposes was reported by Soin *et al.* (2002). In a study of ABC in a clearing department of a bank, they found that it was used for establishing which activities were expensive and why they were being used, and to ascertain whether increased volumes would, or would not, increase costs. They found no evidence of the linking of costs to products or customers.

5.5 Studies relating to factors influencing the success of ABC systems

Several studies have been undertaken relating to the success of ABC amongst adopting firms. Measuring the success of ABC is problematic and researchers have adopted different approaches. Success has been measured by management evaluation (Shields, 1995), use and satisfaction with ABC (Swenson, 1995) and employee satisfaction (McGowan and Klammer, 1997). Most of the studies relating to the factors influencing ABC success have been undertaken in the USA. The findings of these studies have shown, among other things, that respondents' perceptions may vary depending on the role of the individuals involved (McGowan and Klammer, 1997; Swenson, 1995) as well as on the implementation stage during which they are questioned (Krumweide, 1998). These studies have also shown that the degree of success with an ABC system may vary significantly across circumstances (e.g. Shield, 1995).

Shields (1995) drew off Shields and Young's (1989, 1994) theoretical model relating to the implementation of cost management systems to undertake a postal questionnaire survey of 143 USA manufacturing firms relating to the factors influencing the successful implementation of ABC. The assumption underpinning the Shields and Young model is that cost management systems (including ABC systems) are administrative innovations rather than technical innovations.

Shields acknowledges the difficulty in defining ABC success. He states:

> Providing a definition, however, was problematic, as the literature is vague about what constitutes success, and discussions with ABC experts during construction of the survey did not result in consensus about a tangible definition. For example, success can include top management not rejecting it, an implementation of ABC *per se*, use of ABC information by non-accountants, gaining competitive advantage and providing additional profits. Thus, the approach adopted was to let the respondent rate the degree of success with whatever definition he deemed relevant. Future research can attempt to catalogue the various definitions or types of success (p. 153).

and that success is determined by:

> ...the fate of ABC depends on how well it matches the preferences, goals, strategies, agendas, skills and resources of dominant or powerful coalitions of employees, particularly top management (p. 149).

Shields tested a model by identifying 17 variables and testing their impact on the successful implementation of ABC. Using a step-wise regression model he found that respondents' perception of success was linked to six behavioural and organisational variables: top management support; integration with competitive strategies (such as TQM and JIT); performance evaluation and compensation; non-accounting ownership of the ABC project; training provided for designing, implementing and using ABC ; the provision of adequate resources. Technical characteristics of the systems, such as the type of software adopted or whether ABC systems represented stand-alone systems, had no influence on ABC success.

Shields concludes that the key to implementing ABC successfully is effectively dealing with specific behavioural and organisational variables. Success is likely to be increased when the six variables are used as part of an integrated implementation strategy. Top management support for ABC is very important because senior managers can focus resources on activities they deem worthwhile and sideline innovations that they think are not. Linkage to competitive strategy, performance and evaluation are important to motivate and reward employees and encourage them to focus on using ABC information to improve their firms' competitive position and profits. Training in designing, implementing and using ABC is important for two reasons. Firstly, it is seen to be an important way to interrelate ABC among strategy, performance evaluation and compensation. Secondly, it provides an opportunity to achieve non-accounting ownership, since ABC information is intended to be used by a variety of employees for analysis and action non-accounting ownership is a result of adequate training, top management support and linkage of ABC to competitive strategy, performance evaluation and compensation. Finally, Shields states that sufficient internal resources are desirable so that employees do not believe that an ABC initiative is pressurising them to do more without adequate support. Resources should be provided that allow the employees the opportunity to learn about ABC and to experiment with alternative designs.

Swenson (1995) presented the results of a telephone survey of 50 financial and operating managers at 25 USA manufacturing firms relating to their satisfaction with ABC and their use of ABC information to support decision-making. The results indicated that participants viewed ABC as an improvement over their old cost management accounting and that those participants who were relatively more satisfied with their ABC systems were also more likely to use the ABC information to support strategic and operating decisions. McGowan and Klammer (1997) examined the perceptions of users of ABC systems of the factors influencing ABC success across four sites in a USA firm. Their findings suggested that three of the factors identified by Shields (top management support, performance evaluation links and adequacy of training and training resources) were significantly associated with ABC success. In addition, user involvement in implementation and their perception of the quality of information associated produced by the system was positively associated with ABC success.

The final study undertaken in the USA was by Foster and Swenson (1997). They identified four potential measures of ABC success: (1) the use of ABC information in decision making; (2) the decision action taken with ABC information, (3) the dollar improvement resulting from ABC and (4) management evaluation as to the overall success of ABC. Using survey data from a sample of 166 ABC-using firms, the authors examined the effect of using alternative success measures in models testing ABC success determinants. The results suggest that the explanatory power of these models may be highly affected by the choice of a success measure. Broad-based ABC success measures were shown to yield the highest explanatory power. They also reported that the variables that best explained ABC success were integration with performance evaluation linked to compensation, links to quality initiatives, top management support, implementation training and resource adequacy.

The above discussion indicates a high level of consistency regarding the USA research findings. Little research has been undertaken outside the USA relating to factors influencing ABC success. Friedman and Lyne (1999) used longitudinal case studies to investigate the factors influencing ABC success and failure in several UK companies. They found that ABC success was associated with a clearly recognised need for it at the outset, broad based support for it beyond the accounting function, adequate resourcing and its synergistic links with other activities (e.g. TQM). A UK survey by Innes *et al.* (2000) investigated the association between ABC success and top management support, the involvement of consultants, user involvement in the implementation, whether the companies were in the financial or manufacturing sector and the length of time that ABC had been in use. Only top management support had a significant impact in explaining ABC success. They also examined the impact of a variable relating to the association of ABC with TQM programmes and found some weak support for it having an impact on ABC success.

In a case study based at the Harris Semiconductor (HS) plants based in Malaysia, Brewer (1998) examined the relationship between national culture and factors influencing ABC success. Brewer identified ABC success as satisfying two conditions: recognising the socio-technical context of ABC by addressing and overcoming employees' defensive behaviours and routines as stated by Argyris and Kaplan (1994); and actually using data from the ABC system to help make decisions, as stated by Cooper *et al.* (1992).

Drawing off Shields and Young (1989) and Shields (1995), Brewer identified the need to incorporate top-management support and the need to encourage employees to work in groups as factors influencing ABC success and investigated the national culture implications of these factors. He used Hofstede's (1980) taxonomy of work-related cultural values and identified the following two items within the classification to generate his hypothesis:

1. A company that relies upon high-level managers to champion ABC initiatives in a strong 'top-down' fashion will generate more defensive behaviour in low-power-distance cultures, thereby reducing ABC success relative to high-power-distance cultures. The term 'power distance' is one of Hofstede's traits of national culture which states that in high power distance cultures, subordinates believe that inequality is normal and functional and therefore they become more obedient to their superiors which is not the norm in low-power-distance cultures. Brewer identifies the U.S. as having a low-power-distance culture and Malaysia as having a high-power-distance culture. Therefore the Malaysian plants should have a higher level of ABC success as compared to the US plants.

2. The cross-functional team-based approach to work inherent in ABC systems will result in more defensive behaviour in individualist cultures, thereby reducing ABC success relative to collectivist cultures where cross-functional teams co-operatively work in groups. The term 'Individualism' is also another of Hofstede's traits of national culture which states that an individualism culture believes in autonomy whereas a low-individualism or collectivist culture prefers to work as a team. Here, Brewer identifies Malaysia as having a collectivist culture and the US as having an individualist culture. Therefore he advocates that Malaysian plants will have a higher level of ABC success as compared to the US plants.

Based on the above predictions, Brewer drew up the following research hypothesis "the level of ABC success will be greater in HS's Malaysian plant relative to its U.S. plants". His research findings were consistent with his hypothesis. The study, therefore, suggests that national culture may have an impact on the success of ABC and, therefore, it is necessary to cater for the cultural differences when evaluating the likely success of ABC implementation. Nevertheless, Brewer points out that the generalisability of his findings has to be considered because the study is based on only one company (i.e. the Harris Semiconductor Company).

5.6 Studies relating to factors influencing the failure of ABC systems

Malmi (1997) points out that few studies have focused on the problems of failures of ABC and, consequently, little is known about what causes failure. Also Swenson (1995, p.176) states that:

> Future studies should include firms which have attempted to implement ABC but failed {and] .... Look for differences in firm characteristics, or other factors such as management support or commitment, to explain success or failure with ABC.

However, given the steady increase in the adoption of ABC, it is unlikely that a large number of failures is likely to exist or for adopters to wish to publicise them widely. Therefore, because of their small number it is likely that studies of failure will adopt a case study rather than a cross-sectional approach.

Although not directly focusing on the failure of ABC systems, Cooper *et al.* (1992) provided insights into why firms have implementation problems. Based on their field research of eight ABC firms (including six manufacturers) in the USA, they found that some of the firms experienced delay and difficulty relating to technical approaches to ABC design (e.g., hierarchical cost driver analysis, activity mapping, canned ABC software, external consultants). Also, when these do not occur, there still remains a large possibility of failure because employees frequently resist initiating the changes implied by the ABC information. Cooper *et al.* note that a key ABC implementation problem relates to ABC advocates who focus only on the technical issues involved. They suggest that the implementation of ABC will be more effective when ABC advocates begin to focus on non-technical issues. These are the early involvement of non-accountants who will be the primary users of ABC information, ensuring that the sponsor is a member of top management and a training programme emphasising the logic, design, implementation and use of ABC. Similar findings were reported by Howell *et al.* (1992) based on a field study of nine firms (8 manufacturers).

Friedman and Lyne's (1999) UK case study research also identified certain factors that affect the failure of ABC systems. According to them, resistance, the threat of redundancy, the threat of using external consultants' expertise for implementing ABC, data collection problems and the delay in time period in implementing the activity-based techniques were the reasons for the failure of ABC, or for the significant dampening of the ABC success. They also found that the high cost of implementing an ABC system was a factor identified to be a deterrent for the implementation of the ABC system.

Malmi (1997) presented two case descriptions: one an ABC success and the other a failure. Based on the outcomes of case descriptions, Malmi questions whether some of the so-called failures of ABC systems may not actually be failures, but merely reflections of the partial appreciation of the ways that accounting systems are used in practise.

In the first case description, management were concerned about the accuracy of their cost estimates for formulating new business strategy. A new ABC system, taking 10 months to design, was introduced but there were no significant differences in terms of product costs and profitability when compared with the old cost estimates. Because the ABC system did not reveal any new information, senior management did not take any new action to revise their intended strategy. Therefore, the system was only used once. As no decisions ensued and no actions were taken based on the new system, Malmi suggests that the implementation would be classed as a failure based on traditional implementation literature. He quotes Cooper *et al.* (1992) who define failure as lack of actions based on the information. Nevertheless, senior management regarded ABC as a success because it reduced the uncertainty inherent in the formal estimates. The senior management were more confident that they were on the right track and questions about the intended strategy were resolved.

In the second case description, factory management initiated a production control system to be built in parallel with a centrally initiated ABC system. However, the production control part of the system was later abandoned due to lack of project personnel time and because of a diminished need due to excess capacity. As the expected benefits from the project to the factory management were related to production control, the new ABC system did not meet their needs and expectations and they did not use it. After two years it was not maintained any more and the case thus appears to provide an example of a failure.

After providing the two descriptions, Malmi points out that they represent the same ABC project that was undertaken within the axle factory at Sisu Inc. in Finland. The first case description relates to the senior management within the company and the second to the local management within the axle factory. The intended strategy was to remove the domestic dependence on inter-divisional sales of axles by selling them to external customers. The ABC initiative by top management was signalled by the importance of axle profitability to top management. Malmi suggests that more importantly it served as a surveillance function by searching for surprises. As no surprises emerged the intended strategy remained intact. According to Simons (1990, 1995), top managers need interactive control systems in order to monitor personally the strategic uncertainties they believe are critical to achieving organisational goals. Information processing mechanisms can be seen as a means of uncertainty, reduction and information value as the degree to which uncertainty is reduced. Thus, ABC was seen as valuable for the senior management at Sisu by reducing the uncertainty of their intended strategy.

Malmi concludes that, if this wider concept of information is accepted, it has important implications for assessing the success and failure of ABC systems and that Cooper's definition described earlier may be too restrictive. Changes in decision-making may be an adequate surrogate for success when accounting information is used to implement strategy but, when it is used for surveillance, the accounting innovation may be successful even when the resulting accounting information generated does not require any decisions or actions to be taken. Thus, it is possible for a successful ABC system to be used only once and does not necessarily require continuation.

In the case of Sisu they intended to keep and maintain the new system. Given this situation Malmi examines the reasons for the apparent failure. He points out that recent literature on ABC implementation indicates that most implementation problems are neither attributable to technical flaws of ABC or the way it is applied (e.g. Argyris and Kaplan, 1994). In addition, political motives and organisation culture may be related to the resistance to accounting change (Scapens and Roberts, 1993).

In terms of political motives, Malmi pointed out that, in Sisu, axles were considered to be strategic components that were made in-house. All vehicles sold by the group contained Sisu axles and the ability to provide critical resources required by other parts of the organisation was an important source of power. Thus, transfer pricing, which was based on negotiation, was a critical issue but, because the axles were considered to be strategic components, they were determined in a way that made the axle factory look profitable. However, the new system had the potential to change the way that transfer pricing was conducted and possibly lead to a shift of power from the axle factory to the buying sub-units. Also, by creating a new visibility, the ABC system would have increased the axle factory management's accountability, providing new possibilities to exert direct control over the axle factory resources.

In respect of organisational culture, the dominant culture within the axle factory was engineers with accounting playing only a minor role in unit management. Therefore, the new ABC system was not in agreement with the local culture and it was not supported by the management of the unit.

Malmi concludes by pointing out that group management used ABC successfully for their strategic purposes, whereas local management was comfortable with the informal estimates and did not regard the new system as valuable for their day-to-day management of the factory. Thus, as far as local management was concerned, the ABC system was a failure.

5.7 Studies relating to factors influencing the adoption of ABC systems

According to Bjornenak (1997), there has been little research on who adopts ABC and for what reasons. Those studies that have focused on the potential explanatory factors influencing the adoption of ABC have examined whether the firms that have adopted ABC differ from non-adopting firms with regard to many characteristics which, according to ABC proponents, are conducive for ABC adoption. A summary of these studies is presented in Table 5.4. Cooper (1988b) suggested that ABC systems are most appropriate when four factors are present:

- *Competition is fierce:* When market competition is high, intense pressure is placed on prices, which creates a need for more accurate costing tools. In addition, margins may be increased by the price of some products while new market share could be captured by reducing the price of other products. Possessing accurately product costs in a competitive environment provides the basic tools for product strategy, positioning and promotion;

- *Product diversity is high:* A single cost allocation method, such as direct labour, is unlikely to capture accurate product costs when product mix is diverse in terms of batch sizes, physical size, raw materials and the degree of complexity. ABC systems allow for multiple cost drivers which can be tailored to represent different aspects of each product's composition. By using activities and multiple cost drivers to trace costs to products, there is less distortion than with traditional costing systems;

- *Product life cycles are short*: When product life cycles are short, greater distortion occurs with volume based allocation systems. Volume based allocation methods exclude important non-volume related factors which impact on production. Long-term production costs, such as factory buildings and capital equipment, are resources which are consumed by the conversion process. Ignoring these factors further distorts the costs, which has implications for product design and production. ABC uses cost hierarchies which accommodate short-term and long-term cost variability factors (Cooper 1990a);

- *The transaction environment is computerised:* ABC is highly reliant on electronic data processing equipment to collect and manipulate large amounts of information. In organisations where operations, transactions and accounting information are highly automated, activity based information can be more efficiently captured and utilised in an ABC system.

Based on replies to a questionnaire survey from 53 Norwegian manufacturing companies, Bjornenak (1997) examined the impact of various factors thought to influence ABC adoption. ABC adopters (30 companies) were defined as those responding organisations that had implemented ABC, were currently implementing it, or wished to implement it. Non-adopters (23 companies) were defined as those that stated that they did not wish to adopt ABC or that they had not yet decided. The variables studied were cost structure, existing cost system, product diversity and competition. The proportion of overheads within the cost structure was measured by overhead costs as a percentage of total value-added costs (direct labour + overhead). The mean percentages were 73.6% for adopters and 66% for non-adopters (significant at the 10% level). For existing cost system, Bjornenak compared the number of cost pools and allocations for adopters and non-adopters and found that there were no significant differences between the two groups. The number of product variants and the degree of customised production were used to measure product diversity. Only the degree of customisation was found to be significant at the 5% level. Competition was measured using the percentage of sales being exported (based on the assumption that competition is higher in the foreign markets) and the number of competitors for the major products. The results were not consistent with the hypothesised relationship with non-adopters having a higher export rate ($p<0.10$) and a higher number of competitors (not significant).

To capture the combination of factors affecting adoption, discriminant analysis and LOGIT regression were used. The best discriminating function was obtained by combining cost structure, the degree of customized production and sales as a percentage of exports. The function classified 71% within the correct group and 67% using the LOGIT model.

Malmi's Finnish study described in the previous chapter (section 4.10) examined cost structure, competition faced, strategy, product diversity, production type and size as potential determinants of ABC adoption. Cost structure was measured using capital-related costs as a proportion of total costs. No significant differences were found between adopters and non-adopters. Competition faced was measured by exports as a percentage of total sales turnover and perceived changes in competition. Both measures were significant with ABC adoption at the 5% level. Porter (1980,1985) states that companies adopting a cost leadership strategy need more sophisticated product costs than companies competing by product differentiation. The responding units were asked to indicate which of these two alternatives best described their strategy. No significant differences were found between either of these two strategies and ABC adoption. Three questions were used to identify the production process used. Respondents were asked to indicate whether they were mass, batch, single-product or process producers, whether they were made-to-order or made-to-stock or whether they mainly made customised or standard products. None of these items was significant. Product diversity was measured by the number of products and different product variations and was found to be significant ($p<0.01$). Finally, size was found to affect the likelihood of adopting ABC.

Based on questionnaire responses from 204 Irish manufacturing firms, Clarke *et al.* (1999) examined the usage of ABC. The respondents were divided into those implementing ABC (N=24), assessing ABC (N=42), rejecting ABC (N=26) and having not considered ABC (N=112). Five characteristics of the responding firms were examined. They were multinational firms versus national firms, firm size (annual sales), manufacturing activity, number of product lines and manufacturing overheads as a percentage of total costs. The authors found that a greater, and statistically significant percentage (at $p<0.10$), of multinational subsidiaries used ABC (14%) compared with national firms (5%). Significant differences ($p<0.05$) were also observed in respect of size and manufacturing activity. They found that a greater proportion of firms from the drug, pharmaceutical and healthcare industry used ABC. However, the authors suggest that the latter may be due to an interaction effect because 94% of these firms were multinational subsidiaries. No significant overall difference was found in respect of number of product lines or percentage of overhead costs.

In the previous chapter the study by Gosselin (1997) was described (see section 4.10). Gosselin hypothesised and found ($p < .01$) that a prospector strategy is positively associated with the adoption of an activity management level. He also found that organisational structure influences the capability of an organisation to implement innovations. Organic organisations are more likely to implement activity analysis and activity costing while mechanistic organisations are likely to be more successful in the implementation of ABC.

Table 5.4: Summary of previous surveys relating to factors influencing ABC adoption (p = significance p-values shown where available)

	Bjornenak (1997)	Malmi (1999)	Booth and Giacobbe (1998)	Hoque (2000)	Clarke et al(1999)	Gosselin (1997)
Definition of ABC adopters	Implemented, currently implementing or wishing to implement ABC	ABC implementation	Various[3] (see below)	Allocations based on volume-based costing compared with ABC systems	4 group comparison: using, rejected, assessing and not considering ABC	Adopting an activity management approach (i.e. activity analysis, activity cost analysis and ABC defined as activity-based product costing)
Cost structure	$p<.10$	Not significant	$p<.05$ interest in adopting ABC compared with no interest		Not significant	
Product diversity: 1. Number of products/product lines/product variants	Not significant	$P<.01$	$p<.05$ adopting compared with rejecting ABC as an idea		Not significant	
2. Degree of customization	$p<.05$	Not significant				
3. Type of production process		Not significant				
4. Product line innovation (number of product lines introduced)			Not significant			
Competition: 1. Percentage of sales exported	$p<.10$[1]	$p<.05$[2]				
2. Number of competitors	Not significant					
3. Perceived change in competition		$p<.01$				
4. Price makers compared with price takers			Not significant			
Number of cost pools and allocation bases	Not significant					
Strategy: 1. Cost leadership v Product differentiation		Not significant				
2. Prospectors v Defenders						Significant Adopting compared with not adopting an AM approach
Size		Significant but p-value not specified	$p<.01$ interest in adopting ABC compared with no interest		$p<.05$	
Extent of JIT usage (negative relationship with ABC)				$p<.05$		
Extent of automation				Not significant		
Multinational v National companies					$p<.10$	
Industry type					$p<.05$	
Mechanistic v Non-mechanist structure						Significant Adopting activity analysis/cost analysis compared with adopting ABC. Also implementing compared with not implementing ABC.

Notes

[1] Inconsistent with hypothesized relationship with non-adopters having a higher export rate. [2] Consistent with hypothesized relationship with adopters having a higher export rate. [3] Booth and Giacobbe compared 3 groups - Never considered adoption of ABC compared with shown an interest; Adopting ABC as an idea compared with rejecting it as an idea, adopted ABC as a practice compared with rejecting it as a practice.

Booth and Giacobbe (1998), in their survey of 205 Australian manufacturing firms, examined factors influencing three stages of ABC adoption. They were the initiation of interest in ABC (consisting of 94 firms that had never considered adoption of ABC and 113 that had shown an interest in ABC); adoption/non-adoption of ABC as an idea (consisting of the 113 firms in the initiation category that had shown an interest in ABC divided into 49 firms having adopted ABC as an idea and 64 firms rejecting ABC as an idea); adoption/non-adoption of ABC as a practice (consisting of 24 firms having adopted ABC as a practice and 29 firms rejecting it as a practice). Cost structure, product diversity, competition and size were examined as explanatory factors distinguishing between each of the two groupings identified within each of the above three categories.

There were three significant differences : cost structure ($p < .05$), product diversity ($p < .05$) and size ($p < 0.01$). Overhead, as a percentage of product cost, was higher for those firms interested in ABC compared with those who had never considered the adoption of ABC. Also, firms adopting ABC as an idea showed a larger change in overhead costs compared with those rejecting it as an idea. Two measures were used for product diversity. The first required the respondents to indicate on a 5-point Likert scale (1= strongly agree to 5= strongly disagree) whether they agreed with the statement that they have a high number of product lines. The second was a measure of product line innovation based on asking the respondents to indicate the average number of product lines introduced in a 12-month period. The only significant item related to product lines where the mean number of lines for those adopting ABC as an idea was slightly higher for those rejecting it as an idea. Firm size was measured by the number of employees and sales turnover. The finding was supported only for the first category ($p<0.01$), with firms showing an interest in adopting ABC being significantly larger, on average, than those not interested in ABC.

Competition was not significant for any of the above comparisons. It was measured by asking the respondents to indicate whether their business unit was in a position to influence the price for all or the majority of their products (price makers) or whether they had no such influence (price takers). An interesting feature of the above findings was that no significant relationships were observed in respect of those firms that had adopted ABC as a practice compared with other firms.

Hoque (2000) examined the relationship between just-in-time production, automation and cost allocations based on questionnaire responses from 71 New Zealand manufacturing companies. The respondents were asked to indicate whether allocations based on volume-based costing or ABC systems were used in their organisations. To measure the extent to which JIT was used, the respondents were asked to indicate on a 5-point Likert scale ranging from 1 (not at all) to 5 (to a great extent) whether their firms had adopted the JIT production philosophy. Automation was also measured on a 5-point Likert scale ranging from 1 (not at all) to 5 (to a great extent). Hoque found support for the hypothesis ($p<0.05$) that firms using JIT production systems place less emphasis on using activity-based allocations than non-JIT firms. Hoque justified his hypothesis based on the argument that firms adopting a JIT production philosophy establish production cells that are dedicated to the manufacturing of a single product or family of similar products. The consequence of this is that many of the support activities are likely to be direct costs for the dedicated cells resulting in a high proportion of their costs being directly assigned to products. Therefore, the benefits from implementing ABC will be lower in JIT organisations.

The second hypothesis tested by Hoque was that firms using mainly an automated manufacturing system place greater emphasis on the use of activity-based cost allocations than firms without an automated manufacturing system. No significant relationship was found. Hoque's justification for the second hypothesis was based on the assumption that a wide range of products are produced in an automated environment and direct labour represents only a small fraction of total costs. Also, in an automated environment there is a need for a better understanding for what is creating the firm's product cost and support costs and what are the cost drivers. He concluded that these factors suggest that automation should be related to activity-based cost allocations.

In a mail survey of 225 USA manufacturing firms using logit analysis, Krumweide (1998) found that different contextual and organisational factors associated with ABC success become important at different stages of implementation. The variables potential for cost distortion (represented by the diversity of products, processes and support activities), size and job (i.e. firms with continuing manufacturing processes rather than operating in a job shop environment) were found to be important determinants in the decision to adopt ABC[1].

Krumweide also divided the firms that had reached the ABC implementation stage into non-routine and routine users with the former consisting of ABC mainly not being used outside the accounting department and the latter consisting of those firms where ABC information was extensively used throughout the organisation. The organisational factors of top management support, level of non-accounting ownership, number of purposes identified for ABC and the number of years since ABC was adopted had a significantly greater probability in attaining the routine stage. The sign for non-accounting ownership was negative and in the opposite sign to that expected, thus, implying the higher the degree of non-accounting ownership the lower the odds of routinising ABC. In interpreting the implementation model it should be noted that , the firms incorporated in this analysis had already reached the adoption stage where the contextual variables had a significant impact. However, these variables do not necessarily lead to a greater probability of reaching the routinisation stage.

Krumweide analysed the responses over several stages of the ABC adoption process, such as adoption, implementation, acceptance, rotinisation and infusion. He found evidence to suggest that the impact of the various contextual and organisational factors change during these different stages. Commenting on the implications of the findings Krumweide states:

> Combining implementation stages can create two problems. First, factors not found significant may have been found to be significant for certain stages but masked by less significance (or perhaps significance in the other direction) for other stages. Second, factors that were found to be significant may have had coefficients that were biased by varying parameter estimates in different stages. Thus, it is possible that no single stage had the parameter coefficients that were reported (p. 269).

[1] Adoption of ABC was defined as the various stages beyond approval for implementation, and non-adoption comprised not considered, considering and considered and rejected.

Adopting a case study approach ,Abernathy *et al.* (2001) collected data from five research sites in Australia and classified cost systems by the level of sophistication, rather than by the alternatives of traditional and ABC systems. The research sites consisted of two firms, one with three divisions and the other with two divisions. The authors reported that four sites had simplistic costing systems. Two had a single cost pool and the others had, respectively, two and three cost pools. All of them used a single unit-level cost driver (direct labour hours).

Three of the four sites had low product diversity and low-moderate overhead costs. There was a reasonable to high level of satisfaction with the information provided by the costing system. At one of the sites cost information was important for decision-making but it was considered to be sufficiently accurate given the relative low proportion of costs represented by overheads and low level of product diversity. Unit level drivers were considered to be sufficient since most of the overhead costs were considered to be related to production volumes. The costing systems at the other two sites was not considered to be critical for decision-making or decision-control. Because of the low proportion of overheads, profitability margins were more affected by material price and usage variances than through the inaccurate assignment of overheads.

In the fourth site that operated a simplistic costing system, overhead costs were high and related primarily to indirect labour costs. Costing information was important for both decision-making and control purposes and there was a high level of product diversity. The division had not invested in AMT to facilitate product changes thus resulting in large batch and product-sustaining overhead costs associated with set-ups and product development. Also, volumes within batch runs differed widely across products. Management was dissatisfied with the costing system and the authors considered that this was due to the lack of 'fit' between the contextual factors and the existing costing system.

Finally, the fifth site operated a highly sophisticated traditional costing system with many cost pools and two unit level cost drivers (direct labour and machine hours). Cost information was important for both decision-making and cost control and the users of the costing information were very satisfied with the costing system. Product diversity was high but this was facilitated by investment in advanced manufacturing technology (AMT) that facilitated rapid product or volume changes. The effect of the investment was to reduce indirect labour costs and batch and product-sustaining costs. Overhead costs were mainly associated with investment technology which represented committed or facility-sustaining costs. The authors argued that there was little justification for ABC systems in this situation. When products vary in the number and types of production processes or in the length of time spent in each process, a costing system that incorporates multiple cost pools, with each cost pool representing a separate process, captures this variability.

5.8 Studies relating to the association between ABC and improvement in financial performance

Although Cooper and Kaplan (1992) state that ' the goal of ABC is to increase profits, not to obtain more accurate costs', few studies have examined whether there is an association between using ABC and an improvement in financial performance. Recently, a few studies have attempted to remedy this situation. Based on a cross-sectional mail survey of responses from 210 internal auditors in USA organisations, Cagwin and Bouwman (2002) used structural equation modelling to test a model hypothesising the conditions under which there is a positive association between the use of ABC and changes in financial performance. Financial performance was measured using the change in return on investment (ROI) based on the average improvement over the previous three or five years relative to other business units in the respondents' industry. ABC usage was derived from a composite measure relating to the breadth of use by different functions within the organisation, depth of use for specific applications and the level of integration into strategic and performance evaluation systems.

Cagwin and Bouwman tested the following three hypotheses:

1. There is a positive association between the extent of use of ABC and relative improvement in financial performance (compared with other firms in the industry);

2. The association between the extent of use of ABC and relative improvement in financial performance is impacted by specific enabling factors, and

3. A firm's relative improvement in financial performance (compared with other firms in the industry) is positively associated with the level of 'success' of ABC.

For the first hypothesis the effect of ABC on ROI was positive but not significant, thus indicating that there is no direct effect associated with the use of ABC. Therefore, the hypothesis is not confirmed.

For the second hypothesis the specific enabling factors incorporated in the study were:

- Importance of costs (positive);
- Information technology sophistication (positive);
- Business unit complexity (positive);
- Level of intra-company transactions (negative);
- Unused capacity (negative), and
- Competition (positive).

The authors reported that the interactions of ABC with complexity and other initiatives are positive and significant at the 5% level and conclude that the second hypothesis is confirmed. The interactions of ABC with importance of costs and intra-company transactions were significant at the 10% level. The signs of the other variable interactions were in the directions predicted but they were not significant. In their formulation of the hypotheses Cagwin and Bouwman did not specify 'other initiatives' as one of the enabling factors. However, based on the significant interaction they conclude that, when ABC is used concurrently with other initiatives, firms have a statistically significant net improvement in financial performance greater than that obtained from the use of these strategic initiatives without ABC. Other initiatives were defined as JIT, TQM, computer integrated manufacturing, business process engineering, value chain analysis and flexible manufacturing systems. In addition, the authors also conclude that:

> Improvements in ROI are reported when ABC is implemented in complex and diverse firms, in environments where costs are relatively important, and when there are a limited number of intra-company transactions to constrain the benefits. There is also some evidence that other enabling conditions (information technology sophistication, absence of excess capacity and a competitive environment) affect the efficacy of ABC as expected, and that manufacturing firms may obtain greater benefits than non-manufacturing firms (pp. 2-3).

The specific measures of success used to test the third hypothesis were perceived success of the ABC implementation, satisfaction with the cost system and the expressed belief that ABC has been worth implementing. The justification for testing the third hypothesis was that rejection of the null hypothesis would support the use of the success measures used in prior studies of factors influencing ABC success (see section 5.5). The authors conclude that, although no firm statistical conclusions can be reached regarding the third hypothesis, the previously used measures of success that have been incorporated in the study are relatively good proxies for improvements in performance associated with the use of ABC.

Gordon and Silvester (1999) used an event-study approach to investigate the impact on firm value of an announcement that firms were using ABC. The performance of 10 USA firms identified as ABC users in a May 1988 article of the Business Week magazine were examined. They reported that, while ABC firms did have positive abnormal returns on the publication date, so did 10 equivalent size and industry matched control firms. Because the difference in returns to the ABC firms was not significant there was no evidence to indicate that the announcement of ABC use affects firm values.

Kennedy and Affleck-Graves (2001) also adopted an event-study approach by matching 37 firms that adopted ABC between 1988 and 1996 with an equivalent number of non-adopting firms listed on the London Stock Exchange. The firms were matched on 31 December prior to the year of adoption by industry classification. Three samples were derived based on matching by market capitalisation (to control for firm size), market to book value ratio and net total assets. Buy-and-hold returns were computed for the ABC adopting firms and their matched counterparts for the three-year beginning in the year of adoption and continuing for the subsequent two years. The results revealed a three-year return of 61% for the ABC adopting firms compared with 34% for their non-adopting counterparts. The results were significant at the 5% level. The authors also reported the difference between the ABC firms and their matched counterparts under a range of accounting based performance measures (return on shareholder equity, operating percentage profit margin, net profit percentage profit margin and turnover/assets employed). In all cases they found evidence of superior performance by the ABC adopting firms. To check for the robustness of their findings and confounding variables, the results were also confirmed when firms were matched by market capitalisation, market-to-book ratio and net-total-assets value. There was also no difference between the performance of the ABC and non-ABC firms in the two years prior to the adoption of ABC.

The authors acknowledge the implementation of other strategic initiatives that coincide with the adoption of ABC may be the cause of the abnormal returns that they report. In particular, many factors drive relative stock price performance and the superior observed performance may be the result of another variable that is correlated with ABC. Also, the effects of a system such as ABC may be indirect through the mediation influence of other variables (Shields *et al.*, 2000). For example, Innes and Mitchell (1990) observed that substantial organisational structuring is required for the introduction of ABC. The authors conclude that:

> It is very difficult to determine whether the particular management actions that led to the superior management performance of our firms is due to the information system or some other related factor. Consequently, the factors that drove our sample firms to implement ABC may not be present in other firms and therefore, the introduction of ABC may not provide similar benefits to new adopting firms (p. 39).

5.9 Summary/conclusion

The aim of this chapter has been to provide a review of the empirical ABC literature. The surveys relating to ABC adoption rates indicate an initial low adoption rate of about 10% in the early 1990s to about 20% by the late 1990s. However, varying usage rates have been reported. Next the ABC applications were described and it was shown that

ABC has been extended from its original product costing applications to becoming an important mechanism for managing costs. The following sections concentrated on studies relating to factors influencing ABC success and failure. In particular the approaches used for classifying an ABC system as a failure were questioned. The final two sections reviewed the previous literature relating to factors influencing the ABC adoption and the association between ABC adoption and improved financial performance. Two studies provided evidence to suggest that ABC does improve financial performance.

Most of the studies reviewed can be classified as either adopting a contingency theory framework by examining the factors influencing ABC adoption, success/failure and financial performance or as descriptive practice-oriented research. Other empirical studies that have drawn off social and critical theory have not been reviewed since these theories do not underpin this research. In the next chapter the research hypotheses and the justifications for undertaking further will be presented.

CHAPTER 6

DEVELOPMENT OF THE HYPOTHESES

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DEVELOPMENT OF THE HYPOTHESES

6.1 Introduction

The previous chapters have provided a review of the literature to support this thesis. The aim of this chapter is to justify the reasons for undertaking further research relating to ABC systems and to develop the hypotheses that will be tested in Chapter 9. The chapter begins with a section that seeks to justify the need for further research. This is followed by a reiteration of the research objectives that were presented in Chapter 1. The following sections draw off the literature to develop the research hypotheses. They are divided into two groups. The first group focuses on the hypotheses relating to the factors influencing the adoption/non-adoption of ABC systems. The second group concentrates on hypotheses relating to factors that may influence ABC success.

6.2 The need for further ABC research

Even though there has been a considerable amount of research relating to ABC, there were several factors that prompted further research on this topic. First, the term 'adoption' has been subject to different interpretations with some studies defining it as 'actual ABC implementation' and others defining it as 'consisting of either actual implementation or a desire to implement it'. Furthermore, the basis for comparisons of factors influencing the adoption of ABC have differed with some studies comparing those firms that have actually implemented ABC with those that have not and others comparing firms that have considered the adoption of ABC with those that have shown no interest in ABC. It is, therefore, difficult to compare the findings from the various studies, particularly relating to usage rates or the ability of factors to discriminate between adoption/non-adoption when the term 'adoption' has been subject to different definitions.

Second, difficulties can apply in distinguishing between ABC and non-ABC systems and some researchers have questioned whether systems described by survey respondents as ABC really are ABC systems (Dugdale and Jones, 1997). Previous surveys have mostly allowed the respondents to self-specify whether their organizations operated an ABC system. Suitable control questions that allow the researcher to check respondents' claims that their organizations are operating ABC systems have rarely been incorporated in previous questionnaire surveys. Dugdale and Jones conclude that their findings suggest that survey claims for ABC adoption may be mistaken, exaggerated or ambiguous.

Third, those studies that have examined the factors influencing the adoption of ABC have tended to use a measure derived from a single question for each variable. The observation that no relationship exists between an observed variable and the adoption of an ABC system may be due to the inability to measure the variable or the choice of a poor proxy measure. There is a need to improve the measures used for the explanatory variables by strengthening the construct validity by using the composite score derived from aggregating the scores from multiple questions to measure the same construct. Foster and Swenson (1997) claim that a composite score has the advantage over an individual single question when either (1) the variable being measured contains multiple-dimensional aspects requiring several different questions to capture the multiple-dimensional aspects, or (2) there is measurement error in an individual question that is diversified away in aggregating individual questions into a composite.

Two further limitations apply to previous studies that have examined the factors influencing the adoption of ABC. First, most of the studies have included only manufacturing companies and, thus, have not examined the influence that issues relating to corporate/industry sectors have on the adoption of ABC. Second, most of the studies have not taken into account the inter-relationship between the factors that have been tested as being conducive to the adoption of ABC. For example, studies have used the number of products or product variants that firms have as a measure of product diversity and bivariate statistical hypothesis tests have been used to examine whether the difference in product diversity scores for ABC adopters and non-adopters is statistically significant. However, the product diversity measure may also be related to the size of the firms because larger firms may have more products than smaller firms. Thus, the influence of size may contaminate the relationship between product diversity and the adoption of ABC when bivariate statistical tests are used. There is a need for tests to be undertaken using higher powered mutivariate statistical tests that control the impact of the other factors that have been identified as influencing the adoption of ABC.[1]

Other motivations for the study relate to the fact that prior research has tended to ignore investigating the reasons that have discouraged firms from adopting ABC. Also, studies relating to the factors influencing the success of ABC have been undertaken in the USA (Shields, 1995; Swenson, 1995) and no similar UK study was found that had directly focused on this area.[2] Thus, it is appropriate to examine the factors influencing the success of ABC within UK companies.

Although ABC is a new phenomenon that has attracted much interest from researchers, there continues to be a need for further studies. Furthermore, where only a single or a small number of studies on a specific area have been investigated, there is a need for further studies to confirm or refute the findings of the earlier preliminary studies. A summary is given of the major recommendations identified in the literature review for further ABC research.

- " Little is known yet about the potential and organisational consequences of ABC" (Innes and Mitchell, 1990, p. 29).

- "...other perspectives are needed to better understand the diffusion process. Taking the supply side into account seems to be promising"(Bjornenak, 1997, p.15).

- " A final suggestion for future research relates to gaining a better understanding of the factors that influence differences in the levels of adoption of recently-developed management accounting techniques between countries" (Chenhall and Langfield-Smith, 1998, p. 15).

[1] Two of the previous studies (Bjornenak, 1997 and Goselin, 1999) have used logistic regression, a mutivariate technique for use with dichotomous dependent variables, for undertaking hypothesis tests. However, most of the findings reported by Bjornenak relating to factors influencing the adoption of ABC were derived from bivariate tests.

[2] A UK study by Innes *et al.*(2000) did examine the factors influencing ABC success but this was not their major focus. It was a by-product of their research which aimed to examine the changes in use and applications of ABC.

- " Further studies should include firms which have attempted to implement ABC but failed. These studies can then look for differences in firm characteristics, or other factors such as management support or commitment, to explain success or failure with activity-based costing" (Swenson, 1995, p. 176).

- "Measuring the success of ABCM is part of a more general challenge of measuring the success of any major change in managerial methods...."(Foster and Swenson, 1997, p. 133).

- " It would also be worthwhile to study whether fad or fashion as a motive for adoption is correlated to success or failure of an innovation" (Malmi, 1999, p. 669).

- " It will therefore be some time before a complete assessment can be made of the corporate reaction to ABC" (Innes and Mitchell, 1995, p. 151).

- " Whether this marginal fall in adoption rates of ABC revealed in the 1999 survey represents a blip in an underlying growth trajectory (an indicator of where the long-term adoption rate will settle) or a precursor to a decline (which will show ABC as a short-lived, 'faddish' phenomenon) will require further research in the future to ascertain whether users remain loyal to ABC " (Innes *et al.*, 2000, p. 361).

6.3 Research objectives

The research aims to achieve the following specific objectives:

1. To examine the nature, content and purposes of costing systems operated by UK organisations;

2. To examine the importance of specific motives for implementing ABC systems; in particular the extent to which the four perspectives that were described in Chapter 4 (efficient choice, forced selection, fad and fashion perspectives) explain the diffusion of accounting innovations (with specific focus on ABC as the accounting innovation);

3. To determine the reasons and factors which have discouraged firms from adopting ABC;

4. To examine the extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC systems;

5. To investigate the extent to which the different potential explanatory variables influence the adoption of ABC systems; and

6. To ascertain the views of the respondents on the degree of success or failure of ABC systems and the impact of various factors on the determinants of that success.

The first four objectives can be classified as descriptive practice-oriented research (see Chapter 1, section 1.5.5). They focus mainly on drawing off the cross-sectional survey to determine the nature and form of management accounting practices and derive opinions from the respondents on the specific motives for adopting or not adopting ABC. Achieving these objectives does not involve formulating hypotheses for testing. In contrast, the final two objectives do involve drawing off existing theory to formulate and test hypotheses. Given that the major aim of this chapter is to formulate hypotheses for testing, the remainder of the chapter will focus only on the fifth and sixth objectives.

6.4 Study hypotheses

In the following sections the main hypotheses are described. They are divided into two groups. Section 6.5 focuses on the hypotheses relating to the fifth objective: i.e. the factors influencing the adoption/non-adoption of ABC systems. The hypotheses relating to factors that may influence ABC success (the sixth objective specified in section 6.3) are described in section 6.6.

6.5 Hypotheses relating to factors influencing the adoption /non adoption of ABC

Based on the literature review, presented in Chapter5(section 5.7)the following factors have been identified as influencing the adoption of ABC systems:

Cost structure
Product diversity
Degree of customisation
Intensity of the competitive environment
Number of first-stage cost pools and different types of second-stage cost drivers
Size of the organisation
Extent of use of lean production techniques (including JIT techniques)
The extent of the application of total quality management approaches
Influence in determining selling prices
The quality of information technology
The extent that target costing is applied
Importance of cost information
Extent of use of innovative/strategic management accounting techniques
Corporate sector

In the following sub-sections the literature is drawn off to develop hypotheses relating to each of the above factors. The findings of the statistical tests relating to these hypotheses will be presented in Chapter 9.

6.5.1 Cost structure

Johnson and Kaplan (1987) claim that, over several decades, there has been a dramatic change in cost structures resulting in a need for firms to modify their costing systems. Both simplistic and ABC systems accurately assign direct costs to cost objects. As a general rule, ABC systems should lead to the more accurate assignment of indirect costs to cost objects. In their review of European surveys relating to cost structures, Brierley *et a.* (2001) found that direct material costs tend to be higher than indirect costs and direct labour tended to represent the minority of the costs. They conclude that, if indirect costs make up a relatively small proportion of total costs in some industries, it may not be worthwhile investing in sophisticated accounting methods to allocate indirect costs to products in these industries.

Kaplan and Cooper (1998) advocate that firms with high indirect costs should assign these costs using sophisticated systems, since unsophisticated systems are likely to report distorted costs. In these circumstances, they argue that ABC systems should be implemented. Conversely, where the proportion of indirect costs is low, direct costing may be appropriate or, if indirect costs are assigned to cost objects, unsophisticated traditional costing systems using a small number of cost pools and cost drivers may not result in the reporting of seriously distorted costs. Thus, ABC is likely to be particularly appropriate for those firms where unsophisticated costing systems are likely to result in the reporting of distorted product or service costs. Cooper (1988) claims that overhead costs as a percentage of total costs have increased over the years; particularly in recent years, causing cost systems based on direct labour hours to report increasingly distorted product costs.

The message that emerges from the literature is that ABC usage rates should be higher in organisations with a higher proportion of indirect costs within their cost structure. Based on the above discussion the following hypothesis will be tested:

Hypothesis 1 (H1): There is a positive association between the proportion of indirect costs in an organisation's cost structure and the adoption of ABC.

6.5.2 Product diversity

Product diversity leads to a higher potential for cost distortion. Product diversity applies when products consume activity resources in different proportions. According to Gonzalves and Eiler (1996) complexity factors are the biggest single driver of costs. Greater product diversity requires more sophisticated costing systems to capture the variation in resource consumption by different products. Simplistic costing systems that rely on a small number of cost pools and drivers are unlikely to capture the diversity of consumption of activity resources by cost objects. Significantly distorted product cost are, therefore, likely to be reported with unsophisticated traditional costing systems when high diversity exists.

Cooper (1988) and Estrin *et al.* (1994) point out that product diversity includes process, support and volume diversity. Support diversity refers to varying support given to each product by various overhead departments, whereas process diversity refers to differences in consumption among all identifiable activities relating to product design, manufacture, and distribution. Volume diversity occurs when products are manufactured in different batch sizes, thus affecting how batch level costs are assigned to products. To capture volume diversity, a sophisticated costing system is required that establishes separate cost pools for batch-level activities and incorporates non-volume-based cost drivers that measure the consumption of resources by batch sizes rather than volume. If volume-related cost drivers are used, most of the costs will be assigned to high volume products which are likely to be produced in a smaller number of high volume batches. Conversely, low volume products, whose output may be derived from a large number of low volume batches, will be assigned a smaller share of batch-level activities. Where volume-diversity is high, low volume products are likely to be undercosted and high volume products overcosted.

Within a production setting Malmi (1999) points out that the more complex the production process, the more complex the costing system that is required to model it. He points out that product diversity determines production process complexity. The more complex the products, the more the activities that are required to manufacture them. Thus, to measure the resource consumption of different products in a complex setting, complex cost accounting systems involving more cost pools and assignment bases are required.

Based on the above discussion, firms with product/volume diversity have a greater need to adopt a sophisticated costing system to minimise product cost distortion. Therefore, the following hypothesis is formulated:

Hypothesis 2 (H2): *There is a positive association between higher levels of (a) product (support/process) and (b) volume diversity and the adoption of ABC.*

6.5.3 Degree of customisation

Cooper and Zmud (1990) found evidence to indicate that more sophisticated production information systems (e.g. MRP systems) are more likely to be adopted in non-job shop manufacturing processes because of the uncertainties associated with made-to-order production. Krumwiede (1998) suggests that a similar effect on ABC adoption can also expected.

High levels of customisation are likely to result in activities of a non-repetitive nature so that there is no basis for observing repetitive operations to enable standards to be set. To operate an appropriate ABC system in these circumstances, intensity drivers (Kaplan and Cooper, 1998, p.97) are required that directly charge for the resources used each time an activity is performed. Thus, the detailed tracking of costs is required. Hence, the cost of operating a sophisticated costing system is likely to be positively related to increasing levels of product customisation. Operating ABC systems may not meet cost versus benefits criteria where high customisation exists. Conversely, standardised products result in standardised activities thus enabling standards to be set. A database of standard product costs can be established and reviewed periodically so that there is no need to operate an actual costing system. The cost of operating an ABC system is therefore likely to diminish as the level of product standardisation increases.

Based on the above discussion it is hypothesised that ABC usage rates will be lower in organisations with higher levels of customisation resulting in the formulation of the following hypothesis:

Hypothesis3 (H3): *There is a negative association between higher levels of customisation and the adoption of ABC.*

6.5.4 Intensity of the competitive environment

In contingency-based research on management accounting in business, the degree of market competition has been identified as a major factor affecting the stability of an organisation's environment, and in turn its organisational structure and choice of cost accounting system (Khandwalla, 1972; Simons, 1990; Yakou and Dorwieler, 1995; Libby and Waterhouse, 1996). More recently, Mia and Clarke have argued that management accounting systems can provide information used to identify, evaluate and implement appropriate strategies and found that the intensity of competition is a determinant of the use of the management accounting system.

Bruns and Kaplan (1991) identify competition as the most important external factor for stimulating managers to begin to work on a new cost system. Cooper (1988b) has also identified that organisations facing fierce competition should implement ABC. It is argued that firms operating in a more competitive environment have a greater need for sophisticated cost systems that more accurately assign costs to products, services and customers. This is because competitors are more likely to take advantage of any errors from managers having to rely on inaccurate cost information to make decisions. For example, in highly competitive industries mistakes made from relying on inaccurate cost information are more likely to be exploited by competitors. Thus, more reliable cost information is likely to be needed as competition increases.

Cooper stresses that firms facing increased, focussed and creative competition together with deregulation, need to reduce the cost of errors by measuring product costs as accurately as possible to have a competitive advantage. Deregulation has forced firms not only to control overall efficiency but also to manage their competitive position. According to Cooper, the cost systems of most regulated firms were measuring the cost of functional activities and not the cost of products. The reason being that when the products' prices were regulated, there was no apparent need for the firm to waste its effort unnecessarily to report accurate product costs. Therefore, product cost information was not considered to be of vital importance to the firm. However, with the emergence of deregulation, unregulated competitors were ready to cut prices to obtain a competitive advantage. Hence, deregulation and increased competition have created the need for firms to adopt more sophisticated costing systems that improve the accuracy of the reported product costs. Based on the above discussion the following hypothesis is formulated:

Hypothesis 4 (H4): *There is a positive association between the intensity of competition and the adoption of ABC.*

6.5.5 Number of first-stage cost pools and different types of second-stage cost drivers

Compared with traditional costing systems there are two major distinguishing features of ABC systems. First, within the first-stage of the two-stage indirect cost allocation process, ABC systems rely on a greater number, of cost centres based on activities rather than departments. Second, they use a greater number and a more diverse range, of cost drivers in the second-stage of the allocation process. By using a greater number of cost centres and a more diverse range of cost drivers that cause activity resource consumption, and assigning activity costs to cost objects on the basis of cost driver usage, ABC systems can more accurately measure resources consumed by cost objects. Although it would appear to be self-evident that ABC systems should have a greater number of cost pools and different types of cost drivers, the study by Bjornenak (1997) did not find any significant differences in respect of these two variables for ABC and non-ABC adopters.[1] Therefore the hypothesis is:

Hypothesis 5 (H5): ABC usage rates are positively related with:

(a) a greater number of first-stage cost pools, and

(b) a greater number of different types of second-stage cost drivers.

6.5.6 Size of the organisation

Academic researchers have discussed the size of the organisation as a determinant of its choice of accounting policy. It has been considered a significant internal contingent variable that affects the management accounting practices of profit-oriented firms.

[1] This difference may be explained by the fact that Bjornenak defined ABC adopters as those firms that had implemented, were implementing or wished to implement ABC.

Increased sophistication in financial control has been associated with increased organisational size (Child, 1975).

Many researchers have argued that organisational size facilitates innovation (Aiken and Hage, 1971; Kimberly and Evanisko, 1981; Ettlie *et al.*, 1984). Large organisations have more complex and diverse facilities (financial slack, marketing skills, research capabilities, product development experience, etc.) that aid the adoption of a large number of innovations (Nord and Tucker, 1987). Previous studies have noted a positive relationship between company size and the adoption of innovations. For example, Blau and McKinley (1979), Dewar and Dutton (1986) and Damanpour (1992) found a positive relationship between size and innovation. There is also considerable evidence that size is an important factor influencing the adoption of more complex administration systems (Moores and Chenhall, 1994).

More particularly, studies of recently developed management accounting practices, especially ABC, have shown that adoption rates are much higher in the larger firms (Davies and Sweeting, 1993; Drury and Tayles, 1994, 1998, 2000; Innes and Mitchell, 1995; Bjornenak, 1997; Malmi, 1999). A possible reason for this is that larger firms have relatively greater access to resources to experiment with the introduction of innovative systems such as ABC. Several surveys have also indicated that an important factor limiting the implementation of innovation of ABC is the prohibitive cost (Innes and Mitchell, 1995; Shields, 1995). As larger firms have more resources to develop innovative systems, it is also more likely that they will be able to adopt and implement more sophisticated costing systems or any innovation.

Larger firms also have a larger network of communication channels and the necessary infrastructure for adopting ABC and they may have a larger and more diversified range of activities leading to greater product, service and customer diversity. This situation may create the need for more sophisticated costing systems such as ABC to measure resource consumption by different cost objects.

Therefore, the following hypothesis is formulated:

Hypothesis 6 (H6): There is a positive relationship between the size of the organisation and the adoption of ABC.

6.5.7 Extent of use of lean production techniques (including JIT techniques)

Firms adopting JIT production techniques establish production cells that are dedicated to the manufacturing of a single product or family of similar products. Hence, many of the support activities can be directly traced to the dedicated cells. Thus, a high proportion of costs can be directly assigned to products. Therefore, the benefits from implementing ABC or sophisticated costing systems will be lower in JIT organisations. Also, given that JIT production is oriented towards process and time, it is likely to be supported by costing methods that are based on how long the product is in the process. Traditional costing systems using unit level cost drivers may meet this requirement.

However, evidence also suggests that firms that are more innovative in technical areas also tend to be more innovative in administrative areas, and vice versa. (Damanpour and Evan, 1984). Technical innovation relates to process technology and directly to the primary product or service of an organisation (e.g., just-in-time inventory system in an automobile plant). Administrative innovations, on the other hand, are indirectly related to the primary work of the organisation and more related to its management (e.g., management incentive and reward system). In Chapter 4 it was pointed out that ABC is considered to be an administrative innovation.

Accounting is an administrative function, and accounting innovations are more related to management than to the primary processes of a firm (Shields, 1995). Because ABC is often used to model the costs of production and related processes in manufacturing firms, the extent of production system (i.e., technical) innovation implemented may influence the adoption of ABC. Furthermore, Jensen *et al.* (1995) found evidence that management accounting innovations follow innovations in manufacturing practice.

The pursuit of lean production techniques also motivates firms to derive a better understanding of what is creating the firm's product cost and support costs and what are the cost drivers. Prior studies in the USA also found evidence to suggest that firms link ABC to lean production practices. Based on the premise that the linking of ABC to lean production practices outweighs the requirement for a less sophisticated costing system arising from adopting JIT production techniques, the following hypothesis is formulated:

Hypothesis 7 (H7): ABC system adoption is more likely to take place as the implementation of lean production practices increases.

6.5.8 The extent of the application of total quality management approaches

In section 6.5.7 it was pointed out that evidence suggests that firms that are more innovative in technical areas also tend to be more innovative in administrative areas, and vice versa. (Damanpour and Evan, 1984). Thus, firms that have implemented total quality management approaches are likely to be more innovative technically than other firms and, therefore, tend to adopt more administrative innovations like ABC. According to Cagwin and Bouwman (2002), because ABC often provides more and better information about processes, ABC may be more beneficial if other initiatives are employed concurrently. This linkage provides direction to the ABC implementation and a ready application for the ABC information once it becomes available (Swenson, 1998). Other studies have also reported that ABC fits in well with the cost of quality framework. Krumwiede (1998) has also suggested that firms often link ABC to their formal quality management practices. The association of ABC adoption and the extent of the application of TQM approaches is, therefore, examined by the following hypothesis:

Hypothesis 8 (H8): ABC system adoption is more likely to take place as the implementation of TQM increases.

6.5.9 Influence in determining selling prices

Where firms have little influence over the selling prices of their products/services, they are effectively price-takers and have to decide which products/services to sell given their market prices. In this situation periodic profitability analysis plays a key role in determining the relative profitability of different products and services to which its marketing effort should be directed. Accurate cost information is not as crucial for profitability analysis since the information is likely to be used for attention-directing purposes so that both low profit margins or loss-making products may be highlighted for more detailed studies. However, where firms are price-setters, cost information is often used as a direct input for setting selling prices. Therefore, more accurate cost information is likely to be required. Accurate cost information may be crucial since the undercosting of bids can result in the acceptance of unprofitable business, whereas overcosting can result in bids being rejected and the loss of profitable business. In contrast, where firms have little influence over the selling prices, the focus is on ensuring that only profitable activities are undertaken. Thus, the ability to influence selling prices and the need for cost information for pricing decisions are likely to have an effect on the decision-usefulness of cost information. Therefore the following hypothesis is formulated:

Hypothesis 9 (H9): *ABC usage rates are higher in firms having greater influence in determining selling prices.*

6.5.10 The quality of information technology

Information technology influences cost system design directly by enhancing the systems' capabilities. The emergence of ABC could not have come into practical use without the existence of efficient and affordable personal computers. In addition, information technology is considered one of the most important factors, which has played a key role to develop and maintain ABC. The level of technology can, thus, play an important role in determining the nature, character, adoption and influence of cost system design. For example, an information system providing detailed historical data and easy access to users may provide much of the driver information needed by ABC. Reeve (1995) also suggests that an integrated ABC system presupposes a relatively high level of information sophistication with extensive and flexible information stratification and real-time activity information.

Krumweide (1998), however, states that prior literature on the impact of information technology (IT) is conflicting. Managers 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). Alternatively, managers who are generally satisfied with the information provided by the existing system may be reluctant to invest the necessary resources in ABC (Anderson, 1995). Krumweide, therefore, concludes that higher levels of IT quality may encourage or discourage ABC adoption. Therefore, given these conflicting views, the following null hypothesis is formulated:

Hypothesis 10 (H10): *ABC system adoption is unrelated to the quality of an organisation's information technology.*

6.5.11 The extent that target costing is applied

The literature review did not identify any previous literature that directly examined the relationship between target costing and ABC. However, because target costing is applied as a cost management technique at a product's planning and design phase, it is important that it is supported by an accurate costing system. Cost drivers should be established that are the significant determinants of the costs so that cause-and-effect allocations are used. If arbitrary cost allocations are used they will not be the significant determinants of costs. Thus, the target costing exercise will merely result in a reduction of the costs that are allocated to the product but it is unlikely that organisational costs will be reduced. In contrast, if cause-and-effect allocation bases are established, reductions in cost driver usage should be followed by a reduction in organisational support costs. Therefore, where target costing is used, it is important that cost systems use cost drivers that are the determinants of costs so that they will motivate product designers to take actions that will reduce organisational costs. Thus, the use of target costing is likely to have an influence on the decision-usefulness of cost information. Based on the above discussion, the following hypothesis will be tested:

Hypothesis 11 (H11): *ABC system adoption is more likely to take place as the implementation of target costing increases.*

6.5.12 Importance of cost information

Even if ABC could substantially reduce product cost distortions, it is not likely to be helpful unless a firm can actually utilise better cost information in its decision-making process (Cagwin and Bouwman, 2002). According to Anderson (1995) and Estrin (1994), the differing needs by organizations for accurate cost data for strategic decisions and cost reduction may affect ABC adoption. Factors affecting the decision usefulness of cost information include the firm's use of cost data in pricing decisions, cost reduction efforts, need for special cost studies, strategic focus and average profit margins. The following hypothesis is, therefore, tested:

Hypothesis 12 (H12): There is a positive relationship between the importance of cost information and the adoption of ABC.

6.5.13 Extent of use of innovative/strategic management accounting techniques

The diffusion of innovation literature focuses on what determines organisational innovativeness, which has generally been operationalised as a composite score based on the number of innovations adopted by an organisation. This implies that some organisations are more prone to adopting innovations than others. It was also pointed out in sections 6.5.7 and 6.5.8 that ABC is often linked to other strategic and business initiatives and that they complement and enhance each other. Thus, organisations adopting ABC may be more likely to also adopt other accounting innovations. Therefore, the following hypothesis is tested:

Hypothesis 13 (H13): ABC usage rates will be greater in the organisation adopting other accounting innovations than the organisation not adopting them.

6.5.14 Corporate sector

Shields (1997) argues that the design and effectiveness of cost accounting information systems are conditional on characteristics of industries. The diffusion of innovation literature suggests that organizations within a group may imitate other organisations within that group regarding the adoption of innovations. DiMaggio and Powell (1983) describes this imitation process as a 'fad perspective'. They suggest that organisations imitate other organisations in order to appear legitimate by conforming to emergent norms or to avoid the risk that competitors will gain a competitive advantage by using the innovation. Therefore, the imitation process of organizations within a group may result in the sophistication of accounting systems differing between different industry sectors.

Kaplan and Cooper (1998) also suggest that service firms are ideal candidates for ABC, even more than manufacturing firms. Their justification for this statement is that most costs in service organisations are fixed and indirect. In contrast, manufacturing firms can trace important components (direct materials and direct labour) of costs to individual products so traditional product costing systems may report reasonably accurate product costs. Service organisations must also supply most of their resources in advance, and fluctuations in the usage of activity resources by individual services and customers do not influence short-term spending to supply the resources. Such costs are treated by simplistic costing systems as fixed and irrelevant for most decisions. This resulted in a situation where profitability analysis was not considered helpful for decision-making. Cost increases could also be absorbed by increasing the prices of services to customers. Little attention was, therefore, given to developing cost systems that accurately measured the costs and profitability of individual services.

The modern business environment and globalisation have created the need for service organisations to develop management accounting systems that enable them to understand their cost base and determine the sources of profitability for their products/services, customers and markets. Many service organisations have, therefore, only recently implemented management accounting systems. They have had the advantage of not having to meet some of the constraints imposed on manufacturing organisations, such as having to meet financial accounting stock valuation requirements or the reluctance to scrap or change existing cost systems that might have become embedded in organisations. Furthermore, service organisations have been implementing new systems at the same time as the deficiencies of traditional systems were being widely publicised and new insights were beginning to emerge on how cost systems could be viewed as resource consumption models which could be used to make decisions on adjusting the spending on the supply of resources to match resource consumption (Drury and Tayles, 2000). Therefore, service organisations may have a greater need, and also face fewer constraints, to implement ABC systems.

Most of the studies relating to ABC adoption have focused on the manufacturing sector. Only a few have examined whether differences across industrial sectors exist regarding adoption rates, the ways in which ABC is being used, or the stage it has reached. The findings of these recent studies do, however, suggest that both adoption rates of ABC and its use may differ significantly across industries. All of the above factors suggest that, compared with manufacturing, service organisations are more likely to adopt ABC systems. The following hypothesis is, therefore, formulated:

Hypothesis 14 (H14): The rate of adoption of ABC will differ significantly according to the sector in which an organisation operates.

6.6 Hypotheses relating to factors influencing ABC success

The success of ABC systems may be affected by many factors during its implementation within a firm. Shields and Young (1989, 1994) have developed a theoretical model relating to the implementation of cost management systems. They assume that ABC is an administrative innovation, whereby implementation success depends on how well it deals with specific behavioural and organisational variables. In contrast, they argue that the adoption and success of technical innovations are determined more by technical considerations. In this study, organisational factors have been hypothesised to be more influential in determining ABC success. As with any administrative innovation, Shields and Young claim that the success of ABC will depend on how well it matches the preferences, goals and strategies, agendas, skills and resources of powerful coalitions of employees, particularly top management. They conclude that the key to implementing ABC successfully is effectively dealing with specific organisational and behavioural variables.

Besides examining the impact of the organisational and behavioural variables suggested by Young and Shields, this study also examines the impact of two other variables that have been identified in the literature as influencing ABC success. They are size (a firm characteristic) and the period of time that ABC has been in operation. The following section formulates hypotheses relating to the following variables:

1. Non-accounting ownership;

2. Clarity of objectives;

3. Adequate training in implementing and operating ABC;

4. Top management support;

5. Linkage to competitive strategy, performance evaluation and compensation;

6. Provision of adequate resources;

7. Size, and

8. Period of time that ABC has been in operation.

6.6.1 Non-accounting ownership

Promise of support for the ABC initiative from organisational members outside the accounting function may be critical to using ABC extensively and successfully within the organisation. Non-accounting personnel are essential for identifying activities and cost drivers. When the accounting function leads the ABC implementation, the project is viewed as an accounting project and not given sufficient commitment by other departments (Player and Keys, 1995). Also, ABC information may be used more by non-accountants if they are part of its development. It is, therefore, expected that the higher the commitment to ABC from staff outside the accounting department, the more likely it will become used extensively.

Therefore, the following hypothesis is formulated:

Hypothesis 1 (H1): In those firms that have adopted ABC there is a positive relationship between non-accounting ownership and ABC success.

6.6.2 Clarity of objectives

Failure is more likely to occur with any actions without a clear aim. In business life, identifying goals is considered to be of vital importance. This also applies to ABC system adoption and implementation. A detailed and well-designed ABC model will not be used if it provides information that is not relevant to management. Some researchers (Cooper *et al.*, 1992; Player and Keys, 1995a) have found that an important factor for implementation success is clearly defined goals relating to the scope of the ABC project. Cooper *et al.* (1992) found that the most successful ABC projects occurred when a specific target for change was identified early in the project. Early identification of goals helps implementation teams to have a clearer understanding of how the ABC system should be designed and used for management's needs.

Researchers also point out that, if the goals of the system are in line with the organisation's goals, the managers will be more likely to accept the system (Schultez and Ginzberg, 1984). Furthermore, correspondence between users' goals and those of the organisation will more likely lead to achievement of both sets of goals. Under these circumstances acceptance and satisfaction with ABC system will be greater. Therefore, the following hypothesis is formulated:

Hypothesis 2 (H2): In those firms that have already adopted ABC there is a positive relationship between agreed and clear objectives of ABC and ABC success.

6.6.3 Adequate training in implementing and operating ABC

The training factor is considered to play a key role in the success of the ABC system. In relation to ABC, training relates to the design, implementation, and usage of ABC. Training in designing, implementing, and usage of ABC was important in explaining ABC success in the Shields (1995) USA study. Shields and McEwen (1996) suggest that, if people do not know why or how the ABC system works, they are more likely to ignore or misunderstand it and less likely to design a more accurate costing model. Training in implementation will help the team to understand the correct way to install the ABC system. Training in the usage of ABC helps the members to know how to interpret ABC information and how to use it for target goals.

If the resources provided for training are insufficient, then the normal development procedures may not be undertaken; this will increase the risk that firms may fail to successfully implement ABC. Thus, levels of training for designing, implementing and using ABC will play a key role in the successful adoption of ABC.

Therefore, the following hypothesis is formulated:

Hypothesis 3 (H3): In those firms that have adopted ABC there is a positive relationship between the level of adequate training and ABC success.

6.6.4 Top management support

Top management plays a key role in adopting and implementing any system. Operations are likely to be more successful when they are supported by top management. The need for top management support for ABC has been strongly recognised (Cooper *et al.*, 1992; Shields, 1995; Player and Keys, 1995a). Many of the successful applications of ABC described in case study research were linked to the clear support of top-level management and some of the failures were attributed to a lack of this support (Friedman and Lyne 1999). In addition, Innes and Norris (1997) found that success of the ABC system was strongly linked to the support of senior management and/or a champion.

Moreover, Cooper *et al.* (1992) conclude that, based on their study of eight implementations, top management sponsorship was a key success determinant. Hankinson and Lloyd (1992) suggest that obtaining upper managers' support is important for at least three major reasons. Firstly, they can provide sufficient time and resources to the ABC implementation. Secondly, ABC will generally be more successful if it supports the company's overriding strategies. It is, therefore, also important that management communicates what those strategies or directions are. Finally, they can communicate the importance of ABC throughout the organisation.

In the case of a champion supporting the implementation of ABC, it is important that he or she should be someone with significant budgetary and organisational authority who will push the project and get the necessary funding to implement it. Naturally, this push will occur only if ABC fits with the over-riding strategies of top management. But, if this fit exists, top management can facilitate ABC implementation by making its success part of the evaluation criteria and by giving managers the time and resources necessary to implement ABC (Krumwiede and Roth, 1997).

This theory suggests that there will be a relationship between the successful adoption of the ABC system and top management support. Therefore, the following hypothesis is formulated:

Hypothesis 4 (H4): In those firms that have adopted ABC there will be a positive relationship between top management support and ABC success.

6.6.5 Linkage to competitive strategy and performance evaluation

According to Shields and Young, linkage to competitive strategy, performance evaluation and compensation are important to motivate and reward employees to focus on and use ABC information appropriately to improve their firm's competitive position and profits. Employees are likely to pay more attention to ABC information if they perceive that it is linked to those measures of performance that affect their personal interest. Similarly, management are also likely to pay more attention to ABC information if they consider that it plays an important role in either/or implementing and monitoring competitive strategies. Therefore, the following hypothesis is formulated:

Hypothesis 5 (H5): In those firms that have adopted ABC there will be a positive relationship between linkage to (a) competitive strategy and (b) performance evaluation, and ABC success.

6.6.6 Provision of adequate resources

Shields and Young also identified the provision of adequate resources as an important variable in influencing the success of ABC. They state that sufficient internal resources are required so that employees do not believe that the ABC initiative is pressuring them to do more without adequate support. Resources should be provided so that employees have the opportunity to learn about ABC and to experiment with alternative designs and design methods.

Based on the above discussion the following hypothesis is formulated:

Hypothesis 6 (H6): In those firms that have adopted ABC there will be a positive relationship between the provision of adequate resources and ABC success.

6.6.7 Size of the organisation

The debate over whether small or large organisations are more successful in implementing innovations has been discussed in the popular press (Business Week, 1989). Despite many investigations of the relationship between organisational size and innovation success, little consensus on the magnitude, and even the direction, of the relationship however exists in academic circles (Fariborz, 1992). Many researchers have argued that organisational size facilitates the successful implementation of innovations (Aiken and Hage, 1971; Kimberly and Evanisko 1981; Ettlie *et al.,* 1984). Large organisations have the necessary infrastructure and more complex and diverse facilities (financial slack, marketing skills, research capabilities, product development experience, etc.) that aid the successful adoption of a large number of innovations (Nord and Tucker, 1987).

According to Delone (1981) the size of the organisation plays a critical role in the success or failure of MIS operations systems. He concluded from his study of small firms that:

> " firm size alone can have an impact on MIS operations and may in fact be associated with the success or failure of those operations; therefore, MIS researchers should collect data on firm size as a potential control variable when they conduct management information systems experiments across multiple firms"

Based on the above discussion the following hypothesis is advanced:

Hypothesis 7 (H7): In adopting firms, ABC is more successful in the larger firms.

6.6.8 Period of time that ABC has been in operation

The period of time for using the ABC system would appear to have some benefits for the firms which have been using it because of the time the people who work with ABC they have had to become more familiar with it, and move down the learning curves. Even though advocates of ABC claim that it is potentially beneficial, they also point out that it takes time before any potential benefit might show (Kaplan, 1998). Also, the results of empirical research on the success of ABC suggest that the benefits of an ABC system increase over time. Based on an analysis of their results, Foster and Swenson (1997, p.128) conclude that the longer the time period that ABC is used, the higher the benefits. Therefore, the following hypothesis is formulated:

Hypothesis 8 (H8): In adopting firms, there is a positive. relationship between ABC success and the period of time that ABC has been in operation.

6.7 Conclusion/summary

This chapter has attempted to provide a justification for further survey research relating to ABC systems. The research objectives were summarised and it was pointed out that since the first four objectives related to research that was mainly of a descriptive and analytic nature not involving hypothesis development and testing, these objectives would not be pursued in this chapter. The main aim of the chapter has been to develop and present the hypotheses that will be tested in Chapter 9.

In addition, the administration of the questionnaire, the response rate, tests of non-response bias, the validity and reliability of the questionnaire and the justification of the statistical tests used are also described. The next chapter, Chapter 7, presents the research methodology. It involves describing the research design, the methodology and data collection methods and the population and sampling frame.

CHAPTER 7

RESEARCH METHODOLOGY

CHAPTER 7

RESEARCH METHODOLOGY

7.1 Introduction

The research design, the methodology and data collection methods and the population and sampling frame are described in this chapter. In addition, the questionnaire construction process, the content of final version of the questionnaire, the response rate and tests for non-response bias are described. The chapter concludes with a discussion of the validity and reliability of the questionnaire responses. Also, the statistical tools that are used to analyse the data are described.

7.2 Research design

According to the complexity of the topic, researchers have presented several definitions for research design and, even though their definitions differ, they agree on the essential conditions for research design. First, the design is a plan for selecting the sources and types of information used to answer the research question. Second, it is a framework for specifying the relationship between the study variables. Third, it is a blueprint that outlines each procedure from the hypothesis to analysis of the data (Cooper and Emory, 1995). The design provides answers for such questions as: What techniques will be used to gather data? What kind of sampling will be used? How will time and cost constraints be dealt with? No simple classification system is available to define all the variations of research design.

According to Cooper and Emory (1995), eight different perspectives can be used to classify research design. They are:

1. The degree to which the research problem has been crystallised (the study might be exploratory or formal);

2. The method of data collection (the research might be observational or survey based);

3. The power of the researcher to produce effects in the variables under study (the two major types of research are experimental and ex post facto);

4. The purpose of the study (the research might be descriptive or causal);

5. The time dimension (research might be cross-sectional or longitudinal);

6. The topical scope, breadth and depth of the study (for example, the research may be a case study or a statistical study);

7. The research environment (most business research is conducted in a field setting although laboratory research is not unusual; simulation is another category);

8. The subjects' perceptions of the research (e.g. does the study observe the natural behaviour of the participants?).

In order to classify the design of this study, the relationship between this research and the above perspectives will now be discussed.

1. *Degree of problem crystallisation*

According to Sekaran (1992, p.95), a study might be classified as either exploratory or formal, with the former being " undertaken when we do not know much about the situation at hand". Alternatively, Hussey and Hussey (1997, p.10) state that exploratory research " is conducted into a research problem or issue when there are very few or no earlier studies to which we can refer for information about the issue or problem". Extensive preliminary work has to be done to gain familiarity with the phenomena relating to the situation and to understand what is happening before a model can be developed and a rigorous design set up for complete investigation. Exploratory studies are, thus, important for obtaining a good grasp of the phenomena of interest and for advancing knowledge through good theory building (Sekaran, 1992). The immediate purpose of exploration is usually to develop hypotheses or questions for further research. The formal study begins where the exploration leaves off. It begins with a hypothesis or question and involves precise procedures and data source specifications. The main goal of a formal research design is to test the hypothesis or answer the research questions.

This research contains both exploratory and formal elements. It is considered exploratory because the picture about some ABC phenomena, such as reasons for not adopting ABC, is not clear. Given that many hypotheses from the theoretical literature are also formulated (see Chapter 6, sections 6.5 and 6.6) this research can also be considered to represent a formal study.

2. *Method of data collection*

Studies may be observational or survey. With observational studies, the researcher inspects the activities of a subject or the nature of some material without attempting to obtain a response from anyone. In survey studies the researcher questions the subjects and collects their responses by personal or impersonal means. Examples include personal interviews, telephone interviews, self-administered questionnaires, mailed questionnaires, e-mail questionnaire services, or a combination of personal and impersonal techniques to collect the data. In this study, the postal survey was judged to be the appropriate way to collect the data (see Section 7.4).

3. *Researcher's control of the variables*

According to their ability to manipulate variables, researchers differentiate between experimental and ex post facto design. With the former, the researcher tries to control and/or manipulate certain variables in order to study the effect of such control or manipulation. In the second, the researcher has no control over the variables in the sense of being able to manipulate them. In this case, the researcher reports what has happened or what is happening. Controlling or manipulating the variables would have introduced bias to the study. In this study no attempt will be made by the researcher to control or manipulate the study variables. Hence, the study is classified as ex post facto research.

4. Purposes of the study

Some of the purposes of the study can be classified descriptive and others as causal. The main objective of a descriptive study is to learn the who, what, when, where and how of the topic (Cooper and Emory, 1995). The objective of a causal study is to find out why. This is used when it is necessary to establish a definitive 'cause-effect' relationship. Some of the aims of this study are to ascertain ABC usage rates, the types of firms implementing or not implementing ABC, the period of implementation and the applications of ABC. Thus, part of this research can be classified as descriptive. On the other hand, some aims of the research include determining why some firms adopt ABC and others do not. ABC has a value as the literature review has advocated but many firms have not yet adopted ABC. This research also focuses on examining the impact of certain factors on the decision to adopt or not adopt ABC. Therefore, elements of this research can also considered to be a causal study.

5. *The time dimension*

Research may be cross-sectional or longitudinal. In cross-sectional research data are gathered just once, perhaps over a period of days, weeks or months, in order to answer a research question (Sekaran, 1992). In longitudinal research the data gathering is repeated over an extended period of time in order to answer a research question. This research has been carried out at one point in time, so it is considered to be cross-sectional.

6. *The topical scope*

Research can be either statistical or case study based. Statistical research is designed for breadth rather than depth. It attempts to capture a population's characteristics by making inferences from a sample characteristic. Hypotheses are tested quantitatively. Case studies place more emphasis on a full contextual analysis of fewer events or conditions and their interrelations. This study is considered to be statistical because several hypotheses are developed and statistically tested.

7. *The research environment*

Studies can be classified as field studies or laboratory studies. Field studies occur under actual environmental conditions. Laboratory studies are usually conducted under simulated or artificial conditions. This study is, therefore, classified as a field study because it has been conducted under actual environmental conditions.

8. *The subjects' perceptions*

The usefulness of the research outcomes may be reduced when people participating behave differently when they perceive that their behaviour is being studied and researched (Cooper and Emory, 1995). When subjects believe that something out of the ordinary is happening, they may behave less naturally. The participators in this research were aware of the study's objectives. They were informed in a covering letter what the study was trying to achieve and it was hoped that this would evoke their co-operation.

7.3 Research methodology and research methods

What are the differences between research methods and research methodology? It is not easy to discriminate between them and there is no consensus between researchers about the two terminologies because the difference between them is not always clear. The term 'methodology' in its original and proper usage refers to "the systematic and logical study of the principles guiding scientific and philosophical investigation" (Gould and Kolb, 1964, p.425). Roberts (1971) defines methodology as the study of the utility and validity of methods of investigation in a particular scientific discipline or area under consideration. He states that methodology is concerned with various models, classification and conceptual schemes that exist and the techniques that are available for investigatory purposes.

Scruton (1982) argues that the term 'methodology' represents the study of methods, but is often used simply to mean 'method.' There may be more than one method used to discover some matter and, in that case, it is possible to speak of methodology as the discipline that attempts to describe which best method achieves the required result. Hussey and Hussey (1997, p.54) point out that some authors use the two terms interchangeably. They state that research methodology refers to the overall approach of the research process that involves theoretical underpinning or formulation, data collection and analysis. Research method relates to the means that are adopted in order to collect and analyse data. In short, research methodologies are a system of explicit rules and procedures on which research is based and against which claims of knowledge are evaluated (Frankfort-Nachmias and Nachmias, 1992).

With regard to research methodology in the social science context, Creswell (1994) argued that there are two approaches (paradigms). Terms such as positivistic, quantitative, objectivist, scientific, experimental and empirical are used to describe the first approach. The second approach is denoted by terms such as phenomenological, radical, qualitative, subjectivist, interpretative and post-positivistic.

According to Easterby-Smith *et al.* (1991) and Hussey and Hussey (1997), the positivistic approach aims to capture the facts or causes of social phenomena. This approach pays little attention to individual behaviour, and logical reasoning is applied to achieve precision and objectivity when investigating and explaining research results. Explanations involve establishing relationships between the variables of the research and linking them to a specific theory. However, the phenomenological or qualitative approach has emerged as a result of criticisms of the positivistic approach application in social science. With this approach, the view of the reality is not objective and exterior, but socially constructed and given meaning by people. In other words, this approach to research focuses on the subjective aspects of human activity by targeting the meaning, rather than the measurement, of social activity or phenomena.

The most significant distinguishing feature between the two approaches is that adopting either approach leads the researcher to employ a specific research methodology.

Adopting the positivistic approach requires a research methodology that is concerned with hypothesis testing by collecting and analysing quantitative data in order to arrive at generalisable inferences which are often based on statistical analysis. In contrast, adopting the phenomenological approach requires a research methodology that focuses on generating theories by means of collecting and analysing qualitative data that describe and explain a phenomenon in its context.

From the two paradigms it may be said that this research has adopted a positivistic approach in order to answer the research questions and achieve the research objectives and to provide a basis for generalising results for specific situations. This is because the empirical study is designed to examine the linkage between particular variables, to test precise hypotheses and to find the answers to questions in the form of "what" and "why" rather than "how". To achieve the research objectives it was more appropriate to examine a large number of firms rather than engage in studying individual behaviour within firms.

7.4 Data collection methods

In this study the researcher was free to select the appropriate data collection methods which enabled the objectives of the study to be achieved. There were two methods available: case studies of a small number of firms or a questionnaire survey of a relatively large number of firms.

Case studies have been widely used to describe and explore how and why firms have experimented with and/or implemented ABC. This form of research is best understood by considering its development as a two-stage process. The first stage has involved the documentation and analysis of individual ABC systems and has described the difference with traditional systems in terms of effects on product costing, product pricing and product mix (Cooper, 1986; Kaplan and March, 1987; Copper and Wruck, 1989), product and process design (Cooper and Turney, 1989; Berlant *et al.*, 1990; Foster and Gupta, 1990a) make-or-buy and transfer pricing (Kovac and Troy, 1989; Spicer and Colbert, 1990) and the marketing of products (Cooper and Kaplan, 1987; Kaplan, 1989). The second stage has involved cross-case interpretations and analysis which has resulted in tentative taxonomies of practices and the conceptualisation of the design and implementation issues associated with these systems.

Surveys have also been widely used with ABC research, as described in Chapter 5. There is also a need for more surveys to be undertaken (see Chapter 6, section 6.2) where there is greater scope for the results to be generalised. Furthermore, case study research is subject to language barriers which cause additional problems, particularly for overseas researchers.

Surveys have several advantages if the survey instrument is carefully developed and validated before use. The results have strong reliability and validity. Moreover, it is useful to document the norm, identify extreme outcomes and show association between variables (Attewell and Runle, 1991). If a representative sample is chosen, the results have strong generalisability. The survey method was considered to be the most appropriate method for achieving the objectives of this study (see Section 6.3).

Collecting the data for a survey involves three main methods: face-to-face interviews, telephone or fax surveys and postal or E-mail questionnaires. These methods are examined in the following sub-sections.

7.4.1 Face-to-face interviews

This type of research can be defined as an interview during which a structured conversation is used to complete a survey (Dane, 1990, p128). The aim of the conversation is to collect the required data. A questionnaire and interview guidance notes or protocol are designed to provide the structure for the conversation. This has been regarded as the most appropriate method for collecting attitudinal and factual data from a general population and from some special population groups (Weinberg, 1983, p336). According to Oppenheim (2001, p.102), the advantage of personal interviews is that they tend to have high response rates; they also offer the opportunity to correct misunderstandings and to make observation and ratings while controlling for incompleteness and for answering consequences. In addition, they provide an opportunity for direct contact between interviewee and interviewer and, therefore, may motivate interviewees to provide more reliable answers and additional information.

Nevertheless, as with any method, face-to-face interviews have some disadvantages as well as benefits. The major disadvantages of personal interviews are that they often require trained staff and are time-consuming and expensive to conduct and process. It was stated by Weinberg (1983) that one hour of face-to-face interview might take four to five hours of an interviewer's time. There are also risks of interviewer bias and such interviews are usually too expensive to reach a widely dispersed sample (Oppenheim, 2001, p.102). Interviewee bias can arise from the following:

- Giving socially acceptable responses (as perceived by the interviewee) to satisfy a positive self-image;
- Trying to please the interviewer, and
- Being deliberately negative or 'awkward'.

7.4.2 Telephone and fax surveys

Telephone interviews are an alternative method to face-to-face interviews. They enable significant savings to be made in terms of the researcher's time and are less costly to administer (Oppenheim, 2001; Weinberg, 1983). They also combine the benefits of mail questionnaires and face-to-face interview surveys, as respondents' misunderstanding of the questions can be overcome. Response rates may be increased by using telephone communications to persuade the respondents to complete the mail questionnaire. Short telephone interviews can also be used as a method supplementary to other research techniques; for instance, a telephone survey is often employed to follow up a mail questionnaire. In doing so, the researcher might be able to clarify some points that are missing or unclear.

Related to the telephone survey, fax surveys have been also recommended. Dickson and Maclachlan (1996) have identified some advantages of fax surveys, compared with mail surveys. First, they replace the sender's printing and postage costs with potentially lower line transmission costs. Second, they avoid the folding and stuffing efforts and costs for both sender and respondent. Third, the questionnaires are delivered faster and, if the respondent returns the questionnaire by fax, there is also a faster return. Fourth, a faxed survey might encourage response by implying urgency or not being perceived as junk mail.

However, fax surveys are also subject to some disadvantages. Sample coverage is lower, unacceptably so in consumer and many small business populations. Also, there is no way to provide either prepaid response, except with a free-fax number, or a pre-addressed response vehicle, such as an envelope. Thus, because a fax survey costs the respondent money, some people may refuse to respond to the survey.

7.4.3 Postal questionnaires

A postal questionnaire is considered a popular survey method in social sciences, particularly management accounting. It is conducted by mailing the questionnaire to predetermined respondents. It can be defined as a survey in which respondents complete the questionnaire without intervention by the researcher. It is also known as a self-administered survey (Dane, 1990, p.133). Because of the distance between the researcher and the respondents in such a type of survey, the researcher cannot participate when respondents are completing the questionnaires. Questionnaires are potentially open to misunderstandings. Therefore, it is important that the questionnaire is properly designed so that the respondents can clearly understand each question. According to Dillman (1993, p. 376), mail questionnaires have a great potential for social research but researchers must give proper attention to the design and construction.

As with other methods, mail questionnaires have many benefits but also some weaknesses. The benefits of mail questionnaires are that the costs of data collecting and processing are low, as the questionnaires are often designed to be completed simply by ticking or putting a mark on the answer, which saves both time and effort (Oppenheim , 2001). Moser and Kalton (1989) share the same idea that questionnaire surveys are less costly to conduct than personal interviews and do not require trained staff to collect the data (Moser and Kalton, 1989,; Sekaran,1992). Postal questionnaires do not require an excessive amount of time and biasing, which can easily surface in individual interviews owing to the manner in which questions are posed by the interviewer and perceived by the respondent, is minimised (McClelland, 1994).

Mail questionnaires are also recommended where the population is widely and thinly spread (Moser and Kalton, 1989). This applied to this research since the random sample selection process resulted in the wide dispersion of UK firms. A further advantage of mail questionnaires is that they are normally a speedy method of collecting data (Moser and Kalton, 1989, p.257). In addition, they are appropriate when the questions require consultation with other people besides the respondent, or require reference to company records. Furthermore, a questionnaire is considered as being an efficient data collection method when a researcher knows exactly what is required and how to measure the variables of interest (Sekaran, 1992, p.200). Mail questionnaires also provide respondents with greater confidence regarding their anonymity and they, therefore, feel free to release information and express their points of view (Kerlinger, 1986; Mason and Bramble, 1989). Finally, certain data that require personal opinions can be more easily captured by questionnaires than by personal interviews.

Mail questionnaires are also subject to a number of limitations. The first is that they tend to be suitable only when the questions are sufficiently simple and easy to understand with the help of the printed instructions (Moser and Kalton, 1989, p.260). To reduce this limitation, there need to be many stages to make the questions easily understood (see Section.7.7). The second limitation is that respondents can see all the questions before answering any of them, therefore, different answers cannot be regarded as independent (Frankfort-Nachmias and Nachmias, 1976; Moser and Kalton, 1989, p.260). This limitation can be reduced by repositioning and rephrasing questions. Thirdly, with a mail questionnaire, the researcher cannot be sure that the right person completes the questionnaire (Moser and Kalton, 1989,p.261). This limitation can be reduced by selecting the name of the person directly and making a space on the questionnaire to write his/her name and e-mail address for additional confirmation. The fourth limitation relates to the absence of direct contacts with respondents which can result in misinterpretations, with some of the questions being interpreted in a different way to that intended by the researcher. A fifth limitation is that researchers find only what they seek and, if something is not covered in the questionnaire, it will be missed unless the respondent wishes to supply additional information to the researcher.

The final, and probably the most important, limitation of mail questionnaires is that it may be difficult to obtain an adequate response rate (de Vaus, 1990 ; Oppenheim, 2001 ; Moser and Kalton, 1989; Newell, 1999). If the response rate is low, non-response bias can occur because the returned questionnaires may not be representative of the original sample drawn. In addition, it is possible that the number of questionnaires returned may not be enough to carry out statistical tests, which might restrict the achievement of the study's objective.

7.4.4 E-mail questionnaire surveys

With the internet diffusion in recent years, some disadvantages of the postal questionnaire can be reduced, partly with regard to the cost of mail questionnaire. The e-mail services enable the researcher to send questionnaires directly to the respondents. e-mail surveys have several advantages. First, the costs of the paper are totally eliminated. Second, distribution time is greatly reduced as the e-mail system routes the survey electronically. Third, response times and rates should increase because of the ease of distribution and response (e.g. electronic transfer versus manual mail delivery). It also offers an opportunity to correct misunderstandings, but less than face-to-face interview. Moreover, it enables the researcher to make a direct contact with the respondents. In addition, the researcher is able to use the internet techniques to create a website for his/her questionnaire to be easier to access. Thus, a reminder letter is not needed.

As with any method, this one also has some disadvantages. The first is how to find the respondent's e-mail address. Also, using e-mail poses a major problem of confidentiality or anonymity of response. If anonymity is not guaranteed, an individual may be hesitant to respond via electronic medium, as most of these systems also deliver a telephone number, extension, station location, or some other signature relative to their origin (McClelland ,1994).

7.4.5 Choice of research method

The achievement of the research objectives was dependent on the analysis of responses from a large number of firms; consequently, survey research was considered to be the most suitable data collection method. This choice enabled a widely dispersed, large number of participants to be reached.

Furthermore, and in accordance with the aims of this study, a mail survey was also selected as being more appropriate to examine the ABC phenomenon. There are also two other reasons that influenced the selection of mail survey as the research instrument: the first was that the data needed for this research were not available from archival sources. Consequently, the information had to be collected directly from firms. The second reason was that the aim of the research was to test a cross-section of a large number of firms in testing the hypotheses described in the previous chapter.

In addition to a postal survey, e-mail was used as a mechanism to increase the response rate. A website was created for the questionnaire for use with the first reminder letter. In the reminder letters the respondents were asked to access the website if they had misplaced the original questionnaire.

7.5 Selecting target population and the sampling frame

The first step was to define the population. The population consisted of UK manufacturing and service firms. Not-for-profit organisations were excluded because of their special features and the fact that management accounting information is likely to be less relevant in such organisations.

It was necessary to identify an appropriate database for selecting the sample. Initially, the intention was to use the Times 1000 as the database. It includes the largest industrial UK firms in terms of annual turnover and such firms are more likely to have established formal costing systems. Unfortunately, this database was not published in 2000; the most recent edition was published in 1998. It was felt that depending only on the Times 1000 as the main source to identify the sample could lead to the identification of firms that have been dissolved or taken over by other firms. Furthermore, in the cases where the respondents had been identified by name, there was a possibility of them having moved from their jobs. Therefore, it was decided that Times 1000 was not appropriate and should be replaced by another database.

The Financial Analysis Made Easy (Fame) database was selected. There were several reasons for this choice. First, it contained relevant information that was required for selecting a suitable sample (e.g. information relating to sales turnover, number of employees, and telephone numbers). This information was of vital importance for identifying potential respondents. Second, the Fame database was available at the University of Huddersfield. Therefore, it did not require additional time and cost to obtain the required information. In addition, previous survey studies (e.g. Abdel-Kader and Dugdale, 1998) have used this database as their main source to determine the sample for their studies.

Firms that have a turnover that exceeded £50 million (3,487 companies) were selected because the focus was on larger companies that would be likely to have an established management accounting function and that would be likely to consider adopting ABC. This fact had been established by the researcher during the pilot study (see section 7.7.3). The information included company name, company address, latest number of employees, and last turnover GBP but unfortunately, not the name of potential target respondents.

The questionnaire required that respondents were familiar with their organisation's management accounting system so it was, therefore, necessary to select respondents who met this requirement. Therefore the membership database of the Chartered Institute of Management Accountants (CIMA) was used to assist in determining the potential respondents. This database listed 11,235 members employed in the service and manufacturing sector. It contained details of the members' forenames, surname, job title, company name and address, and the date of entry to CIMA.

A database was created on Access. This database contained one file for the 3,487 firms from the Fame database and another file for the 11,235 CIMA members. A random sample of 1,000 firms was selected from the Fame database. An attempt was made to match all the 1000 firms with the CIMA file. This resulted in 534 firms which had the same names and addresses on both files. It was then decided to divide the total sample into two sub-samples, the 534 firms containing the first sub-sample, and the second sub-sample consisting of the remaining 466 firms from the Fame sample which were not matched with the CIMA file. Therefore, 534 questionnaires were sent to the named persons (selected on the basis of the most appropriate job title from the CIMA list), but the remaining 466 for the second sub-sample were addressed to the Finance Director/Management Accountant. In addition, the second sub-sample, without names, had a covering letter which added that, if the business did not have a formal costing system, all the questions should be omitted except Section D (which related to data on contextual factors) .

7.6 Selection of the individual respondents

It was very important to provide the respondents with careful instructions in order to ensure that the information requested was provided. It was pointed out in the previous section that considerable effort was made to try and identify those respondents who were likely to have a good knowledge of their costing systems and the organisational and contextual factors required to test the hypotheses. Some researchers using the mail research method have addressed their questionnaires to the head office and asked that the most appropriate person complete the questionnaire. For example, an Indian ABC survey by Joshi (1998) mailed the questionnaires to the General Manager/Vice-President/Management Accountant/Head of the Finance Department. Armitage and Nicholson (1993) addressed their questionnaire to the Controller. Hoque (2000) addressed his questionnaire to the Chief Executive of each company by name. In some surveys the researchers request the appropriate people to complete their survey without identifying a person by name or an appropriate job title. Such a procedure could mean that people not well informed about some aspects of the questionnaire might answer some questions which would, consequently, affect the reliability of the results.

It has been suggested that the chief financial executives are considered to be the people most likely to provide accurate and useful data concerning the design and use of the product costing systems (Kaplan and Atkinson, 1989; Langfield-Smith, 1998). However, such a person (the organisation's most senior financial executive) may be too busy to answer questionnaires and as previous research has indicated (e.g. Ramadan, 1985), they are likely to pass the questionnaire to somebody else within the organisation to complete. It is likely that a person in the position of senior management has little time to answer the questionnaire.

Because of this, many researchers have used qualified management accountants to answer questionnaires relating to their survey (e.g. Bhimani, 1993; Spencer and Francis, 1998). It would appear that a qualified management accountant in a company is the best-informed person concerning the product costing system. He/she is likely to have a good knowledge of this system and more time than chief financial executives or the finance director to answer the questionnaire. Therefore, it was considered appropriate to address the questionnaire to qualified management accountants since this was likely to maximise the response rate. However, the job title of management accountant is not used universally by all organisations. Furthermore, it is difficult to identify the names of qualified management accountants from external sources in order to address the questionnaire to personally named individuals.

Having taken into account all the above factors, the sub-sample derived from CIMA database (n = 534) represented the ideal choice. It enabled the selection of the person with the most appropriate job title who would be likely to have the best understanding of their organisation's costing system and the factors influencing the adoption/non-adoption of ABC. Where it was not possible to use the CIMA database (n = 466) the correspondence clearly indicated that, ideally, the questionnaire should be completed by the head of the management accounting function, or the equivalent job title used by the company. The job titles of all of the people completing the questionnaire were examined carefully prior to including the responses in the analysis. Table 7.1 summarises the respondents by job title for this study.

Table 7.1 Classification of respondents by job title.

Job title	Frequency	Percentage
Management / Cost Accountant	45	23.86
Financial Controller	26	14.77
Finance Director	17	9.65
Finance Manager	9	5.10
Head of Activity Based Costing/Management	8	4.54
Manager	4	2.27
Chief Accountant	3	1.70
Financial Services Manager	2	1.13
Divisional Financial Controller	2	1.13
ABC Accountant	2	1.13
Head of Management Accounting	2	1.13
Commercial Accountant	2	1.13
Chief Cost Accountant	2	1.13
Operation Finance Control	2	1.13
Accountant	2	1.13
Other*	48	27.27
	176	100.0

* This category included various items related with job titles within the accounting function e.g. Decision Support Accountant, Division Cost and Profit unit Finance Accountant, Finance Analyst, Financial Planning Accountant, Group Finance and planning manager, Senior Financial Analyst, Supply Chain Accountant, etc).

7.7 Stages in the construction of the questionnaire

The survey method has been widely used in management accounting research for the last three decades. However, Young (1996) has strongly criticised management accounting surveys. He argues that most of the survey research conducted in management accounting has "failed to follow well-established survey procedures" (Young, 1996, p.55). In particular, his study of the survey research published in top accounting journals over the last ten years identified a pattern of poor survey methods .

He noted that most studies fail to use "technically sound" sampling methods, do not examine non-response bias, do not specify the sampling frame and suffer from inadequate sample size. He concluded that these failures result in non-representative samples and low statistical power, which call into question the inferences made by the researcher. Moreover, these failures question whether the studies were even adequate tests of the theories under investigation (Young, 1996).

Considering Young's criticism, it was clear that detailed and careful planning should be undertaken in this study to avoid the identified criticisms. To this end it was helpful to consider the survey process as consisting of two stages: stage 1 relating to pre-survey issues and stage two relating to the designing, classification and sequencing of the questions.

7.7.1 Stage one (pre-survey issues)

In this stage the purposes of the study were identified and the postal survey method was selected as the most effective way of achieving the research objectives. The goal was to collect information about product costing systems with specific emphasis on factors influencing the adoption, non-adoption and success of ABC systems. Before the survey was developed the information required to achieve this objective was determined. The list of information requirements denotes the essential constructs that must be operationalised into variables and measured by the survey instrument. Moreover, they help outline the boundaries of research. The information requirements acted as a checklist to ensure that the final survey collected all the necessary information to test the hypotheses presented in Chapter 6.

In order to build a good questionnaire it was necessary to develop a series of measures that would adequately achieve the study's objectives. The researcher took eleven months to prepare the questionnaire. The major source for determining the questionnaire content was the existing literature. This was the basic source for maximising the reliability and validity of the research instrument and to embed the research strongly within the existing literature. The questions used were, where possible, adapted from published research. This approach was used to maximise the reliability and validity of the research. In addition, the researcher attended conferences to provide the opportunity to meet the people who were involved in similar areas of research. For example, the researcher attended the Management Accounting Research Group Conference held at London School of Economics and discussed with some of the delegates questions relating to the study. Moreover, the researcher met some people involved in ABC at the Armstrong Seminar held in Leeds on 14 September 2000. This seminar enabled the researcher to derive information other than from academic conferences. During this period the first version of the questionnaire was constructed.

7.7.2 Stage two (designing, classifying and sequencing the questions)

The questionnaire contains a combination of open-ended and closed type questions. Although the main type of question used was the closed one, the advantage of obtaining further information was not lost because a space for additional views was given where relevant, to be completed by the respondents. Questions with multiple-choice answers were also used. In addition, open-ended questions were used to give the respondents the opportunity to express their views on specific issues. These issues are explained in more detail in the following sections.

7.7.2.1 Designing the questions

The questions represented the vehicle for extracting these data. In designing questions it is essential to bear the potential audience in mind. Hussey and Hussey (1997, p.165) mention general rules for designing questions. The following list is adapted from them.

1. Explain the purpose of the interview or questionnaire to all participants.

2. Keep your questions as simple as possible.

3. Do not use jargon or specialist language.

4. Phrase each question so that only one meaning is possible, avoid ambiguity.

5. Avoid vague, descriptive words such as 'large' and 'small'.

6. Avoid asking negative questions as these are easy to misinterpret.

7. Ask only one question at a time.

8. Include relevant questions only (do not be tempted to include every question you can think of).

9. Include questions which serve as cross-checks on the answers to other questions.

10. Avoid leading or value-laden questions which imply what the required answer might be.

11. Avoid questions which are nothing more than a memory test.

12. Keep your interview schedule or questionnaire as short as possible, but include all the questions required to cover your purposes.

All of the above rules were followed wherever possible. For example, the purpose of the study was explained clearly to respondents in the letter accompanying the questionnaire (see Appendix A). In addition, written guidance notes were provided at the beginning and throughout the questionnaire. Regarding the simplification of the questions, every effort was made during the construction of the questionnaire to make all the questions as simple clear and concise as possible.

Also, to avoid the respondents guessing the answers to certain questions, it was stated in the questionnaire guidelines that they should omit any question which they did not know the answer to or where the information was too time-consuming to obtain. This statement gave the respondents an opportunity to avoid questions that they may have found difficult to answer.

7.7.2.2 Classification of the questions

Questions can be classified according to their content, type and scale. According to Frankfort-Nachmias and Nachmias (1996, pp. 251-253), questions can be classified according to their content as factual or subjective.

- Factual questions are designed to obtain objective information relating to respondents' background. Examples include questions about respondents' job title, the location of a respondent within the organisation. These questions were mainly used in order to classify respondents and to test for non-response bias.

- Questions about subjective experiences aimed to obtain information relating to respondents' attitude, feelings and opinions. Examples include questions relating to the importance attached to each factor listed in the questions and the degree of satisfaction about the accuracy of the cost system relating to the assignment of overhead to products/services for decision making purposes. Many of the questions included in the questionnaire can be considered as questions about subjective experience in order to measure the potential explanatory factors and, in turn, to achieve the research objectives.

In addition, questions can be classified according to their types into four main groups: open-ended, closed-ended with ordered choices, closed-ended with unordered response choices and partially close-ended. The following descriptions are adapted from Dillman (1978, pp. 86-87).

- Open-ended: the respondents are not given a specific set of responses to choose the most appropriate answer. Instead they are asked to create their answers and state them in their own words.

- Closed-ended with ordered choices: the respondents are provided with a specific set of responses, each is a gradation of a single dimension of some thought or behaviour. The respondent's task is to find the most appropriate place on an implied continuum for his /her response.

- Closed-ended with unordered response choices: the respondents are provided with a specific set of responses, but no single dimension underlies them. Respondents must choose from among discrete, unordered categories by independently evaluating each choice and selecting the one that best reflects his/her situation.

- Partially closed-ended: such questions provide a compromise; although answer choices are provided, respondents have the option of creating their own response.

The main type of question used in the questionnaire was partially closed-ended ones with ordered choices. Closed-ended questions with unordered responses were also used, but to a lesser extent. The advantage of obtaining further information was not lost, since respondents were asked to add any further information in the space given to many of the questions. Many of the questions included an item entitled 'other, please specify', in order to encourage respondents to add any other items that were not listed in the specific question.

The final classification of the questions is according to their scale, or sometimes called 'forced format'. Questions can be classified into the following five types.

- The first type is multiple-choice answers where respondents are asked to choose from a set of all possible answers (Frankfort-Nachmias and Nachmias , 1996; Hussey and Hussey, 1997). Questions with multiple-choice answers were used in the questionnaire. For example, Question A4 (see Appendix B) was designed as multiple-choice in order to obtain information about the cost /overhead rates used to calculate product or service costs for decision-making purpose. As indicated above the respondents were also given an additional category or set of answers labelled other, please specify', in order to capture all possible answers. This idea was suggested by Hussey and Hussey (1997, p. 169); they state:

> In such circumstances, and wherever you are uncertain that you have covered all possibilities, you should add an 'other' category which the respondents can use to specify the answer in their own words.

- The second type is rating questions that are used to ask respondents about their judgement in terms of ordered categories such as "strongly agree" or "disagree" (Frankfort-Nachmias and Nachmias, 1996, p. 258). These rating scales are often in the form of a Likert scale that turns a question into a statement and asks respondents to indicate their level or agreement or disagreement by ticking a box or number. Such Likert scales have the advantage of listing different statements that do not require much space and which are easy for respondents to complete, and are simple for a researcher to code and analyse (Hussey and Hussey, 1997). Rating scales (e.g. Question (C1)) were extensively used in the questionnaire.

- The third type is the semantic differential that use two words or phrases (contrasting adjectives) to represent two ends of a continuum and respondents are asked to indicate their choice on a seven-point scale (Hussey and Hussey, 1997). This type of scale was used throughout the questionnaire in order to grant respondents some degree of flexibility. In addition, the middle-point was labelled by an adjective in order to represent a neutral or moderate opinion. Two reasons justify labelling the middle point. The first is that previous surveys such as Joseph *et al.* (1996) used this technique. The second is that it makes it easy to categorise responses into groups such as low, moderate and high. Such a classification is likely to be more 'user-friendly' to the respondent. This type of question is represented by Questions A8, B6 and B7.

- The fourth type involves a ranking scale where respondents are asked to determine the degree of importance or the priorities that they attribute to a set of objects (Frankfort-Nachmias and Nachimas, 1996). This type was used in the questionnaire in two questions during the pilot stage. Respondents were asked to rank the order of importance of the three most important uses of the information derived from the ABC system. However, at a later at stage, it was decided to delete these questions to reduce the length of the questionnaire. Nevertheless, the advantage of obtaining ranking information was not lost since it was possible to rank the mean responses to some of the questions, for example, Question B8.

- The final type is a dichotomy question answered by 'yes' or 'no'. This simple type of question was used frequently in the questionnaire in order to get direct answers from respondents. Examples include Question A1 (whether or not the business units assign indirect cost to product/services) and Question B1 (Is activity analysis undertaken without the activities being costed?).

7.7.2.3 The sequencing of the questions

The sequence in which survey questions or scaled items are listed will often affect the response (Alreck and Settle, 1995). The order of the questions is very important to create logic and encourage a suitable response rate. There is also evidence that the order of questions may influence the answer obtained (Cantril, 1944; Mosteller *et al.*, 1949; Whitfield, 1950, cited in Moser and Kalton, 1989). The questions should proceed in a logical manner, moving from topic to topic in a way that indicates to the respondent the relationship between the questions (Moser and Kalton 1989).

There are three things that might induce order bias (initiation, routine, and fatigue). Initiation requires that respondents learn how to handle the response task. Items of little importance should be listed first; therefore, any bias from initiation will not affect the most important items (Alreck and Settle, 1995).

When several similar items appear in sequence, the routine of responding may lead to a response strategy or policy. If that happens, each item will not be viewed or evaluated independently. Bias from routine response can be reduced by varying the list to make individual items distinct and to require separate consideration of each, rather than listing all items to ascend in one direction.

Finally, when the respondents must rate or respond to a long list of items, fatigue may occur. If that happens, they may respond carefully to the earlier items and carelessly to the later ones, thus causing errors or bias. This form of bias can be controlled by keeping any list or sequence short enough, so that even the least motivated respondents will not be affected by fatigue when responding to that section (Alreck and Settle, 1995).

Dillman (1978, p.123, 124) suggests the following principles for ordering questions.

- First, questions are ordered along a descending gradient of social usefulness (or importance); those which the respondent is most likely to see as useful come first, and those least useful come last.
- Second, group questions that are similar in content together, and within content areas, by type of question. Two purposes are served by this principle: the first is to ease the mental effort required for constantly switching from one kind of question to another; the second is to encourage well-thought-out answers, something that is more likely to occur if respondents are asked questions in an order that seems logical to them.

- The final ordering principle is that the questions in any topic area that are most likely to be objectionable to respondents should be positioned after the less objectionable ones. This does not mean that all objectionable questions are relegated to the last page of the questionnaire; rather, such ordering is done within the typical order and flow suggested by adherence to the first three principles.

In this questionnaire the aim was to make the question order as simple as possible. The first question (Question A1) sought to ascertain whether the cost system assigned indirect costs to products/services. This question aimed to avoid any initiation bias. Even if the respondent answered wrongly there were other questions that confirmed the correct answer. Also, the questions were mostly listed in either a consistent positive or negative direction in order to avoid response errors or confusion. However, to check the validity of the responses a few questions were deliberately presented in a negative format [e.g. B8 (f, h) D12 (b) and D3 (b and d)] and later reverse coded at the analysis stage. Any changes in format/presentations were highlighted to ensure that they were clear to respondents. Finally, all the items were kept short enough to reduce risk of fatigue.

7.7.3 Stage three (the pre-test and pilot test)

After the first draft questionnaire had been designed it was further refined through a rigorous process of pre-testing and piloting. The first step was to hand the draft questionnaire to a group of eleven Ph.D. student volunteers at different universities (4 at the University of Bradford, 3 at Loughborough University, 2 at the University of Huddersfield, 1 at the University of Dundee, and 1 at the University of Sheffield). All the students were undertaking Ph.D. degrees in accounting or business and were chosen because they were involved in researching areas close to the topic. They were briefed by telephone and they provided many comments relating to the wording and the placing of some questions. All their comments were taken into account at this stage.

In the second step the questionnaire was handed to a number of members of academic staff at different universities (Universities of Bradford, Dundee, Edinburgh, Huddersfield and Sheffield) in order to check the extent to which the questions were clear, understandable and relevant to the UK environment and appropriate for the purposes of the research. It should be noted that two of the academics were leading UK professors and the authors of the two major UK surveys on activity-based-costing. The researcher's supervisor's comments were also taken into account and he also reviewed the final version prior to the pilot study. After this stage the questionnaire was used for the pilot study.

For the pilot study the questionnaire was sent to 43 firms which were randomly selected. The questionnaires were addressed directly to named persons who were asked to complete and comment on any questions that they could not understand. A successful pilot study requires that it is viewed as being equivalent to a final survey in order to discover any problems so that they can be resolved. To meet this requirement, a special letter was prepared and addressed to the respondents (see Appendix C).

The pre-test and pilot survey offered an opportunity to focus on the issues of the clarity of the questions, wording, validity, layout and instructions and the time taken to complete the questionnaire. It requested comments from the respondents on any aspect of the survey including ideas for improvement. In particular, they were asked to make any comments relating to questions that they could not understand and add questions that they thought would be useful for the survey. The pilot survey also provided the opportunity to test the data-coding scheme and to gain experience in small-scale data analysis using real data with SPSS for Windows. The data were used to simulate the hypotheses tests to ensure all the necessary data were collected by the survey.

7.7.3.1 The results of the pilot study and final modifications to the questionnaire

During the pilot stage, 15 of the 43 questionnaires distributed were returned completed and 5 were returned uncompleted. The main reasons given for non-completion were lack of time, the fact that it was not company policy to participate in surveys and the person was no longer employed by the organisation. As the response rate (40%) was acceptable it was decided not to mail any reminders to the non-respondents. The questionnaire responses suggested that the respondents found the questionnaire understandable and easy to complete. One interview was undertaken as part of the pilot study with a senior accountant at Halifax plc who provided useful feedback and indicated that generally the questionnaire was suitable for meeting the objectives specified. However, he did point out that the questionnaire was very long. His comments were taken into account when producing the final version of the questionnaire.

Many modifications were made to the questionnaire as a result of the pre-test and pilot test stages. In response to the comments received the number of pages of the questionnaire were reduced, but without reducing the number of important questions. Most of the modifications related to the questionnaire layout, instructions and improvements in the clarity of the content in order to make it more user-friendly.

7.8 The features of the covering letter

The covering letter enclosed with the final version of the questionnaire (see Appendix B) was designed to ensure that the respondents clearly understood what was expected. Wherever possible, the letter was personalised with the respondent's name and signature of the supervisor and the researcher, with summary details about both of them. These steps sought to increase the response rate significantly (Alreck and Settle, 1995). To increase the response rate, a pre-paid envelope was also enclosed.

The covering letter and the first page of the questionnaire contained most of the important features that many authors recommend (Moser and Kalton, 1989; de Vaus, 1996; Frankfort-Nachmias and Nachmias, 1996):

- An explanation of the purpose of the study; the reasons why it is important that the respondents should complete the questionnaire and the method by which the respondents were selected;
- A statement that assured the respondents that the responses will be treated as confidential, an explanation of the potential uses of the results, and an offer making the results available to the respondents; and
- A signature demonstrating that the questionnaire was sent personally to the respondent.

The respondents were also informed in the questionnaire guidelines to answer only those questions that were relevant to their business unit and to omit any questions where they were unsure of the response or where the information was too time consuming to obtain. Therefore, the responses to individual questions may not be equivalent to the total number of completed questionnaires. It was, also pointed out to the respondents that, if their business unit did not have a formal system for assigning costs to products, they should complete only Section D of the questionnaire. For those respondents that were required to complete the full questionnaire it was stated that completion should take less than 30 minutes to complete. In addition, it was stated that the respondents to the questionnaires would receive a summary of the main research findings.

7.9 Content of the final version of the questionnaire

The final version of the questionnaire (see Appendix B) was designed to capture information on the diffusion of management accounting innovations, particularly the product costing systems, with specific emphasis on factors influencing the adoption, non-adoption and success of ABC systems. A seven-point scale (Likert-type) was used to measure the variables which had been selected from the literature. The questionnaire consisted of 11 pages, excluding the front covering page. The first page included guidance notes to facilitate answering some of the questions. The questionnaire was divided into the following four sections:

- Section A: General questions relating to the organisations' costing systems;
- Section B: Questions applicable only to those units that have implemented ABC Systems;
- Section C: Questions applicable to businesses that have not implemented ABC; and
- Section D: Questions about the context /environment in which the business units operate.

The first question in section A (A1) was designed to determine whether or not the firms or organisational units assign indirect costs (overheads) to products/services. Questions

A2 and A3 were designed to identify the number of cost centres (cost pools) and the number of different types of cost drivers (i.e. indirect cost/overhead allocation recovery methods) used to assign indirect costs to products /services. Information on the types of cost drivers that are used and number of different products/services that costs are assigned to was derived from Questions A4 and A5. Questions A6 and A7 related only to manufacturing organisations and requested information relating to the methods of assigning non-manufacturing costs to products for different types of decisions. The respondents' perceived level of accuracy of their cost systems in assigning overhead to cost objects for decision making purposes was derived from Question A8. This question was adapted from Drury and Tayles (2000). In Chapter 4 (section 4.10) it was indicated that the implementation or non-implementation of ABC involves several stages ranging from 'not considered' to 'fully complete and accepted'. Question A9 sought to ascertain which of nine potential stages applied to the responding organisations.

Section B focused on the users of ABC systems. Question B1 sought to ascertain whether ABC was restricted only to activity analysis without costing the activities. The respondents were asked to indicate how long their ABC systems have been in operation in Question B2. Question B3 required the respondents to indicate whether ABC was in the pilot testing stage, whether it was operated in parallel with the previous costing system or whether ABC was the sole costing system. Question B4 focused on whether ABC was used to assign costs to products /services for decision making, used to cost activities for cost control /cost management purposes, or both . Question B5 was used to measure the success of ABC systems in providing improved decision-making and /or cost management information. The respondents were asked, on a scale of 1 (not very successful) to 7 (totally successful), their views on the success of their firm's cost system. Question B6 provided a list of 11 purposes for which ABC information can be used. The respondents were asked to indicate whether ABC was used for each purpose, and if so, the degree of importance attributable to ABC information. This question was adapted from Innes and Mitchell (2000).

Question B7 (items a, b, c, d, e, h, j, k) was adapted from Malmi (1999). It focused on the motives for implementing ABC. A list of 13 potential motives was provided and the respondents were asked to indicate their relative importance on a 7-point scale ranging from 1 (very unimportant) to 7 (vitally important). The measurement of success of ABC and the factors influencing the success was measured in Question B8. The question contained 22 statements and the respondents were asked to indicate the extent of their agreement to each statement on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Some of the statements listed were adapted from Shields (1995) and others from Krumweide (1998). The final question (B9) asked the respondents to indicate what software was used for their ABC systems.

The third section of the questionnaire, Section C, focused on the reasons for not adopting ABC systems. The section contained only one question (C1). This question contained 20 potential reasons that had been derived from the literature review for not implementing ABC. For each reason the respondents were asked to indicate their agreement rating on a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

The fourth section of the questionnaire, Section D, focused on the context /environment in which the business unit operates. Questions D1-D3 sought to measure volume and product diversity. Questions D1 and D2 were derived from Drury and Tayles (2000) and Question D3 was adapted from Estrin *et al.* (1994) and Krumweide (1998). Questions D4-D7 focused on the competitive environment. Questions D4 and D5 were adapted from Khandwalla (1972) and the items a, b in Question D7 were adopted after some modifications from Anderson and Young (1999). The remaining items in this question were self-formulated.

Information on the cost structure of each business unit was obtained from Question D8 (derived from Drury and Tayles, 2000). The extent to which a total quality management philosophy was adopted by the business units was measured by Question D9. The statements incorporated in this question were derived from Banker *et al.* (1993), Monden (1993) and Krumwiede, (1998). Question D10 (adapted from David, 1994; Reeve, 1995 and Krumwiede 1998) gathered information relating to the business unit's information technology. The extent to which business units had adopted a just-in-time philosophy was measured in Question D11. This question was adapted from Banker *et al.* (1993), Monden (1993) and Krumweide (1998). Question D12 sought to ascertain the extent to which the business units were price-setters or price-makers in terms of pricing decisions and Question D13 (derived from Estrin *et al.*, 1994 and Krumweide,1998) focused on the importance of cost data for a variety of different purposes.

The extent to which target costing was used was derived from Question D14 and Question D15 focused on the use of other innovative strategic management accounting techniques (e.g. value chain analysis, shareholder value analysis, benchmarking, balanced scorecard performance measurement, competitor cost assessment and strategic costing). Apart from Question D23 the remaining questions in section D requested information relating to details about the respondents' business unit including size and the business sector within which it operates. Question D23 sought to measure the performance of the business unit over several dimensions. This question (items a, b, c and d) was adapted from Powell (1995).

7.10 Questionnaire administration and response rate

The final version of the questionnaire (see Appendix A) was mailed to the potential respondents on 24 November 2000. The total number of completed and usable questionnaires was 176 after two reminders. A further 35 were returned uncompleted without any reasons and 173 were returned with appropriate reasons provided for non-completion (see Table 7.2).

Table 7.2 Analysis of reasons given for non-completion of the questionnaire

Reasons	N	%
We do not wish to participate.	35	20.2
The respondent is no longer employed (retried /left)	31	17.8
Inappropriately targeted (change in respondents' responsibilities, not relevant to the nature of the respondents' work)	23	13.3
We restrict all surveys to five to ten minutes completion	20	11.6
It is not firm policy to respond to questionnaires/surveys	18	10.4
Time pressures.	17	9.8
Addressee has gone away	15	8.6
Other miscellaneous reasons	8	4.6
No reasons	6	3.5
Total	173	100.0

Many steps were taken to increase the response rate. Two reminder letters were sent. The first on 17 January 2001 included information about the website created for the questionnaire. The respondents were asked to log on to extract the questionnaire if they had misplaced the original one or to indicate if they were not prepared to participate in the survey. The second reminder was sent on 16 February 2001 to encourage a response. During this period approximately 300 telephone calls were also made to encourage the completion of the questionnaire. Table 7.2 provides an analysis of the reasons given for non-completion and also shows the overall questionnaire response rate. A total of 65 questionnaires were received after the original mailing, 83 after the first reminder and 28 after the second reminder. The large number of questionnaires after the first reminder was due to the using the e-mail and the website facility.

There are a number of ways of measuring the response rate. According to de Vaus (1990, p.99), a common way of computing the response rate is to use the following formula:

Response rate = Number of completed and returned / N in sample – (Ineligible + Unreachable)

Adopting this approach the response rate = 176 / [1000 - (31+23+15)] = 18.9%[1]

7.11 The adequacy of the response rate

The response rate for this survey (18.9%) is comparable with other management accounting surveys, such as Abdel-Kadar and Dugdale (1998) 23%; Bescos and Cauvin, (2001) in a study of ABC in Canada (22.2%), France (4.7%) and Japan (27.7%). Studies by El-shishini and Drury (2001) , Innes and Mitchell (1991, 1995) and Ittner et al. (2002) also reported response rates of 18% 25% 26% and 11%, respectively.

[1] The figures deducted from 1,000 are derived from rows 2, 3 and 7 in Table 7.2.

Also, the marketing research literature suggests that a 5 - 10% response rate is realistic for a mail survey of firms (Feltham, 1999). Kervin (1992, p. 444) also argues that response rates for questionnaires can be as low as 10%. Therefore, the response rate was considered adequate in order to achieve the research objectives.

Dillman's (1978) is a frequently cited study that aimed to test different theoretical hypotheses relating to the methods of increasing the response rate. According to Emory and Cooper (1991, pp. 334-335) and de Vaus (1996, pp. 117-120), the following results are from Dillman's study.

- It is generally cited amongst researchers that short questionnaires are likely to obtain higher response rate than longer questionnaires. However, research evidence does not support this view;
- Researchers argue that preliminary notification of respondents, especially by telephone, is seen as being an effective method of increasing the response rate. However, reminders seem to be a better investment than preliminary notification;
- Dillman showed that the inclusion of a pre-paid envelope encourages response since it facilitates questionnaire return;
- Empirical evidence suggests that personalisation of the mailing questionnaire has no clear-cut effects on increasing the response rate;
- Empirical evidence suggests that the promise of anonymity to respondents does not significantly increase the response rate;
- Incentives accompanying the questionnaire are a very effective method of increasing the response rate;
- There is no significant effect of questionnaire size, methods of reproduction and colour in terms of the response rate;
- The inclusion of deadline date does not increase the response rate; however, it serves as a means of accelerating the rate of the questionnaire return.

Bearing these results in mind, it should be noted that efforts were made to increase the response rate. According to de Vaus (1996), the accompanying letter is a tool to motivate respondents to complete the questionnaire. Following this suggestion, and taking into account the results of Dillman's study, the accompanying letter incorporated all possible statements that could encourage respondents to complete the questionnaire (see Section 7.8). In addition, two reminders were sent. Also, many respondents were contacted using e-mails and telephone calls in order to explain to them the importance of their responses to the success of this research.

7.12 The effect of non-responses and tests for non-response bias

It is important in any survey to consider the impact of non-response and its effects. Overall, the strategy to non-response is three-pronged. First, prevention of the problem is the best tactic. All reasonable and cost-effective steps should be taken to prevent a large non-response level (Lessler and Kalsbeek, 1992). Second, non-response is a reality for every survey and an examination of its impact on the analysis is important. Finally, where possible, compensating for non-response should be considered (Lessler and Kalsbeek, 1992).

An analysis of the impact of non-response rate is crucial. It is important to note that. although non-response rates describe the extent of non-response, they do not indicate how this affects the survey data estimates. Lessler and Kalsbeek, (1992, p.116) state:

> 'Low response rates point only to a potential for severely affected estimates'

Kervin (1992, p. 419) defines non-responses as biased "when cases with certain characteristics are more likely to be refusals or non-contacts". In other words, the non-response cases are not randomly distributed within the sample and certain types of cases are under-represented. Also, Lessler and Kalsbeek, 1992, p.118) define non-response bias as the 'distortion in survey estimates that occur due to the inability to get a usable response from some sample members'.

The non-response bias is a joint (multiplicity) function of non-response rate and differences in key variables between respondents and non-respondents. Consequently, a high response rate, but with massive differences between respondents and non-respondents, can create more bias than a low response rate coupled with small difference between the groups. Thus, if there are no major differences between respondents and non-respondents, it is plausible to conclude that the sample obtained is not significantly different from the original sample (Lessler and Kalsbeek, 1992).

Moreover, the significance of the non-response rate depends on the population under study. If past studies on the same topic and to the same population also achieved low response rates, then the likely root cause is a low propensity to respond in the population. Regardless of the response rate, if the sample obtained is "at face value a microcosm of the population being studied", then the inferences drawn from the sample data are generalisable to the population (Lessler and Kalsbeek, 1992, p. 119).

There are two alternative methods for comparing respondents and non-respondents. First, variables applying to the sample obtained and the original sample are compared. The rationale for this test is that if the sample obtained is significantly different from the original sample, on known variables, then the sample data is also likely to be different from the population on the variables of interest in the survey. If these differences are significant, then the presence of non-response bias is likely. This approach assumes that a random sample was originally planned. The second method is to compare early and late respondents. These groups are compared using the key survey variables. If the two groups differ significantly on these variables, non-response bias is likely to exist. The test assumes that late respondents more closely resemble non-respondents. Finally, where non-response bias is likely to exist, steps should be taken to compensate for it. This could include re-weighting the data, sampling a group of non-respondents or conducting analysis sensitive to the problem (Lessler and Kalsbeek, 1992).

The second method was used to test for non-response bias. Four main variables were tested: the defined business unit (i.e. head office of a divisionalised company, division of a divisionalised company, non divisionalised company, etc. as specified in Question D16), the sector of the business (i.e., Manufacturing, Financial and Commercial, Retail , Service and Other as specified in Question D18), firm size measured by the group annual sales turnover and the number of employees.

The Mann-Whitney test was used to test if there is any difference between the early and late respondents. First, the responses obtained from the first 10% (cases 1-17) were compared with the last 10% responses (cases 158-176). As Table 7.3 shows, the p-values were respectively: 0.285, 0.415, 0.987 and 0.087. Since all of the p-values exceed the 5% level of significance, it can be concluded that there are no significant differences between the first 10% and the last 10%. Therefore, the hypothesis that there was a difference between the early and late responses was rejected. The sample was also divided into three sub-samples based on order of receipt. The Kruskal-Wallis p-values were in excess of 5% (see Table 7.4), thus indicating that there were no significant differences between the samples. In addition, various other methods were used to divide the responses by the order of receipt and there was no evidence of non-response bias.

Table 7.3: Test Statistics for the 10% early and 10% late responses

	Business Unit	Business Sector	Number of employees	Annual sales turnover
Mann-Whitney U	127.000	135.000	151.000	107.500
Wilcoxon W	317.000	325.000	287.000	260.500
Z	-1.197	-.903	-.033	-1.756
Asymp. Sig. (2-tailed)	.231	.367	.974	.079
Exact Sig. [2*(1-tailed Sig.)]	.285	.415	.987	.087

Table 7.4: Test Statistics (Kruskal Wallis) for the three sub-samples based on order of receipt

	Business Unit	Business Sector	Number of employees	Annual sales turnover
Chi-Square	3.625	1.982	2.829	1.519
df	2	2	2	2
Asymp. Sig.	.163	.371	.243	.468

7.13 The validity and reliability of the questionnaire

Whatever procedure for collecting data is selected, it should always be examined critically to assess to what extent it is likely to be valid and reliable. The researcher has to ensure that the measure which he/she has decided to use is reasonably suitable. In terms of the validity of the survey, two major issues arise: measurement validity and measurement reliability. Measurement validity refers to whether the 'thing' that is purported to be measured really is being measured, whereas measurement reliability refers to how well the construct of interest is measured. Concern here is with stable measures and the accuracy of measurement. Validity and reliability are discussed in more detail in the following sub-sections.

7.13.1 Validity

The question of validity draws attention to how far a measure really measures the concept that it purports to measure (Bryman and Cramer, 2001, p.66). Researchers use this term to test how well an instrument that is developed is able to measure the particular concept is supposed to measure. In other words, validity is concerned with whether the researchers are measuring the right concept or not (Cooper and Emory, 1995).

The validity of a questionnaire refers to the success of the measurement scale or instrument in measuring what it is designed to measure and yield the type of information required. Therefore, the differences between individuals' scores can be considered as being true differences in the characteristic or variable under study (Kerlinger, 1986; Moser and Kalton, 1989; Oppenheim, 2001; de Vaus, 1996; Shannon and Davenport, 2001).

Four types of instrument validity are frequently cited. The first is content validity, which is considered as being the most important type of validity. It measures the extent to which the measurement scale reflects what is assumed to be measured (Shannon and Davenport, 2001). According to Emory and Cooper (1991), content validity can be approached by a careful definition of the research topic and the items included in the measurement scale. In addition, they suggest that a group of persons or experts can judge the extent to which the scale measures what it is supposed to measure. More specifically, Litwin (1995) suggests that assessing the content validity involves a review of the questionnaire content in order to ensure that it includes everything it should, and does not include anything it should not. In the social sciences there is disagreement among researchers relating to the content of many concepts, and it seems difficult, therefore, to develop measures that have agreed validity (de Vaus, 1996).

The second type of validity is face validity that is assessed by the respondents to the measurement instrument. If the respondents see a measurement instrument as being valid, it can be argued that it has face validity (Shannon and Davenport, 2001). Similarly, face validity can be assessed by passing the questionnaire to untrained persons in order to get feedback relating to whether the items appear satisfactory to them (Litwin, 1995).

The third type of validity is concurrent validity. It refers to the extent to which a measurement scale relates to other measures or 'gold standard'. It is assessed in terms of the extent to which results obtained from this scale are consistent with the results of other scales that are designed to measure the same thing or object (Litwin, 1995; Oppenheim, 2001; Shannon and Davenport, 2001). A related type of validity is predictive validity which refers to the ability of an instrument scale to predict future performance, events, behaviours and attitude (Litwin, 1995; Shannon and Davenport, 2001).

The fourth type is construct validity. It is the most difficult type of validity to understand, assess and report. It shows how well the test instrument scale links up with a set of theoretical assumptions about an abstract construct. It is usually assessed by tracking the performance of the instrument scale over years in different settings and populations (Oppenheim, 2001; Litwin, 1995). In order to assure construct validity it is recommended to use established constructs or measurement scales and to take into account the opinion of a panel of judges (experts) to see what they think (de Vaus, 1996).

In this study, it should be noted that the following efforts have been made to ensure questionnaire validity:

1. The purpose of study was identified very carefully (see Chapter 6);

2. The questionnaire was passed to volunteers, members of staff, and a pilot study was undertaken (see Section 7.7.3);

3. A personal interview was held with one management accountant during the pilot study (see Section 7.7.3.1); and

4. Many questions were drawn from previous studies that were used with different populations and at a different time, thus contributing construct validity.

7.13.2 Reliability

The term reliability of a measure refers to its consistency (Bryman and Cramer, 2001). There are two separate aspects for this notion: external and internal reliability. The first is the more common of the two meanings and refers to the degree of consistency of a measure over time; the second is particularly important in connection with multiple-item scales. Reliability of the questionnaire's results refers to: "A statistical measure of how reproducible the survey instrument's (questionnaire) data are" (Litwin, 1995, p. 6). According to Frankfort-Nachmias and Nachmias (1996), there are three common ways of estimating reliability: test-retest reliability, parallel-form reliability and split-half reliability. All these forms will now be discussed.

1. Test-retest reliability (or stability over time). Measuring stability requires the administration of a questionnaire to the same set of respondents at two different points in time to examine to what extent responses are stable. It is commonly measured by calculating the correlation coefficient, which is called r-value (or coefficient of stability). The r-value is considered to represent stability if it equals or exceeds 0.70. Correlation coefficients obtained from this method may be called measures of stability as they relate to constancy over time (Moser and Kalton, 1989; Litwin, 1995; Hussey and Hussey, 1997; Shannon and Davenport, 2001).

2. Alternative-form reliability tests or parallel forms reliability. This involves the use of different worded items to measure the same variable or attribute. A common way to test for alternate-form reliability is simply to correlate the scores of two (or more) forms of a measure given to a single group of respondents. The resulting correlation coefficient is called a coefficient of equivalence. The greater the obtained correlation,

the greater the evidence of alternative-form reliability (Moser and Kalton, 1989; Litwin, 1995; Shannon and Davenport, 2001).

3. Internal consistency reliability involves a measure to indicate how well the different items measure the same construct. This method is, therefore, applied only to a situation where multiple questions are used to measure the same construct. It is widely recognised to measure internal consistency by calculating a Cronbach's coefficient alpha (Litwin, 1995; Shannon and Davenport, 2001).

It was not possible to send the same questionnaire to the same respondents to complete at two different points in time. Also, respondents would be unlikely to agree to complete the questionnaire twice. Nevertheless, two respondents agreed to receive a second copy of the questionnaire. The second copy was sent to them two months after the first one. The period was considered long enough to reduce bias. The replies were virtually identical, thus suggesting that the responses are likely to be highly stable over time. For further confirmation a number of the respondents were asked to clarify their responses by e-mailing them and asking them to provide responses to some of the questions they had already answered. There were no significant differences in their answers, thus indicating that the questionnaire was likely to meet the test-retest reliability requirements. Measuring alternate-form reliability was not possible, due to the fact that it is extremely difficult to administer two different forms of the same questionnaire to the respondents.

To measure the internal consistency reliability, the Cronbach alpha measure was used. Alpha is considered as a good indictor to achieve reliability:

> One of the most important indicators of a scale's quality in the reliability coefficient, alpha' (DeVellis, 1991, p.83).

Theoretically, alpha can take on values between 0.0 and 1.0. Nunnally (1978) suggests a value of .60 as a lower acceptable bound for alpha, but DeVellis, (1991) mentioned the range of alpha as follows:

- below .60, unacceptable;

- between .60 and .65, undesirable;
- .65 to .70, minimally acceptable;
- .70 to .80, respectable; and
- .80 to .90, very good.

With the differences between these values of alpha, one can say that it is preferable for alpha's value to be high but it is not a condition .

Cronbach's alpha was calculated for multiple questions that were used to measure the same variable. According to SPSS Professional Statistics 6.1 (1994, Ch. 6), Cronbach's alpha has many interpretations. The first is that it shows the correlation between a particular test or scale and all other possible tests or scales containing the same number of items or questions which could be constructed from a hypothetical universe of questions that measure the given variable. In other words, it shows how much correlation is expected between the items used and all other possible items measuring the same variable.

The second interpretation is that it measures the squared correlation between the score obtained on a particular scale (the observed score) and the score that would have been obtained if questioned on all the possible items in the universe. As alpha can be interpreted as a correlation coefficient, it ranges from 0 to 1, and negative alpha means that the items are not positively correlated among themselves, the reliability model is violated.

Thirdly, alpha can be compared to the standardised item alpha, which is the alpha value that would be obtained if all of the items were standardised to have a variance of one. Few differences between the two means that the scale has a fairly comparable variance.

Rather than presenting Cronbach's alpha at this point for the questionnaire responses, the alphas for those questions where multiple item scales are used to measure the same construct are presented in Chapter 9 (Table 9.1). However, it should be noted at this stage that, apart from one variable, all of the alphas exceeded 0.60 and most of them exceeded 0.70. They are presented at the specific points where the results from statistical tests using multiple item scales are reported.

7.14 Justifications for statistical analysis used in analysing data

The process of analysing any data depends on the aims of the study and the nature of the data. Despite this, it may be said that, in general, there are two main groups of statistical tests which can be used in analysing the data: parametric and non-parametric tests. One of the unresolved issues in data analysis is when parametric, rather than non-parametric, tests should be used. Some writers have argued that it is only appropriate to use parametric tests when the data fulfil the following three conditions (Bryman and Cramer, 2001, p.115; Siegel,1956, p.19; and Siegel and Castellan,1988, p.33):

1. The level or scale of measurement is equal interval or ratio scaling, that is, more than ordinal.

2. The distribution of the population scores is normal (i.e. observations must have been taken from normally distributed populations).

3. The variances of both variables are equal or homogeneous (i.e. the selection of any respondent from the population to be included in the sample must not bias or affect the inclusion of any other respondents).

Parametric refers to a measure which describes the distribution of the population, such as mean or variance. Since parametric tests are based on the assumption that we know certain characteristics of the population from which the sample is drawn, they are called parametric tests. On the other hand, non-parametric tests do not depend on assumptions about the precise form of the distribution of the sample population (they are called distribution-free tests). However, the need to meet the above three conditions for using parametric tests has been strongly questioned (Bryman and Cramer, 2001). They state that regardless of the level of measurement, it has been suggested that parametric tests can also be used with ordinal variables, since tests apply to numbers and not to what those numbers signify (Bryman and Cramer, 2001).

It is recognised that a non-parametric test is the most appropriate test when the data constitutes sets of ranks or are nominal data (Siegel and Castellan, 1988; Kinnear and Gray, 1999). There are many reasons supporting the use of non-parametric tests. They make fewer assumptions about the underlying population from which the data are obtained. More specifically, non-parametric tests forego the traditional assumption that the underlying population is normal. Thus, a non-parametric test is called a distribution-free test (Hollander and Wolfe, 1973; Siegel and Castellan, 1988; Kinnear and Gray, 1999; Ropson, 2002; Bryman and Cramer,2001). It is likely to be the only method which can be used where the sample size is very low unless the distribution of the population is known exactly (Siegel and Castellan, 1988). Non-parametric statistics are also much easier to learn, apply and interpret than parametric tests. (Hollander and Wolfe, 1973; Siegel and Castellan, 1988). Furthermore, they can have considerable advantages in terms of efficiency and validity when the assumption of normality is not satisfied. Finally, non-parametric tests are only slightly less efficient than parametric tests when the underlying population is normal (Lehmann and D'abrera, 1975; Hollander and Wolfe, 1973; Ropson,2002).

Although it has traditionally been recognised that non-parametric tests are the most appropriate tests when the data are nominal or ordinal, there are many accounting studies that do not adhere to this approach. For example, Guilding (1999) and Shields (1995) used a parametric test to analyse data which were measured on an ordinal scale. In addition, Bryman and Cramer (2001, p. 59) state that:

> Certainly, there seems to be a trend in the direction of this more liberal treatment of multiple-item scales as having the qualities of interval variables.

Also, they quoted from Labovitz (1970) who advocated the treatment of all ordinal variables as if they were interval variables. Therefore, there are strong arguments for using parametric tests with multiple-item scales since the amount of error that can occur is likely to be minimal compared with the expected advantages resulting from the use of techniques like regression. Given this controversial view relating to the use of parametric and non-parametric tests, and the fact that the majority of the variables are measured on an ordinal scale, non-parametric tests have been mainly used to analyse the data. In addition, regression analysis and logistic regression (parametric tests) have also been used since there are no non-parametric counterparts and it is an appropriate analysis tool for some of the data relating to this study. In addition, factor analysis is used. The purpose of factor analysis is to summarise the information contained in a large number of variables and reduce them into a smaller set of factors in order to identify the underlying dimensions (structure) in examined phenomena (Zikmund, 2000).

7.15 Summary /conclusion

In this chapter an explanation has been given that to achieve the research aims and objectives, a positivistic approach has been adopted to fill the gaps in this topic arising from the literature review (Chapter five). The definition of methodology was discussed and the data collection methods described. The justification for using the mail questionnaire as the appropriate method to collect the data was provided. The stages that were used to develop the questionnaire and to increase the validity of the questionnaire were also described. Next, the approaches used to select the sample and ensure a satisfactory response rate were explained. The chapter concluded with a description of the tests that were undertaken for non-response bias and a justification of the statistical tools that will be used to analyse the data. In the next two chapters the research findings are presented.

CHAPTER 8

A DESCRIPTION OF THE RESEARCH FINDINGS

CHAPTER 8

A DESCRIPTION OF THE RESEARCH FINDINGS

8.1 Introduction

This chapter aims to:

1. Provide a general description of the questionnaire responses, and

2. Present the findings relating to four of the six objectives listed in section 1.2 in Chapter 1 (and repeated in section 6.3 of Chapter 6).

Section 8.2 provides a description of the responding organisations in terms of business sector, size and cost structures. Sections 8.3 – 8.6 and 8.8 – 8.9 focus on the first objective: to examine the nature, content and purposes of costing systems operated by UK organisations. The descriptive findings concerning the views of the respondents on the degree of success or failure of ABC systems are presented in section 8.8. This topic is also dealt with in the next chapter. In section 8.10 the findings relating to the second objective - the importance of specific motives (e.g. efficient choice, forced selection, fad and fashion motives) in implementing ABC are presented. The research findings applicable to the reasons and factors which have discouraged firms from adopting ABC (i.e. the third objective) are presented in section 8.11. The final objective (i.e. objective 4) that is addressed in this chapter is the extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC systems. Section 8.12 addresses the findings applicable to this objective.

The statistical tests for the hypotheses that were formulated in Chapter 6 relating to the final two objectives of this research are presented in the next chapter.

8.2 Business sector, size and cost structure of the responding organisations

In section 7.9 of the previous chapter it was pointed out that the questionnaire was divided into the following four sections:

- Section A: General questions relating to the organisations' costing systems;
- Section B: Questions applicable only to those units that have implemented ABC systems;
- Section C: Questions applicable to businesses that have not implemented ABC;
- Section D: Questions about the business unit and the context /environment in which they operate.

It was recognised that some of the responding organisations may not have established formal costing systems. Respondents within this category were requested to answer only section D. Thus, all of the 176 respondents were asked to complete section D and only those with established costing systems (N = 153) to complete sections A – C. Questions D18 and D19 respectively required the respondents to indicate the business sector which most appropriately described the sector in which their business unit operated and the annual sales turnover of the business unit. The responses are summarised in Table 8.1. It can be seen from Table 8.1 that 52% of the respondents were employed in the manufacturing sector and 48% in the non-manufacturing sector. The non-manufacturing sector accounts for considerably more than 48% of UK gross domestic product and the lower proportion of non-manufacturing organisations included in this survey is likely to be attributed to the fact that the sample omitted organisations whose objectives were not profit making. Most of the organisations within this category are likely to operate in the service (non-manufacturing) sector. Also, the sample selection (see section 7.5 in Chapter 7) excluded smaller companies. Such companies are more likely to be non-manufacturing. Table 8.1 also indicates that 14 business units were located within the 'other' category. Some of these respondents described their business activities. They included oil and gas exploration/production (2), utilities (3) and defence (2). Table 8.1 also indicates that 14% of the respondents had an annual sales turnover of less than £50 million and 43% had a turnover exceeding £200 million.

Question D8 asked the respondents to specify details relating to the cost structure of their business units. An analysis of total costs by business sectors is presented Table 8.2. This table indicates that, for all organisations, the average direct and indirect costs were respectively 69% and 31%. Thus, direct costs represent the dominant costs and the findings suggest that the assertions made by many commentators promoting ABC that indirect costs are now the dominant costs is overstated. Similar findings have also been reported in respect of studies undertaken in Belgium (Kerremans *et al.*,1991), Sweden (Ask and Ax, 1992), Ireland (O'Dea and Clarke, 1994), Denmark (Sorensen and Israelsen, 1994) and Finland (Lukka and Granlund, 1996). They all report that direct materials are the predominant cost and that direct labour represents the lowest proportion of total costs.

Table 8.2 also shows that manufacturing units have the largest percentage of direct costs and supports the assertion made by Kaplan and Cooper (1998) that manufacturing companies can trace important components of their costs to individual products because of the higher proportion of direct costs. Because of this, they conclude that manufacturing companies have less need for ABC systems compared with non-manufacturing organisations. A comparison with other surveys that have focused on manufacturing companies indicates that they have reported very similar results in terms of cost structures. Surveys in the UK (Drury *et al.*, 1993), USA (Green and Amenkhienan, 1992), Australia (Joye and Blayney, 1990) and Belgium (Kerremans *et al.*, 1991) have all reported that direct costs and overheads averaged approximately 75% and 25%, respectively, of total manufacturing costs.

The most noticeable feature of Table 8.2 is that financial and commercial organisations have a significantly higher proportion of indirect costs (51%) compared with the remaining sectors. A t-test was performed comparing the differences between the responses for the percentage of indirect costs for financial and commercial organisations (N = 20) and the remaining organisations (N = 146). The results were significant at the 1% level (two-tailed). In addition, the t-test was performed to examine the differences in the responses for the cost structures between the manufacturing (N = 91) and the non-manufacturing (N = 85) organisations. The results were also significant at the 1% level (two-tailed).

Table 8.1: Information relating to the respondents' business sector and annual sales turnover

	Number of Cases (N)	Percentage (%)
Business Sector		
Manufacturing	91	52
Financial and Commercial	22	12
Retail	9	5
Service	40	23
Other	14	8
	176	100
Annual Sales Turnover		
Less than £ 25m	6	3
£26-£50m	19	11
£51-£75m	19	11
£76-£100m	30	17
£101-£200m	26	15
£201-£300m	30	17
Over £300m	46	26
Total	176	100

Table 8.2: Average cost structure as a percentage of total costs analysed by business sectors

	Manufacturing	Financial and commercial	Service	Retail and other	Total
Direct materials	52.2				
Direct labour	14.0				
Direct non-manufacturing costs	8.7				
Indirect manufacturing costs	10.3				
Indirect non-manufacturing costs	14.8				
Total direct costs – Mean/(standard deviation)	74.9 (13.9)	49.0 (23.9)	68.1 (25.6)	66.4 (18.5)	69.1 (19.1)
Total indirect costs – Mean/(standard deviation)	25.1 (13.9)	51.0 (23.9)	31.9 (25.6)	33.6 (18.5)	30.9 (19.1)
N	87	20	39	20	166

Table 8.3: Analysis of costing systems by business sectors

Business sector	% ABC adoption[1]	% Traditional absorption costing	% Direct costing systems	% No formal costing system	N
Manufacturing	20	52	21	7	91 (52%)
Financial and commercial	68	9	9	14	22 (12%)
Retail and other	22	26	35	17	23 (13%)
Service	33	17	28	22	40 (23%)
Total (%)	29	35	23	13	(100%)
Total (N)	51	62	40	23	176

Notes
[1] Adoption was defined as the summation of rows (d), (e), (h) and (i) of Table 8.5 (i.e. Question A9) and non-adoption represents the summation of the remaining rows.

8.3 Costing systems operated by the business units

A total of 153 respondents answered sections A – C of the questionnaire, thus indicating that they operated formal costing systems. The respondents were asked in question A1 to indicate whether they assign overhead costs to products/services for the purpose of identifying whether they used direct costing or absorption costing systems. The data collected in Question A9 also provided the information to identify whether the absorption costing systems consisted of ABC or traditional systems. Tables 8.3 and 8.4 provide an analysis of the types of costing systems used by business sectors and sales turnover. Both tables indicate that the following types of costing systems were used:

- Traditional absorption costing systems (35%)
- ABC systems[1] (29%)
- Direct costing systems (23%)
- No formal costing systems (13%)

The above analysis indicates that the traditional absorption costing systems still dominate (35%) but that a significant percentage of respondents also use ABC systems. Table 8.3 also indicates that a significantly greater proportion of the respondents in the financial and commercial sector have adopted ABC systems. The analysis of costing systems by size shown in Table 8.4 indicates that 53% of the smaller firms (annual sales turnover of less than £100 million) have either no formal costing systems or operate only direct costing systems. The corresponding percentage for the largest companies (annual sales turnover exceeding £300 million) is 20%. The adoption rate for ABC is 12% for business units with annual sales of less than £100 million compared with 39% for the £100 million – 300 million sales category and 43% for the over £300 million sales category. ABC adoption rates appear to be significantly lower for the smaller business units but for the two categories above an annual sales turnover of £100 million adoption rates are fairly similar. This suggests that factors may preclude the adoption of ABC for smaller organisations but size may not be a significant influence on ABC adoption where the analysis is restricted only to the medium and large size categories.

[1] See discussion in section 8.4 relating to the fact that the ABC adoption rate is likely to be over-estimated.

Table 8.4: Analysis of costing systems by annual sales turnover

Annual sales revenue (£ million)	% ABC adoption[1]	% Traditional absorption costing	% Direct costing systems	% No formal costing system	N
< £100m	12	35	30	23	74 (42%)
£100m - £300m	39	34	23	4	56 (32%)
Over £300m	43	37	11	9	46 (26%)
Total	29	35	23	13	176
Mean (£ million)	995	309	188	105	
Standard deviation (£ million)	2,093	471	327	90	

Notes
[1] Adoption was defined as the summation of rows (d), (e), (h) and (i) of Table 8.5 (i.e. Question A9) and non-adoption represents the summation of the remaining rows.

8.4 ABC implementation stages

In Chapter 4 (sections 4.4 and 4.10) it was pointed out that various studies have identified and examined the processes involved in the different stages, of implementing innovations. To identify the exact ABC implementation stage those respondents that operate formal costing systems were asked in Question A9 to indicate which of various non-adoption/adoption/implementation stages best described their business unit's current situation. Table 8.5 shows that for those organisations that had implemented formal costing systems (N = 153), approximately 35% had not seriously considered ABC, 17% had rejected it and 3% had adopted ABC but later abandoned it. The ABC adoption rate is 33% (N = 51) consisting of the sum of rows (d), (e), (h) and (i) of Table 8.5.[1]

It should be noted, however that the adoption rate is likely to represent an over estimate. The follow-up reminder process described in Chapter 7 (section 7.10) placed more emphasis on encouraging those non-respondents within the sample who were known ABC users (compared to those who were non-adopters) to complete the questionnaire. This greater emphasis given to ABC adopters applied partly to the first reminder but mostly to the second reminder. It involved several repeat telephone requests and e-mails. The aim was to derive a sufficiently large sample of ABC adopters to undertake further

[1] Table 8.5 expresses ABC adoption as a percentage of organisations with formal costing systems whereas in Tables 8.3 and 8.4 adoption relates to the percentages of organisations with formal and informal costing systems.

statistical analysis relating to ABC adoption. The only criterion used to select these respondents was that they were known ABC adopters. No evidence was found to suggest that non-response bias existed in the Tables 7.3 and 7.4. It is considered that the process described represents a random selection in terms of all other factors relevant to the study, apart from ABC adoption. For all other responses relating to factors influencing ABC adoption, success etc, it is considered that the results are unlikely to be biased. Care should, therefore, be taken in generalising the findings relating to ABC adoption rates. The adoption rates for the initial questionnaire (N = 65), the first reminder (N = 83) and the second reminder (N = 28) were 15%, 25% and 79% respectively[1]. Given that no attempt was made in the initial questionnaire to select ABC adopters, it would appear that 15% is a more reliable estimate to generalise ABC adoption for the UK population.

Table 8.5: Analysis of respondents with a formal costing system by ABC implementation stages

	Responses	
	N	%
(a) ABC has not been seriously considered	53	35
(b) ABC is being considered and implementation is possible, but implementation has not yet been approved	15	10
(c) ABC has been considered (not implemented) and rejected as a cost assignment method	26	17
(d) Approval has been granted to implement ABC and allocate the necessary resources, but implementation has not yet begun	2	1
(e) Implementation is in process: The ABC implementation team is in the process of determining project scope and objectives, collecting data and/or analysing activities and cost drivers	3	2
(f) ABC was approved for implementation but abandoned prior to implementation	3	2
(g) ABC was implemented but later abandoned.	5	3
(h) (h) Implementation is complete and is in the process of gaining acceptance	23	15
(i) Implemented and generally accepted: ABC information is commonly used by non-accounting staff for decision-making and/or cost management purposes. It is considered a normal part of the information system.	23	15
Total	153	100

[1] The respective adoption rates for the initial mailing, first reminder and second reminder are 18%, 29% and 85% if ABC adoption is measured as a percentage of organisations with formal costing systems as described in Table 8.5.

8.5 Number of first stage cost pools and different types of second stage drivers used

Questions A2 and A3 attempted to gather more detailed information relating to the costing systems. The respondents were asked to indicate in A2 the number of cost centres that are used in the first stage and in A3 the number of different types of cost drivers that are used in the second stage for assigning overheads to products/services. A total of 112 out of the 113 respondents operating an absorption costing system answered this question. The responses are summarised in the cross tabulation table presented in Table 8.6 The areas in the lower right hand corner of this table represent the more sophisticated product costing systems and those in the top left hand corner represent the least sophisticated systems. This table indicates that 5 out of the 112 respondents (5%) used a single blanket/plant wide overhead rate. This is lower than the results reported in some of the previous studies. For example, previous research relating to the use of a single overhead cost pool (e.g. Emore and Ness, 1991 in the USA; Joye and Blayney 1990,1991 in Australia; Joshi, 1998 in India) have reported a usage of between 20%-30%. However, only 5% of the companies in Finland (Lukka and Granlund 1996) were using a single plant-wide rate and a survey undertaken in Norway (Bjornenak 1997b) reported that only one firm used the single plant-wide rate. A recent UK study by Drury and Tayles (2000) indicated that only 3% of the firms were using a single cost pool. Table 8.6 also indicates that 35% (N = 39) of the organisations were using fairly unsophisticated costing systems involving less than 20 cost pools and less than 4 different types of cost drivers. The shaded area in Table 8.6 indicates that 35 out of the 112 (31%) responding organisations used more than 20 cost pools and 4 or more different types of second stage cost drivers. Of these 35 respondents 34 stated that they had implemented ABC (i.e. stages (h) and (i) for the responses to Question A9) and the remaining respondent had implemented then abandoned ABC. An analysis of the 46 organisations that had implemented ABC (i.e. stages (h) and (i) for the responses to Question A9) indicated the following combinations of first stage cost pools and different types of second stage drivers[1]:

[1] Of the 46 respondents that had implemented ABC 1 respondent did not provide information on the number of cost drivers or cost pools resulting in the list totaling 45.

- 34 used more than 20 cost pools and 4 or more different types of second stage cost drivers (i.e. the shaded area in Table 8.6);
- 1 used 6-10 cost pools and 4 different types of second stage cost drivers;
- 1 used 6-10 cost pools and 5 different types of second stage cost drivers;
- 1 used 11-20 cost pools and 4 different types of second stage cost drivers;
- 4 used 11-20 cost pools and 5 different types of second stage cost drivers;
- 1 used 11-20 cost pools and 6 different types of second stage cost drivers;
- 2 used 11-20 cost pools and 7 different types of second stage cost drivers;
- 1 used 21-30 cost pools and 4 different types of second stage cost drivers.

The above analysis indicates that the ABC systems are located towards the lower right hand corner and, thus, represent the more sophisticated costing systems. Therefore, the analysis suggests that those respondents that claim that their organisations have implemented ABC 'really' are ABC adopters. However, the number of cost drivers and cost pools used by a significant proportion of ABC users would appear to be less than that envisaged by Kaplan and Cooper (1998, p.102). They suggest that relatively simple ABC systems having 30-50 cost pools and many cost drivers ought to report reasonably accurate costs.

To provide further insights into the types of second stage drivers used, Question A4 required the respondents to indicate the relative percentage usage of a list of seven different types of second stage cost drivers/allocation bases. The list also included an eighth item that enabled the respondents to specify other items not included in the list. The responses are summarised in Table 8.7 which shows the average percentage usage rates. This figure was derived by summing the percentage responses for each row of Question A4 and dividing the total by the number of respondents answering this question (n = 110). The highest average percentage usage rate was for direct labour-based methods, being 34%. Volume-based overhead rates [i.e. the sum of rows (a) to (e)] have an average percentage usage rate of 65.6%.[1] also shows the number of organisations using the different categories of second stage cost drivers. Of the 113 organisations using absorption costing systems, 110 respondents answered Question A4. Therefore, 70 out of the 110 (64%) respondents used direct labour-based rates. Thus, direct labour continues to be the predominant method despite the strong criticisms by Kaplan and Cooper on the use of such rates in situations where direct labour constitutes a small proportion of the total cost structure. In this study it was found that direct labour averaged 14% of total cost for manufacturing organisations. Table 8.6 also indicates that the average usage for activity-based overhead rates was 17% compared with approximately 65% for traditional volume-based rates. It should also be noted that only 29 respondents stated that they used activity based cost driver rates despite the fact that 46 respondents stated that they had implemented ABC systems although some of these respondents specified activity based rates within the 'other' category. The average usage rate for this category was 17%. Within this category no clear picture emerged. Many of the cost drivers entered by the respondents were specific to their business unit, such as mortgage balances, new mortgage volumes, new savings accounts, pallets/changeovers/shop orders and cubic size of individual packs.

Table 8.6: Cross tabulation table (cost pools by cost drivers)

Number of cost drivers

	1	2	3	4	5	6	7-10	Over 10
	N %[a]	N %	N %	N %	N %	N %	N %	N %
1 cost pool (N = 5)	5 (4.5)							
2-3 cost pools (N = 5)	2 (1.8)	1 (0.9)	2 (1.8)					
4-5 cost pools (N = 7)	5 (4.5)	1 (0.9)		1 (0.9)				
6-10 cost pools (N = 19)	7 (6.2)	4 (3.6)	3 (2.7)	4 (3.6)	1 (0.9)			
11-20 cost pools (N = 20)	3 (2.7)	2 (1.8)	4 (3.6)	3 (2.7)	4 (3.6)	2 (1.8)	2 (1.8)	
21-30 cost pools (N = 19)	4 (3.6)	1 (0.9)	2 (1.8)	2 (1.8)	2 (1.8)		7 (6.3)	1 (0.9)
31-50 cost pools (N = 27)	2 (1.8)	2 (1.8)	4 (3.6)	2 (1.8)	3 (2.7)	1 (0.9)	9 (8)	4 (3.6)
Over 50 cost pools (N = 10)	2 (1.8)				3 (2.7)	1 (0.9)	1 (0.9)	3 (2.7)
Total (N = 112)	30 (27)	11 (10)	15 (13)	12 (11)	13 (12)	4 (4)	19 (17)	8 (7)

Note

[a] The numbers in the parentheses relate to the number of individual observations (N) expressed as a percentage of the total number of observations.

[1] This figure probably represents an under-estimate since entries within the 'other' category are likely to include volume-based rates.

Table 8.7 Frequency and average percentage usage of second stage cost driver rates (N = 110)

	N	Average % usage	Standard Deviation
(a) Direct labour hour or cost based rates	70	34.1	37.1
(b) Machine hour based rates	33	12.4	22.7
(c) Material cost based rates	26	7.1	19.6
(d) Production or cell time based rates	17	3.7	11.8
(e) Rates based on units produced	35	8.3	18.9
(f) Activity based cost driver rates	29	17.0	33.3
(g) Other	37	17.4	34.1
Total	247	100	

8.6 Treatment of non-manufacturing costs

Question A6 focused on the treatment of non-manufacturing costs by manufacturing organisations. Financial accounting stock valuation requirements specify that manufacturing costs must be treated as product costs and assigned to products, whereas non-manufacturing costs should be recorded as period costs and not assigned to products. Johnson and Kaplan (1987) have argued that information for management accounting is derived from a costing system that has been designed for meeting financial accounting requirements. They conclude that financial accounting dominates management accounting. Given that non-manufacturing costs should be assigned to products for decision-making but not for financial accounting stock valuation, Question A6 attempted to ascertain whether non-manufacturing costs were treated differently for decision-making.

The responses to Question A6 are summarised in Table 8.8. The total number of responses shown in this table is 65 consisting of those manufacturing organisations that stated that they operated ABC or traditional absorption costing systems (see Table 8.3[1]). It can be seen from this table that, for administration and selling costs, approximately 60% of the respondents did not allocate these costs to products. There was a greater tendency to allocate distribution costs with 40% not allocating these costs. Further

[1] The 65 respondents represent 72% of the 91 manufacturing organisations in Table 8.3 that operate absorption costing systems.

analysis indicated that 26% of the organisations did not allocate any of the three categories of non-manufacturing costs to products[1]. The findings relate to the fact that a significant number of manufacturing organisations do not allocate non-manufacturing costs to products for decision-making, therefore, provide some support for Johnson and Kaplan's assertion that, in these organisations, financial accounting rules unduly influence the information that is generated for decision-making. Table 8.8 also indicates that, where non-manufacturing costs are allocated, cause-and-effect cost drivers are the most widely used method for distribution costs and sales revenues for selling costs.

A possible reason for not allocating non-manufacturing costs is that they are regarded as fixed and unavoidable and, therefore, not relevant for decision-making. Question A6 focused on the treatment of non-manufacturing costs for product mix and discontinuation decisions. It could be argued that for these decisions, the allocation of costs which are unavoidable, or where it is difficult to determine cause-and-effect allocations, is inappropriate. In contrast, for pricing/bidding decisions involving the use of cost-plus pricing, organisations may choose to assign a fair share of non-manufacturing costs to ensure that all costs are covered by the cost-plus determined selling price. Question A7 was used to ascertain whether non-manufacturing costs are treated differently for cost-plus pricing decisions. The responses indicated that, although there was a greater tendency to allocate selling, distribution and administration costs for cost-plus pricing, decisions, there were no statistically significant differences in the responses for the different types of decisions specified in questions A6 and A7. For cost-plus pricing the respective percentages for not allocating selling, distribution and administration costs were 52%, 36% and 33% (N= 42).

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[1] An analysis of the responses by size indicated that there was no relationship between the size of the units and whether or not non-manufacturing costs were allocated to products.

Table 8.8: Treatment of non-manufacturing indirect costs for discontinuation and product mix decisions (N = 65)

	(1) Selling costs	(2) Distribution costs	(3) Administration costs
(a) Not allocated to products	60%	40%	48%
(b) Allocated to products on the basis of the manufacturing cost of each product	8%	5%	12%
(c) Allocated to products on the basis of the selling cost of each product	17%	9%	5%
(d) Allocated to products on the basis of direct labour hours/cost or machine hours	3%	5%	8%
(e) Assigned on the basis of the cause (identified as the cost driver) for each type of non-manufacturing cost	7%	32%	22%
(f) Other	5%	9%	5%

8.7 Respondents' satisfaction with the accuracy of their costing systems

Question A8 asked the respondents to indicate on a scale of 1 (not very accurate) to 7 (extremely accurate) how satisfied they were with the accuracy of their organisation's costing system in assigning overheads to products/services for decision-making purposes. The mid-point of the scale was anchored 'neutral.' A summary of the responses is presented in Table 8.9. This table indicates that 33% of the respondents whose organisations had implemented ABC assigned a score of 6 or 7 compared with 14% for those not implementing ABC. The differences were significant at the 1% level using the Mann Whitney test (two-tailed). It should be noted that the respondents were mostly management accountants who may have been responsible for the decision to implement ABC and not the users of ABC information.

Table 8.9: Respondents' satisfaction with the accuracy of assigning indirect costs for decision-making

	N	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
All organisations	113	4.35	1.40	14.1	22.2
Organisations that have implemented ABC systems	46	4.96	1.23	4.3	32.6
Organisations that have not implemented ABC systems	67	3.94	1.46	17.4	14.5

8.8 The nature of ABC systems

ABC systems consist of several variants and some companies may implement partial activity approaches rather than adopting full ABC systems. This possibility was taken into account by asking those respondents that had not implemented ABC to indicate in Question B1 if their organisations had implemented activity analysis whereby activities are not costed. A total of 35 non-ABC adopters indicated that they had implemented activity analysis. Thus, 24% of the total respondents (35 out of 176) had implemented activity analysis. Adding this percentage to ABC adopters usage rate of 29% (see Table 8.3) indicates that the majority of the respondents (53%) adopted some form of an activity-based approach.

An analysis of the responses to Question B1 also showed that between 22% and 23% of respondents in the manufacturing, service and retail/other sectors had implemented activity analysis but not a full ABC system. The implementation rate for financial and commercial organisations was 5%, thus reflecting that they implement full, rather than partial, ABC systems.

The 46 respondents that had implemented ABC were asked in Question B4 whether ABC was used (1) to assign costs to products/services for decision-making and (2) to cost activities for cost control/cost management purposes. A total of 39 out of the 46 respondents (85%) used ABC for both purposes, 4 only for decision-making and 3 for only cost management purposes. The findings, therefore, indicate that ABC has been extended beyond its original purpose of providing more accurate product/service costs for decision-making.

Table 8.10 indicates the period that ABC systems have been in operation. This table indicates that 63% of the ABC adopting organisations (N=29) have implemented ABC within the past five years. Only 15% of the adopters have operated ABC systems for more than 8 years. Although concerns have been expressed that ABC adoption rates have been rather slow (Chenhall and Langfield-Smith, 1998), Table 8.10 indicates a steady increase in the adoption of ABC systems with 41% of the respondents implementing ABC within the past three years. If the recent trend shown in Table 8.10

continues, ABC systems will become the dominant absorption costing system over the next few years.

Table 8.10: Stage of ABC systems and ABC success analysed by period of operation (N = 46)

Period of ABC operation	N	Pilot testing stage	Operated in parallel with previous system (N)	Operated as the sole costing system (N)	Success rating		
					% less than 4 (moderately successful)[1]	% 4 (moderately successful)[1]	% greater than 4 (moderately successful)[1]
Less than one year	6	2	3	1		50	50
1-2 years	6		6			17	83
2-3 years	7		3	4	14	43	43
3-4 years	2			2		50	50
4-5 years	8		2	6	12		88
5-6 years	4			4	25	50	25
6-7 years	5		2	3			100
7-8 years	1			1			100
8-9 years	5		2	3	20	20	60
Over9 years	2			2			100
Total	46	2	18	26	9	24	67

Note:

[1] The success rating was measured on a 7-point scale ranging from 1 = Not very successful to 7 = Totally successful

Table 8.10 also shows that 26 out of the 46 of the units (56%) that had implemented ABC operated it as the sole costing system, 18 (39%) operated ABC in parallel with the previous costing system and the ABC system was in the pilot testing stage for remaining two units that had only recently implemented it. Further analysis indicated that, for those organisations that had operated ABC for more than 5 years, 77% (13 out of 17) used it as the sole costing system, whereas the corresponding percentage for those operating it for less than 5 years was 52% (15 out of 29).

Question B5 asked the respondents to indicate, on a scale of 1 (Not very successful) to 7 (totally successful) with the mid-point anchored moderately successful, how successful the ABC systems had been in providing improved information for decision-making and/or cost management. Table 8.10 indicates that 9% assigned a score of less than 4, 24% a score of 4 and 67% a score of greater than 4. A comparison of the responses for those respondents who had operated ABC for less than 5 years with those operating it for more than 5 years indicated that there were no significant differences with 65% in the former and 71% in the latter category assigning a score of more than 4. Generally, the respondents considered ABC to have been slightly higher than moderately successful. The mean score for the 46 respondents was 4.96 (standard deviation = 1.09).

8.9 Purposes of ABC systems

Question B6 examined whether ABC was used for 11 different purposes listed in the question (plus an 'other' category that allowed the respondents to identify purposes that were not listed in the question). In addition, the respondents were asked to indicate on a 7-point scale (ranging from '1 very unimportant' to '7 vitally important') the importance attributable to ABC information for each of the purposes specified. The findings are reported in Table 8.11.

It can be seen from the table that ABC is widely used for many different purposes but cost reduction/cost management and profitability analysis represents the most widely used applications. Stock valuation and design stage use for new products/services represent the least widely used applications. However, since these applications are likely to be specific only to manufacturing organisations, their use is likely to be understated. In terms of the importance attributable to ABC information for each application, Table 8.11 indicates that scores of 6 or 7 were assigned to 8 out of the 11 applications by over 50% of the respondents. The three highest rankings were:

- Profitability analysis (Rank 1);
- Use at the design stage for new products/services (Rank 2);
- Activity performance measurement and improvement (Rank 3).

The two lowest importance rankings are product or service discontinuation decisions and new product/service introduction decisions. The importance rankings provide additional insights since a particular application may not be applicable to a firm (such as stock valuation or cost-plus-pricing) but the information may be of vital importance for those firms that do use the application.

Table 8.11: ABC applications (N = 46)

ABC applications	ABC users adopting the application[1]		Importance rating[2]			
	N	%	Mean	Standard deviation	% rating 1 or 2	% rating 6 or 7
(a) Stock valuation	10	21.7	5.36	2.40	20.0	60.0
(b) Product /service discontinuation decisions	32	69.6	4.97	1.36	6.3	43.8
(c) Product/service mix decisions	26	56.5	5.35	1.02	0.0	38.5
(d) Outsourcing decisions	28	60.9	5.46	1.55	10.7	71.5
(e) Determining the cost of products or services for use in cost-plus pricing	29	63.0	5.45	1.24	3.4	58.6
(f) New product/service introduction decisions	29	63.0	5.10	1.29	3.4	48.2
(g) Design stage use for new products/services	17	45.9	5.59	1.50	17.6	70.6
(h) Profitability analysis	41	89.1	5.93	1.08	2.4	75.6
(i) Cost reduction and/or cost management	41	89.1	5.29	1.35	4.9	56.1
(j) Budgeting	32	69.6	5.13	1.54	9.4	53.1
(k) Activity performance measurement and improvement	31	67.4	5.58	1.58	3.2	58.1

Notes:
[1] Represents the number and percentage of the 46 ABC users applying ABC for each purpose.
[2] Importance rating for users of each application derived from a 7-point scale ranging from 1 = very unimportant to 7 = vitally important with the mid-point of 4 anchored neutral.

As indicated above, Question B6 provided space for respondents to include applications in addition to the ten listed in the question. The following additional items were inserted:

- Benchmarking (N = 1);
- Determination of internal charges to other group companies (N = 2);
- Meeting financial reporting requirements (N = 1).

Question B6 was adapted from Innes and Mitchell (1995) and Innes *et al.*, (2000). They listed nine applications in their surveys. The applications in order or extent of usage were:

1. Cost reduction (4.4);
2. Product/service pricing (4.4);
3. Performance measurement/improvement (4.3);

4. Cost modelling (4.3);

5. Budgeting (4.4);

6. Customer profitability analysis (4.5);

7. Output decisions (4.1)

8. New product/service design (4.2);

9. Stock valuation (3.9).

The figures in parentheses represent the importance scores based on a 5-point scale ranging from 1 = very unimportant to 5 = very important. It can be seen that cost reduction was the most widely used and stock valuation the least widely used application in both studies. Also profitability analysis attracted the highest importance rating in both studies.

8.10 The importance of specific motives for implementing ABC

Regarding the motives for ABC adoption in Question B7, the respondents were given a list of 13 potential motives for adopting ABC and asked to indicate on a scale of 1 (very unimportant) to 7 (vitally important) the degree of importance attributable to each motive in the decision to adopt ABC. The responses are summarised in Table 8.12. Based on Abrahamson's four perspectives described in sections 4.7.1 – 4.7.4 of Chapter 4 items (a) to (g) plus item (l) fall within the efficient choice perspective, (j), (k) and (m) represent fad or fashion motives and items (h) and (i) represent forced selection motives. Table 8.13 shows that, apart from item (m), all of the items falling within the fad/fashion or forced selection categories have a mean score of less than 4 (neutral category) and are, thus, located towards the 'very unimportant' end of the scale. Item (m) refers to the statement ' To be seen as having a sophisticated system that was comparable with best practice '. This statement can be interpreted as falling within the fad/fashion category but the part of the statement relating to seeking to follow best practice can also be interpreted as representing an efficient choice motive. Table 8.12 shows that the following deficiencies relating to existing costing systems (items ranked 1-3) were the dominant motives for implementing ABC:

1. (b) The existing system did not provide useful information to management;

2. (c) It was necessary to update the existing costing information system;

3. (a) The existing costing system was not reliable.

This was followed by a group of motives relating to the changing environment (competitive, manufacturing and cost structure). The least important motives relate to external pressure groups (e.g. external auditors, consultants and government/regulatory pressures) and fad/imitation motives. It appears from the information presented in Table 8.12 that the efficient choice motive is the dominant perspective for implementing ABC.

The study by Malmi (1997) described in Chapter 4 (see section 4.10) reported that the motives for ABC adoption varied across the different diffusion stages of the diffusion curve (initial phase, take off phase and later stages). To ascertain whether the motives varied over time, the motives listed in Table 8.12 were analysed by different time periods. The analysis is presented in Table8.13. This table indicates that there is no strong evidence to suggest that motives change over time. All of the three highest rank items listed above (i.e. items a, b and c) had a score in excess of 4 for each of the time periods listed in Table8.13 Also, those items with an average score in excess of 4 in the earliest period (> 7 years) of implementation had scores in excess of 4 for later years of implementation. Similarly, those factors with a score in excess of 4 in the most recent years of implementation (e.g. < 2 years) also had scores in excess of 4 for most of the later periods of implementation. Malmi's findings for Finnish companies are not supported from the evidence presented in Table 8.13. It should be noted that Malmi's questionnaire asked the respondents to indicate which specific motives influenced adoption, whereas this study focused on the degree of importance of each of the motives.

To ascertain whether there was any pattern in the responses for the motives for implementing ABC, factor analysis was also used. However, the factor analysis did not provide any additional insights into the responses. The factor analysis identified four components with Eigenvalues greater than one that, in total, accounted for 65% of the variance in total responses. The first component in the factor analysis included items d, e, h and k shown in Table8.13, the second items c, f and i, the third g, j and m and the fourth a, b and l. The components respectively accounted for 28%, 17%, 11% and 10% of the variance in total responses. Therefore, the efficient choice, fashion/fad and forced selection motives do not clearly emerge from the factor analysis.

Table 8.12 Potential Motives for adopting ABC (N = 51)

Rank	Reason	% rating 1 or 2[a]	% rating 6 or 7[a]	Mean[a]	Standard deviation
1	(b) The existing costing system did not provide useful information to management	10	57	5.24	1.51
2	(c) It was necessary to update the existing costing information system	10	53	5.14	1.59
2	(a) The existing costing system was not reliable	6	43	5.08	1.54
4	(g) The changing manufacturing environment created the need to replace the existing system[b]	18	35	4.65	1.93
5	(f) The changing cost structure created the need to replace the existing system	20	36	4.40	1.90
6	(m) To be seen as having a sophisticated system that was comparable with best practice	15	30	4.33	1.73
7	(l) The changing competitive environment created the need to replace the existing system	30	36	4.09	2.07
8	(j) We wished to try a new accounting innovation	48	22	3.16	2.14
9	(k) Advice from auditors and/or consultants	49	14	2.96	2.00
10	(i) Pressure from government or other regulatory authorities	58	22	2.88	2.29
10	(e) Other units within the company had benefited from adopting ABC	60	10	2.64	1.78
12	(d) Our competitors were using ABC	56	6	2.64	1.78
13	(h) Advice from parent or headquarters	66	10	2.42	1.90

Notes
[a] Based on a scale of (1) very unimportant to (7) vitally important with the mid-point anchored neutral
[b] Based only on responses from manufacturing companies (N = 18)

Table 8.13: Potential motives for adopting ABC analysed by period of adoption

	> 7 years (n = 8) Mean (SD)[a]	5 – 7 years (n = 9) Mean (SD)[a]	4 – 5 years (n = 8) Mean (SD)[a]	2 – 4 years (n = 9) Mean (SD)[a]	< 2 years (n = 12) Mean (SD)[a]
Efficient choice motives					
(a) The existing costing system was not reliable	4.88 (1.64)	6.22 (1.09)	4.50 (1.69)	4.67 (1.66)	5.00 (1.54)
(b) The existing costing system did not provide useful information to management	4.00 (1.69)	6.33 (0.71)	4.13 (2.03)	5.00 (1.00)	6.00 (0.74)
(c) It was necessary to update the existing information system	5.88 (0.83)	6.00 (1.32)	5.25 (0.71)	4.56 (1.81)	4.08 (2.02)
(d) Our competitors were using ABC	1.75 (1.39)	4.00 (2.29)	3.13 (1.64)	2.44 (1.59)	1.83 (1.19)
(e) Other units within the company had benefited from adopting ABC.	2.00 (1.31)	4.00 (1.94)	2.25 (1.49)	2.00 (1.22)	2.42 (2.02)
(f) The changing cost structure created the need to replace the existing system.	3.88 (1.73)	5.56 (1.42)	4.25 (1.39)	3.56 (2.51)	4.08 (1.98)
(g) The changing manufacturing environment created the need to replace the existing system.	4.38 (2.00)	4.44 (2.79)	5.13 (1.13)	3.88 (1.89)	3.00 (2.13)
(l) The changing competitive environment created the need to replace the existing system	2.40 (1.52)	4.33 (2.45)	3.13 1.64	4.71 (1.11)	4.18 (2.36)
Fashion and fad motives (j) We wished to try a new accounting innovation	3.63 (2.50)	3.22 (2.11)	3.00 (2.27)	3.56 (2.01)	2.17 (1.85)
(k) Advice from auditors and/or consultants	1.88 2.10	5.11 (1.27)	1.38 (0.74)	3.56 (2.24)	2.00 (1.41)
(m) To be seen as having a sophisticated costing system that was comparable with best practice	4.75 (1.67)	5.00 (1.87)	4.00 (1.63)	4.29 (1.25)	3.55 (2.11)
Forced selection motives (h) Advice from parent or headquarters	1.88 (2.10)	3.22 (2.44)	1.63 (1.06)	2.78 (1.00)	2.00 (1.48)
(i) Pressure from government or other regulatory authorities	1.50 (2.70)	3.89 (2.62)	1.88 (1.46)	3.11 (2.62)	2.42 (2.23)

Notes:
[a] Based on a scale of (1) very unimportant to (7) vitally important with the mid-point anchored neutral

8.11 The reasons and factors which have discouraged firms from adopting ABC

A distinctive contribution of this study is that it examines the reasons and factors that have discouraged firms from adopting ABC. Question C1 was formulated to discover the reasons that discourage firms from adopting ABC. Only those respondents (N = 94) that operated formal costing systems and had not implemented ABC (i.e. stages A, B and C of the stages listed in Question A9/ Table 8.5) were requested to answer section C of the questionnaire. Of the 94 eligible respondents, 90 answered the question.

Question C1 provided the respondents with a list of 20 potential reasons that may explain why their business units had not implemented ABC. They were asked to indicate on a scale of 1 (strongly disagree) to 7 (strongly agree) the extent to which they agreed or disagreed with the potential reasons why their business units had not implemented ABC. The responses are summarised in Table 8.14. The most important reason related to the fact that the perceived benefits of ABC did not justify the cost of implementing it. Other important reasons related to the respondents' perception that ABC was unlikely to improve the control of costs (as indicated by the responses to the statements that the control of overheads is already adequate, most of the costs are considered to be fixed and the limited ability of ABC to explain cost variability) and the lack of support from top management and individuals to act as champions to support the introduction of ABC.

There was strong disagreement with the statement that the lack of understanding by accounting staff and resistance to change by the accounting function were barriers to implementing ABC. Also the lack of resources, in terms of employee skills and information technology, was not considered to be a major reason for not implementing ABC.

Question C1 also provided a space enabling the respondents to insert other reasons for not implementing ABC besides the 20 listed items. The respondents entered the following additional items:

- Individual product life cycle management has greater importance;

- Customer driven costs are as important as product costs (e.g. selling and distribution costs) and these are catered for in our customer integrated profitability reporting;

- Cost are assessed on individual bases and we have no wish to be constrained by the inflexibility of a standard package;

- Allocation of costs is totally arbitrary when relating to individual products;

- Costs are easily controlled – we are a small business;

- ABC is difficult in a constantly changing business;

- ABC is of little use in cost reduction.

Table 8.14: Reasons for not implementing ABC (N = 90)

Rank	Reason	% rating 1 or 2[a]	% rating 6 or 7[a]	Mean[a]	Standard deviation
1	(b) The perceived benefits of ABC do not justify the cost of implementing it	6	32	4.83	1.49
2	(s) The control of overheads is already adequate	17	29	4.17	1.67
3	(h) Most of the costs in our business unit are fixed	20	27	4.16	1.64
3	(c) Insufficient support from top management	16	17	4.16	1.45
5	(l) Lack of individuals to act as champions to support the introduction of ABC	18	22	4.14	1.67
6	(m) ABC systems are too complex	13	12	4.07	1.40
7	(n) ABC is limited in its ability to explain cost variability	11	13	3.97	1.26
8	(q) Our competitors are not introducing ABC	11	4	3.89	0.98
9	(j) We do not have the information technology software to support an ABC system	35	29	3.83	2.09
9	(o) ABC is limited in its ability to assist in cost control	11	13	3.83	1.36
9	(e) Lack of acceptance by managers	16	4	3.83	1.25
12	(k) Lack of relevant employee skills in designing and operating an ABC system	28	15	3.78	1.75
13	(r) We are fully satisfied with our current costing system	22	17	3.77	1.65
14	(p) ABC is limited in its ability to generate more accurate costs for decision-making	16		3.74	1.33
15	(t) Most products or services consume similar quantities of resources so there is no need to implement an ABC system	24	10	3.55	1.53
16	(g) Overheads are a small proportion of total costs so we do not need an ABC system	36	17	3.53	1.92
17	(d) Resistance to change by the accounting function	40	4	3.14	1.46
18	(a) ABC has never been considered because most of the accounting staff do not understand the concept	45	5	2.96	1.63
19	(f) The relatively small size of our firm does not justify implementing an ABC system	46	10	2.94	1.64
20	(i) We do not operate in a very competitive environment so an ABC system is not required	62	6	2.42	1.57

Notes
[a] Based on a scale of (1) strongly disagree to (7) strongly agree

To ascertain whether there were any patterns among the 20 responses, factor analysis with Varimax rotation was used. The factor analysis (see Table 8.15) identified six factors with Eigenvalues greater than one that in total explained 66% of the variance in the total responses. The first dimension listed in Table 8.15 is labelled 'lack of resources' since it contained the variables lack of employee skills, lack of individuals to act as champions, lack of information technology software, ABC systems are too complex and accounting staff do not understand the concept. The second dimension was labelled 'perceived deficiencies of ABC' since it comprised the inability of ABC to explain cost variability, generate more accurate costs and assist in cost control. The third dimension was labelled 'insufficient support from management/accounting functions' since it comprised variables relating to lack of support. The fourth dimension had three variables that related to the 'lack of a need for ABC because the current costing system was satisfactory in the particular circumstances faced by the organisations' . The fifth dimension had four variables (we do not operate in a very competitive environment, most of the costs are fixed, small size does not justify ABC and our competitors are not introducing ABC). This dimension was labelled ' organisational/contextual factors do not justify ABC.' The final dimension consisted of two variables relating to the perception that 'ABC is not justifiable on cost versus benefits criteria.'

Frequency distributions were derived for each of the six factors. The mean scores and the percentage of respondents assigning a score in excess of the mid-point of 4 (labelled neutral) were as follows:

Factor	Mean score	Standard Deviation	% in excess of a score of 4
1. Lack of resources	3.71	1.21	43.2
2. Perceived deficiencies of ABC	3.85	1.17	37.2
3. Insufficient support from management and/or accounting functions	3.71	1.09	34.9
4. Lack of a need for ABC because the current costing system was satisfactory	3.85	1.34	41.9
5. Organisational/contextual factors do not justify ABC	3.35	0.91	20.9
6. ABC is not justifiable on cost versus benefits criteria	4.18	1.32	38.4

Table 8.15: Factor analysis rotated component matrix (reasons for not implementing ABC)

	Component					
	1	2	3	4	5	6
Lack of relevant employee skills in designing and operating an ABC system	.756					
We do not have the information technology to support an ABC system	.735					
Lack of individuals to act as champions to support the introduction of ABC	.713					
ABC systems are too complex	.658					
Accounting staff do not understand the concept	.550					
ABC is limited in its ability to explain cost variability		.896				
ABC is limited in its ability to assist in cost control		.858				
ABC is limited in its ability to generate more accurate costs for decision-making		.749				
Lack of acceptance by managers			.770			
Insufficient support from top management			.712			
Resistance to change by the accounting function			.618			
We are fully satisfied with our current costing system				.756		
Most products or services consume similar quantities of resources so there is no need to implement an ABC system				.721		
The control of overheads is already adequate				.715		
(We do not operate in a very competitive environment so an ABC system is not required					.605	
Most of the costs in our firm are fixed					.599	
The relatively small size of our firm does not justify implementing an ABC system					.541	
Our competitors are not introducing ABC					.517	
Overheads are a small proportion of total costs so we do not need an ABC system						.714
The perceived benefits of ABC do not justify the cost of implementing it						.490
Eigen values	3.1	2.7	2.3	2.1	1.7	1.4
Percentage of variance explained	15.5	13.3	11.3	10.6	8.5	7.0

8.12 The extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC

To discover the extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC, Question D15 sought to ascertain the extent to which the following innovative/strategic management accounting techniques were used:

- value chain analysis;

- shareholder value analysis;
- benchmarking of operational processes, management processes or support activities with outside organisations;
- performance measurement based on the balanced scorecard;
- competitor cost assessment;
- strategic costing involving the use of cost data based on strategic and marketing information to identify superior strategies that will sustain a competitive advantage, and
- target costing.

The responses are listed in Table 8.16 It can seen that the mean score for the ABC adopters was in excess of 4 (sometimes used) in respect of the extent of use of external benchmarking, performance measurement based on the balanced scorecard and strategic costing. In contrast, the mean score for the ABC non-adopters was less than 4 for all items. With the exception of target costing, there was a significant difference in the usage of the techniques listed in Table 8.16 for ABC adopters and non-adopters ($p < .05$ for competitor cost assessment, one tailed and $p < .01$ for the remaining items, one tailed). The most widely used technique for all of the respondents was external benchmarking (mean = 3.97) and the least widely used technique was value chain analysis (mean = 2.59).

Table 8.16: Responses relating to the extent of the use of various strategic management accounting practices

	% rating 1 or 2[a]	% rating 6 or 7[a]	Mean[a]	Standard deviation
Value chain analysis:				
ABC adopters	37.2	11.8	3.41	1.73
Non-ABC adopters	68.0	3.2	2.25	1.50
Shareholder value analysis				
ABC adopters	31.4	23.5	3.78	1.83
Non-ABC adopters	60.0	10.4	2.62	1.79
Benchmarking of operational processes, management processes or support activities with outside organisations				
ABC adopters	23.6	27.4	4.43	1.78
Non-ABC adopters	24.8	8.0	3.72	1.42
Performance measurement based on the balanced scorecard				
ABC adopters	21.6	31.4	4.31	1.87
Non-ABC adopters	40.0	12.8	3.25	1.84
Competitor cost assessment				
ABC adopters	22.0	16.0	3.96	1.62
Non-ABC adopters	35.2	11.2	3.47	1.67
Strategic costing involving the use of cost data based on strategic and marketing information to identify superior strategies that will sustain a competitive advantage				
ABC adopters	21.5	29.8	4.41	1.70
Non-ABC adopters	36.2	8.9	3.37	1.62
Target costing				
ABC adopters	55.1	18.4	3.08	1.77
Non-ABC adopters	50.9	16.4	3.17	1.94

Notes
[a] Based on a scale of (1) never used to (7) extensively used with the mid-point anchored sometimes used.

8.13 Summary and conclusion

This chapter has presented the findings relating to the first four objectives of the research. Approximately two thirds of the respondents operate absorption costing systems comprising of nearly an equal split between ABC and traditional costing systems. Direct costs are the dominant costs. It was observed that manufacturing organisations have a significantly greater proportion of direct costs compared with non-manufacturing organisations. Direct labour-based cost drivers continue to predominate for all types of organisations. Nearly 50% of manufacturing organisations do not allocate indirect costs for decision-making.

Of the 176 respondents, 29% had implemented ABC and 24% activity analysis[1]. Therefore, 53% of the respondents had implemented some form of activity-based approach. A significantly greater proportion of ABC users reported that they were satisfied with the accuracy of the assignment of indirect costs compared with non-ABC adopters. Also, 67% of ABC adopters indicated a score in excess of 'moderately successful' when asked to indicate how successful ABC information had been in providing improved decision-making and/or cost management information. Profitability analysis and cost reduction/cost management represented the most important ABC applications.

The most important motives for implementing ABC were related to the deficiencies of the existing costing systems. There was little evidence to support the fad/fashion or forced selection motives. The dominant motives appeared to fall within the efficient choice category. The most important reasons for not adopting ABC related to the fact that the perceived benefits of ABC do not appear to justify the cost of implementing it. Lack of understanding or resistance to change by the accounting function and a lack of resources in terms of employee skills did not appear to be barriers in implementing ABC. Finally, apart from target costing there was a significantly greater proportion of ABC users adopting other accounting innovations compared with non-ABC users.

The main aim of this chapter has been to present the descriptive findings and little attempt has been made to discuss their implications. This issue will be addressed in the concluding chapter. In the next chapter the aim is to explain the factors influencing the adoption of ABC and the success of ABC by presenting the statistical findings relating to the hypotheses formulated in Chapter 6.

[1]The figure of 29% is likely to represent an over-estimate (see section 8.4 for an explanation of this point)

CHAPTER 9

TESTING THE HYPOTHESES

9.1 Introduction

9.2 Methods of aggregating the multiple-item instruments

9.3 Measuring the level of adoption of ABC systems

9.4 Measuring the potential explanatory variables influencing the adoption of ABC

9.5 Statistical methods used for testing the hypotheses

9.6 Testing the hypotheses using statistical tests relating to differences between the responses of ABC adopters and non-adopters

9.7 Testing the hypotheses relating to ABC adoption using logistic regression

9.8 Summary of the research findings relating to factors influencing the adoption of ABC

9.9 Factors influencing the successful adoption of ABC systems

9.10 Summary of the research findings relating to factors influencing ABC success

9.11 Summary/conclusion

CHAPTER 9

TESTING THE HYPOTHESES

9.1 Introduction

The aims of this chapter are to explain how the variables are measured and the statistical tests that are used. The major aim is to present the statistical results relating to the hypotheses that were presented in Chapter 6 (sections 6.5 and 6.6). No attempt will be made to discuss the research findings since the findings presented in this, and the previous chapter, will be discussed in Chapter 10. This chapter begins with three sections (9.2 – 9.4) discussing various issues relating to measuring the variables. The statistical tests that are used for testing the hypotheses are explained in section 9.5. The results of the two different statistical approaches that are used relating to factors influencing the adoption of ABC systems are presented in sections 9.6 and 9.7 and summarised in section 9.8. The final two sections present the findings relating to factors influencing ABC success.

9.2 Methods of aggregating the multiple-item instruments

A major feature of this study was the extensive use of two or more questions to measure variables where objective measures do not exist (such as the intensity of competition). Using multiple-item questions aims to capture the different characteristics (or dimensions) of the individual concepts representing the variables. Multiple-item questions involving 7-point scales were extensively used to obtain scores relating to the potential explanatory factors, which may influence ABC adoption or success. Using multiple-item instruments requires a method that can be used in order to arrive at an overall measure for the instrument or the variable. Many researchers have used the following methods:

- The first method is the average score. This method of aggregating the multiple-items that measure a variable is explained by Judd *et al.* (1991). They demonstrated that, when an individual indicates his or her own attitude (or opinion) relating to an object on some scales, a substantial element of intuitive judgement is involved, no matter how precise the rating instructions and no matter how well trained the individual. Such judgement in the use of rating scales makes the ratings vulnerable to bias. Averaging the scores for several variable items reduces this bias.

- The second method is to aggregate the multiple-item instruments using factor analysis. Many writers (Pedhazur and Pedhazur, 1991, pp. 102-103; Cortina, 1993, p. 103; Oppenhiem, 2001, pp. 166-171; Bryman and Cramer, 2001, pp261-273) argue that factor analysis is a useful tool in order to aggregate variables and to test for an instrument's homogeneity and unidimensionality. This technique involves the use of different methods. One of these methods, and probably the most famous one, is the principal-component method where factors are extracted with Eigenvalues of more than one.

Bearing the two methods of aggregating variables in mind, the multiple-item instruments were aggregated using the average score for testing the hypotheses relating to factors influencing the adoption of ABC. The following reasons justify this decision.

- For management accounting research, particularly in ABC, Foster and Swenson (1997) claimed that a composite score has the advantage over an individual single question when either (1) the variable being measured contains multiple-dimensional aspects requiring several different questions to capture the multiple-dimensional aspects, or (2) there is a measurement error in an individual question that is diversified away in aggregating individual questions into a composite.

- Nunnally and Berstein (1994, pp. 316-317) suggested that the use of factor analysis is likely to overestimate the number of dimensions of the instruments.

- It is easier to interpret the aggregating of multiple-item instruments using the average score than factor analysis which is sometimes difficult to interpret without a subjective judgement.

9.3 Measuring the level of adoption of ABC systems

To measure the characteristics of the product costing system, two dichotomous categories are used: ABC adoption and ABC non-adoption. The terms adoption and non-adoption have been subjected to different interpretations in previous studies with some studies defining adoption as actual ABC implementation and others defining it as consisting of either actual implementation or a desire to implement it. A further problem applying to previous studies relates to the difficulties that can apply in distinguishing between ABC and non-ABC systems. Some researchers have questioned whether systems described by survey respondents as ABC really are ABC systems (Dugdale and Jones, 1997). Previous surveys have mostly allowed the respondents to self-specify whether their organisations operated an ABC system. Suitable control questions that allow the researcher to check respondents' claims that their organisations are operating ABC systems have rarely been incorporated in previous questionnaire surveys. Dugdale and Jones conclude that their findings suggest that survey claims for ABC adoption may be mistaken, exaggerated or ambiguous.

To overcome the difficulties which can apply in distinguishing between ABC and non-ABC systems, the following steps were taken to ensure that a number of ABC users really are ABC users:

- Questions A2 and A3, relating to the number of cost pools and different types of cost drivers, and the responses to questions B1 – B4 were used as check questions for the responses.
- Section C contained twenty questions that represent the reasons for not adopting ABC which provided a further check on the accuracy of the responses to Question A9.

Also, where the responses were not clear, approximately 10 respondents were telephoned to clarify their responses. In addition, Question A9 was formulated to capture all potential stages relating to the adoption/non-adoption of ABC which can apply and the respondents were asked to indicate which stage best described their business unit's current situation.

The following stages in Question A9 and Table 8.5 were classified as representing ABC adoption for the purpose of testing hypotheses relating to the adoption of ABC:

- approval has been granted to implement ABC and allocate the necessary resources, but implementation has not yet begun (stage D, n = 2);
- implementation is in process; the ABC implementation team is in the process of determining project scope and objectives, collecting data and/or analysing activities and cost drivers (stage E, n = 3);
- implementation is complete and is in the process of gaining acceptance (stage H, n = 23), and
- implemented and generally accepted; ABC information is commonly used by non-accounting staff for decision-making and/or cost management purposes. It is considered a normal part of the information system (stage I, n = 23).

Non-adoption consists of the following categories:

- ABC has not been seriously considered (stage A, n = 53);
- ABC is being considered and implementation is possible, but implementation has not yet been approved (stage B, n = 15);
- ABC has been considered (not implemented) and rejected as a cost assignment method (stage C, n = 26);
- ABC was approved for implementation but abandoned prior to implementation (stage F, n = 3), and
- ABC was implemented but later abandoned (stage G, n = 5).

Therefore, of the 153 responding organisations with formal costing systems, 51 were classified as ABC adopters and 102 were classified as non-adopters. For the purpose of measuring the success of ABC systems, the analysis was based on the responses from the 46 respondents that had implemented ABC (i.e. stages H and I in Question A9).

9.4 Measuring the potential explanatory variables influencing the adoption of ABC

The potential explanatory variables influencing the adoption of ABC and the questions used to measure them are listed in Table 9.1.Factual measures were used to measure cost structure, size, corporate sector, the number of first stage cost pools and different types of second stage cost drivers used. For the first variable (cost structure) the respondents were asked in Question D8 to specify the percentage of direct/indirect costs in relation to total costs. Size was measured by asking the respondents in Question D19 to insert the annual sales turnover of their business unit. For the corporate sector the respondents were asked to tick one box (in Question D18) to indicate the sector that most appropriately described the activities of their business (manufacturing, financial and commercial, service, retail and other). The respondents were also asked in Questions A2 and A3 to specify the number of first-stage cost pools/second-stage cost drivers. For the remaining variables, seven-point ordinal Likert scales were used. Wherever possible, composite scores derived from multi-item questions were used. Details of the number of questions used and the Cronbach Alphas for the remaining hypothesised explanatory variables extracted are also shown in Table 9.1.

With the exception of support diversity, all of the Cronbach alpha measures were above the generally accepted minimum criterion level of 0.6 (Nunnally, 1978). Composite scores were used to measure the variables with a Cronbach alpha exceeding 0.6 and the following three individual questions relating to support diversity were treated as separate variables:

(1) The products/services marketed by the organisation are quite diverse (Question D3a);

(2) Most products/services require similar resources to design, manufacture/provide and distribute (the responses to Question D3b were reverse coded);

(3) Costs of support department (e.g. engineering, purchasing, information processing, marketing) resources consumed by each product/service line are about the same (the responses to Question D3d were reverse coded).

Table 9.1: Details of questions used and Cronbach Alpha scores for hypotheses relating to potential explanatory variables influencing the adoption of ABC systems

Hypothesis/ independent variables	Questions	Number of questions	Cronbach Alpha
H1 Cost structure	D8	1	n/a
H2a Product diversity	D3 (a, b, d)	3	.43
H2b Volume diversity	D2 and D3c	2	.73
H3 Degree of customisation	D1	1	n/a
H4 Intensity of the competitive environment	D5, D7b and D7d	3	.88
H5a Number of first-stage cost pools	A2	1	n/a
H5b Number of different types of second-stage cost drivers	A3	1	n/a
H6 Size of the organisation	D18	1	n/a
H7 Extent of use of lean production techniques (including JIT techniques)	D11 (a, b, c, d, e, f)	6	.96
H8 Extent of the application of total quality management approaches	D9 (a, b, c, d)	4	.75
H9 Influence in determining selling prices	D12 (a, b)	2	.74
H10 Quality of information technology	D10 (a, b, c, d)	4	.77
H11 Extent that target costing is applied	D14	1	n/a
H12 Importance of cost information	D13 (a, b, c)	3	.63
H13 Extent of use of innovative/strategic management accounting techniques	D15 (a, b, c, d, e, f)	6	.79
H14 Corporate sector	D18	1	n/a

9.5 Statistical methods used for testing the hypotheses

In order to test hypotheses, the following methods are frequently used:

- Parametric and non-parametric correlation;
- Parametric and non-parametric tests to measure the differences in scores between two or more groups, and
- Multiple discriminant analysis techniques.

It is widely recognised that correlation provides a yardstick whereby the intensity or the strength of a relationship between a pair variables can be measured (Bryman and Cramer, 2001, p.170). In other words, a correlation demonstrates the extent to which two variables vary together. A correlation may be positive or negative. A positive measure occurs when one variable increases in relation to the other. However, negative correlation means that when one variable increases, the other one decreases (Foster, 1998, p. 181).

A parametric correlation is referred to as Pearson's (r). This measure of correlation assumes that the variables are measured on an interval scale (Foster, 1998, p.181). However, this method is widely used in the social sciences where variables are measured on an ordinal scale since it provides a stronger approach to investigating the relationships between variables than non-parametric counterparts (Bryman and Cramer, 2001, p.170). The other types of correlation are non-parametric and include Spearman's rho and Kendall's tau rank correlation. These methods are suitable when variables are measured on an ordinal scale. In addition, they can be used in a wide variety of contexts since they make fewer assumptions relating to the distribution of the variables and the nature of the relationship between variables (Bryman and Cramer, 2001, p.179). With regards to which of non-parametric correlation should be reported, Bryman and Cramer (2001, p.179-180) argue that Spearman's rho is more commonly used and, therefore, should be reported. On the other hand, tau deals with tied ranks (i.e. two or more respondents are at the same rank) better than rho. Drawing on the previous discussion, Speraman's rho will generally be used since most of the data are measured on an ordinal scale.

In general, it should be noted that correlation has + or – to indicate the direction of the relationship where this value can range from –1 to +1. A correlation of +1 means perfect positive correlation and a correlation of –1 means perfect negative correlation. However, a correlation of 0 indicates that there is no relationship between the two variables (Foster, 1998, p. 181; Bryman and Cramer, 2001, p.173). In order to judge the strength of the relationship between the variables, Bryman and Cramer (2001, p.174) cited from Cohen and Holliday (1982) the following guidance for judging the strength of the relationship between variables:

1. Very low relationship where the coefficient equals or is below 0.19.

2. Low relationship where the coefficient ranges from 0.20 to 0.39.

3. Moderate relationship where the coefficient ranges from 0.40 to 0.69.

4. High relationship where the coefficient ranges from 0.70 to 8.9.

5. Very high relationship where the coefficient ranges from 0.90 to 1.

In contrast, Miles and Shelvin (2001, p. 25) cite Cohen's (1988) interpretation of a small correlation having a value of approximately 0.1, a medium correlation as 0.3 and a large correlation as 0.5 or greater. It should be noted that the above classifications of the correlation are subjective.

The second method is to use parametric and non-parametric tests to measure if the differences in scores between two or more groups are statistically significant. Parametric tests are recommended when the scores are measured on an interval scale and non-parametric tests when the scores are measured on an ordinal scale or where the variables are categorical (Bryman and Cramer, 2001, p.116). The Mann-Whitney test is recognised as the most appropriate non-parametric test for ordinal data since it compares the number of times a score from one sample is ranked higher than a score from the other sample. This method does what a t-test does when the distribution of the two samples deviates significantly from normal (Siegel and Castellan, 1988; Bryman and Cramer, 2001,; George and Mallery, 2000). Bryman and Cramer, (2001, p.143) argue that the Mann-Whitney test is about 95 % as powerful as the t-test. Where the responses are categorical, the chi-square test should be used (Bryman and Cramer, 2001). Based on the above discussion parametric tests are used for interval data (e.g. t-test for cost structure and size), the Mann-Whitney test for ordinal data and the Chi-square test for categorical data (e.g. corporate sectors).

The third method is to use multivariate analysis techniques such as multiple regression, multiple discriminant analysis and logistic regression. However, multiple regression analysis can be used only when the dependent variable is metric. Where categorical variables are used to measure the dependent variable, the appropriate multivariate analysis techniques are discriminant analysis and logistic regression.

Therefore, for testing the hypotheses relating to the factors influencing the adoption/non-adoption of ABC, the dependent variable is a categorical measure and the two techniques of discriminant analysis and logistic regression are available. With these techniques it is possible to include non-metric data for independent variables by substituting either ordinal or nominal data (with dummy-variable coding) and the dependent variables by the use of a binary measure in the specialised technique of logistic regression (Hair *et al.*, 1998). Logistic regression, or logit analysis, as Hair *et al.* (1998) suggest, is a

> 'special form of regression in which the criterion variable is a non-metric, dichotomous (binary) variable. While differences exist in some aspects, the general manner of interpretation is quite similar to linear regression (p.82)'.

With discriminant analysis, the dependent variable can be two or more categories, whereas logistic regression can only be used where there are two dichotomous categories (e.g. ABC adoption and non-ABC adoption). The key assumptions for deriving the discriminant function are multivariate normality of the independent variables and unknown (but equal) dispersion and covariance structures (matrices) for the groups, as defined by the dependent variable. Data not meeting normality assumption can cause problems in the estimation of the discriminant function.

Bearing this in mind, it is suggested that logistic regression should be used as an alternative technique. Under logistic regression, the normality is not necessarily the same for both dependent and independent variables. Hair *et al.* (1998) state that logistic regression is one of the most widely used linear probability models. Highlighting similarities of this analysis, Hair *et al*, suggest that:

> 'logistic analysis may be preferred for several reasons. First, discrimintant analysis relies on strictly meeting the assumptions of multivariate normality and equal variance-covariance matrices across groups; features not found in all situations. Logit analysis does not face these strict assumptions, thus making its application appropriate in many more situations. Second, even if the assumptions are met, many researchers prefer logit analysis because it is similar to regression with its straightforward statistical tests, ability to incorporate non-linear effects and wide range of diagnostics. For these and more technical reasons, logit analysis is equivalent to discriminant analysis and may be more appropriate in certain situations' (Hair *et al.*, 1998, p.130).

Norusis (1999, p. 3) also states that, where the research involves many variables where the normality assumption is not fulfilled with some variables and the dependent variable is dichotomous, logistic regression is similar to a linear regression model. Logistic regression has been used and reported in the published management accounting research journals and has been used in previous ABC research (Gosselin, 1997; Krumwiede, 1998). Based on the above discussion, logistic regression was chosen to test the hypotheses relating to the influence of the potential factors on the adoption/non-adoption of ABC.

The multiple regression model is used to test the hypotheses that examined the potential factors which influence the success of ABC implementation. Here the dependent variable is measured using an ordinal scale, rather than two categorical variables as with the ABC adoption/non-adoption hypotheses. It is widely recognised that the multiple regression model should be used for conducting multivariate analysis when more than three variables are involved (Bryman and Cramer, 2001). Multiple regression is a general test used to analyse the relationship between a dependent variable and several independent variables (Hair *et al.*, 1998). Bryman and Cramer (2001) state that the regression coefficient shows the amount of change in the equation with the effect of all other independent variables in the model controlled (i.e. partialled out). Thus, the model for this research examines the impact of explanatory/independent variables on the dependent variable (the success of ABC implementation). The distinguishing feature of the multiple regression model is that, for each of the independent variable, the contribution of the relevant variable to the dependent variables is expressed with the effect of the rest of other variables removed. With the first and the second methods described earlier (i.e. correlation and examining the differences between the scores of two groups), the effect or interpretation of the other variables is not controlled.

Besides the use of multivariate techniques, as described above, it was also decided to use correlation and statistical measures of the differences in scores between two or more groups. Therefore, all of the three identified methods were used for the following reasons:

- The correlation expresses the strength or the weakness of the relationship between two variables. However, it does not determine which variable is the dependent and which variable is independent and there is a danger that spurious results may be reported. In contrast, multivariate analysis techniques identify the dependent and the independent variables. Regarding the use of non-parametric tests, they have the advantage of not having to meet the normality requirements of parametric tests. They are appropriate for testing the hypotheses in this research relating to the differences in scores between with two groups (i.e. ABC adoption and non-adoption) where the variables are measured on an ordinal scale.

- The three methods are frequently used and reported in the published management accounting research journals (Scapens and Sale, 1985; Ugras, 1994; Hoque, 2000).

In the following sections the results are presented using the three different methods described above for:

1. Testing the hypotheses relating to the potential explanatory factors influencing the adoption/non-adoption of ABC, and

2. Testing the hypotheses relating to the factors influencing the success of ABC.

Measures of the differences in the scores between two groups and logistic regression are used to test the hypotheses relating to the adoption/non-adoption of ABC. Because the dependent variable is a dichotomous categorical variable, correlation tests are not applied since they are more appropriate when both of the variables that are being examined are measured on either an ordinal or interval scale. For testing the hypotheses relating to ABC success, correlation and multiple regression are used since all of the variables are measured on an ordinal or interval scale. Statistical tests relating to measures of the differences in the scores between two groups are not used because ABC success is measured on a 7-point scale. Therefore, to apply such statistical tests, it would be necessary arbitrarily to divide the success scale into two measures: successful and not successful. This requires a subjective judgement relating to the point where the grouping should be made. The choice of grouping can thus affect the results obtained and also involves data reduction.

9.6 Testing the hypotheses using statistical tests relating to differences between the responses of ABC adopters and non-adopters

In order to test the potential explanatory factors and their influence on the adoption of ABC, the Mann-Whitney Test was used for the ordinal scale variables and the t-test for the interval scale variables. The p-values and summary statistics for each of the variables examined for ABC adopters and non-adopters are shown in Table 9.2. This table indicates that significant differences were observed between ABC adopters and non-adopters in respect of the following variables at the 5% level:

- H2a Support diversity (1) ($p < .05$);
- H2b Volume diversity ($p < .05$);
- H4 Intensity of the competitive environment ($p < .01$);
- H5a Number of first stage cost pools ($p < .01$);
- H5b Number of different types of second stage cost drivers ($p < .01$);
- H6 Size (sales turnover) ($p < .05$);
- H7 Extent of use of lean production techniques (including JIT techniques) ($p < .01$);
- H12 Importance of cost information ($p < .01$), and
- H13 Extent of use of innovative/strategic management accounting techniques ($p < .01$)

It should also be noted that the following two variables listed in Table 9.2 are marginally above the 5% significance level:

- H1 Cost structure measured as a percentage of indirect costs ($p = .050$), and
- H8 Extent of use of total quality management approaches ($p = .053$).

The p-values reported in Table 9.2 are for variables measured on interval or ordinal scales. The details in respect of corporate sector, a categorical variable, are as follows:

	% ABC adoption	*% Non-ABC adoption*	N
Manufacturing	20	80	91
Financial and commercial	68	22	22
Retail and other	22	78	23
Service	33	67	40
			176

The chi-square test indicated that there was a significant difference in ABC adoption rates ($P < .01$) by the different corporate sectors.

Table 9.2:Descriptive statistics and p-values relating to the influence of the potential explanatory variables on ABC adoption

	N	Mean	Standard Deviation	% rating 1 or 2[a]	% rating 6 or 7[a]	P-value[a]
(H1) Cost structure (% of indirect costs):						0.05
ABC adoption	51	33.7	20.8			
Non – ABC adoption	116	28.2	19.1			
(H2a) Support diversity (1)						0.014
ABC adoption	51	4.59	1.47	12	30	
Non – ABC adoption	125	3.93	1.86	25	29	
(H2a) Support diversity (2)						0.185
ABC adoption	51	2.84	1.62	47	6	
Non - ABC adoption	125	3.15	1.79	47	18	
(H2a) Support diversity (3)						0.061
ABC adoption	51	4.49	1.47	12	31	
Non - ABC adoption	125	4.06	1.70	22	26	
(H2b) Volume diversity						0.043
ABC adoption	51	5.73	1.39	4	61	
Non - ABC adoption	125	5.32	1.55	6	52	
(H3) Degree of customization:						0.288
ABC adoption	51	3.82	1.82	29	24	
Non - ABC adoption	125	3.67	1.90	37	22	
(H4) Intensity of the competitive environment						0.006
ABC adoption	51	5.48	1.68	10	63	
Non - ABC adoption	125	5.28	1.25	5	41	
(H5a) Number of first-stage cost pools						0.000
ABC adoption	50	45	38			
Non - ABC adoption	62	21	26			
(H5b) Number of different types of second-stage cost drivers						0.000
ABC adoption	50	8	5.00			
Non - ABC adoption	62	2	1.20			
(H6) Size (£ million)						0.011
ABC adoption	51	1,049	2,111			
Non - ABC adoption	125	333	753			
(H7) Extent of use of lean production techniques (including JIT techniques						0.001
ABC adoption	19	4.98	0.97	0	21	
Non - ABC adoption	75	4.07	1.05	4	5	
(H8) Extent of the use of total quality management approaches						0.053
ABC adoption	51	4.82	1.19	2	18	
Non – ABC adoption	125	4.47	1.18	5	10	
(H9) Influence in determining selling prices						0.479
ABC adoption	50	3.38	1.74	34	10	
Non - ABC adoption	125	3.33	1.62	34	10	
(H10) Quality of information technology						0.534
ABC adoption	51	4.16	1.31	6	16	
Non - ABC adoption	125	4.19	1.33	9	10	
(H11) Extent that target costing is applied						0.482
ABC adoption	49	3.08	1.8	55	18	
Non - ABC adoption	122	3.17	1.9	51	16	
(H12) Importance of cost information						0.000
ABC adoption	51	5.41	0.89	2	37	
Non - ABC adoption	125	4.77	1.05	2	14	
(H13) Extent of use of innovative/strategic management accounting techniques.						0.000
ABC adoption	55	4.05	1.16	4	6	
Non - ABC adoption	121	3.11	1.11	20	0	

Notes
[a] P-values are one-tailed for all items except item (k) which is two-tailed. P-values are based on the Mann-Whitney test for the ordinal scale items b,c,d h, i, j, k, l, m and n. The remaining items were measured on an interval scale and the p-values were derived from the t-test. The respondents were generally asked to indicate on a scale of 1 (strongly disagree) to 7 (strongly agree) the extent to which each of the variables applied in their organization. Thus, the ordinal measures vary from low to high levels on a scale of 1 to 7.

9.7 Testing the hypotheses relating to ABC adoption using logistic regression

The logistic regression model incorporated the independent variables listed in Table 9.2 that were used to examine the statistical differences in the responses for ABC adopters and non-adopters. The variable 'the extent of the use of lean production techniques (including JIT techniques)' was excluded from the model since this variable was applicable only to manufacturing organisations. Including this variable would have resulted in many responses being omitted from non-manufacturing organisations because of missing data relating to lean production/JIT techniques. Also, the number of cost pools and different types of second stage cost drivers were not included in the model since these represent features associated with ABC systems rather than potential explanatory variables. Only one measure of support diversity was used (support diversity (1) being the only significant diversity measure in Table 9.2). In addition, the corporate sector variables were entered as dummy variables and annual sales was transformed logarithmically to adjust for the observed non-linearity. The dependent variable was coded 2 for ABC adopters and 1 for non-adopters.

The output of the logistic regression model (see Table 9.3) indicates that the following variables are statistically significant:

- H4 Intensity of the competitive environment ($p = .041$);
- H6 Size (Annual sales in £ million) ($p = .010$);
- H12 Importance of cost information ($p = .000$);
- H13 Extent of use of innovative/strategic management accounting practices ($p = .001$), and
- H14 Financial and commercial sector dummy variable ($p = .016$).

A positive sign for the logistic regression coefficient indicates that the variable is directly related to ABC adoption, whereas a negative sign indicates that, as the variable increases, an organisation is less likely to adopt ABC. Exp B shown in the final column of Table 9.3 is an indicator of the change in odds resulting from a unit change in the indicator. Values greater than 1 indicate that, as the predictor increases, the odds of the outcome occurring increase; conversely, a value less than one indicates that as the predictor increases, the odds of the outcome occurring decrease. This is consistent with the signs of the regression coefficients. The signs for cost structure, influence in determining selling prices, extent that target costing is applied and degree of customisation in Table 9.3 are in the opposite direction to the values predicted in the hypotheses development in Chapter 6 (section 6.5). Given that they are not statistically significant ($p > .05$) the signs are of no account. However, the intensity of the competitive environment is significant but in the opposite direction to that predicted. This finding is discussed in the final chapter (see section 10.2.5). All of the remaining significant variables listed above are in the direction predicted.

The chi-square statistic shown in Table 9.3 is comparable to the overall F test in multiple regression. The model is statistically significant at the .000 level. The Hosmer and Lemeshow value (.597) measures the correspondence of the actual and predicted values of the dependent variable. A better model fit is indicated by a smaller difference in the observed and predicted classification and a good model fit is indicated by a non-significant chi-square value (Hair *et al.*, 1998). The Cox & Snell R^2 (.348) and the Nagelkerke R^2 (.493) are statistics that attempt to quantify the proportion of explained "variation" in the logistic regression model. They are similar in intent to the R^2 in a linear regression model (Norusis, 1999, p.45). The problem with the Cox & Snell measure is that it cannot achieve a maximum value of 1. Therefore, Nagelkerke (1991) proposed a modification of the Cox & Snell measure so that the value of 1 could be achieved. The final entry in Table 9.3 indicates that the model correctly classified 79.4% of the respondents as ABC adopters or non-adopters.

Because the Cronbach Alpha was less than 0.6 for the three alternative measures of support diversity, three versions of the model were tested using each of the separate measures of support diversity. Table 9.3 presents the results using support diversity (1). In the second version of the model support diversity (1) was replaced by support diversity (2) and in the third model it was replaced by support diversity (3). The p-values (one-tailed) were .015 for support diversity (2) and .121 for support diversity (3). The three separate measures of support diversity (see section 9.4) were:

1. The products/services marketed by the organisation are quite diverse;

2. Most products/services require similar resources to design, manufacture/provide and distribute (the responses were reverse coded), and

3. Costs of support department (e.g. engineering, purchasing, information processing, marketing) resources consumed by each product/service line are about the same (the responses were reverse coded)

In order to examine whether the variable 'excluding the extent of the use of lean production techniques (including JIT techniques)' was significant, the model was run for manufacturing organisations only with this variable added. The variable was significant at the 5% level (p = .044 one-tailed).

Since multicollinearity can affect the parameters of a regression model, tests for multicollinearity were undertaken. SPSS does not have an option for diagnostic statistics for logistic regression (Field, 2000). However, the tests can be undertaken by running a linear regression analysis. The tests indicated that no variance inflation factor (VIF) exceeded the threshold value of 10 (the highest VIF was 1.775) and the tolerance values indicated that collinearity does not explain more than 10% of any independent variable's variance. In addition, examining the condition indices and applying the more rigorous threshold value of 15 (Hair *et al.*, 1998) none of the indices accounted for a substantial proportion of variance (.90 or above) for two or more coefficients. Thus, no support was found for the existence of multicollinearity.

9.8 Summary of the research findings relating to factors influencing the adoption of ABC

Table 9.4 summarises the findings in respect of the two different statistical methods that have been employed. This table shows that the following variables are significant for both statistical methods:

- H4 Intensity of the competitive environment;
- H6 Size (measured in £ million);
- H7 Extent of the use of lean production techniques (including JIT techniques);
- H12 Importance of cost information;

- H13 Extent of the use of innovative/strategic management accounting techniques, and
- H14 Corporate sector.

The following variables are significant for only one of the two statistical methods reported in Tables 9.2 and 9.3:

- H2a Support diversity (1);
- H2a Support diversity (2), and
- H2b Volume diversity.

Finally, the following variables are not significant for both of the statistical methods employed:

- H1 Cost structure;
- H2a Support diversity (3);
- H3 Degree of customization;
- H8 Extent of use of total quality management approaches;
- H9 Influence in determining selling prices;
- H10 Quality of information technology, and
- H11 The extent that target costing is employed.

It should be noted that the p-values for cost structure and quality of information technology are respectively .050 and .053 for one of the statistical methods (the Mann-Whitney test) but insignificant for the second test (logistic regression).

Table 9.3:Logistic regression analysis relating to the factors influencing the adoption of ABC

	Expected sign	*B* (Logistic Coefficient)	Standard Error	One-tailed *p*-value	Exp B
Volume diversity	+	.098	.199	.312	1.103
Intensity of the competitive environment	+	-.397	.229	.041	.672
Extent of the use of total quality management approaches	+	.012	.263	.482	1.012
Quality of information technology	?	-.091	.212.	.666[a]	.913
Extent of use of innovative/strategic management accounting practices	+	.698	.230	.001	2.010
Cost structure (% of indirect costs)	+	-.005	.014	.367	.995
Importance of cost information	+	1.346	.381	.000	3.843
Influence in determining selling prices	+	-.076	.159	.317	.927
Extent that target costing is applied	+	-.060	.148	.341	.941
Degree of customisation	+	-.110	.152	.234	.895
Support diversity	+	.092	.152	.273	1.096
Financial and commercial sector dummy variable	?	2.154	.896	.016[a]	8.621
Retail and other sector dummy variable	?	-.050	.807	.950[a]	.951
Service sector dummy variable	?	.497	.654	.447[a]	1.643
Size (Annual sales in £ million)	+	.526	.227	.010	1.693
Intercept		-11.119	2.466	.000	.000
Chi-square	.000				
Hosmer and Lameshow chi-square	.597				
Cox and Snell R square	.348				
Nagelkerke R square	.493				
Per cent correctly classified	79.4%				

[a] p-value for two-tailed test is reported here since the sign is not hypothesised

Table 9.4:Summary of the statistical tests relating to ABC adoption

	Examination of the statistical differences in responses between adopters and non-adopters	Logistic regression analysis
(H1) Cost structure (% of indirect costs):	p = .050	Not significant
(H2a) Support diversity (1)	p = .014	Not significant
(H2a) Support diversity (2)	Not significant	p = .015
(H2a) Support diversity (3)	Not significant	Not significant
(H2b) Volume diversity	p = .043	Not significant
(H3) Degree of customization:	Not significant	Not significant
(H4) Intensity of the competitive environment	p = .006	p = .041
(H5a) Number of first-stage cost pools	p = .000	Not applicable
(H5b) Number of different types of second-stage cost drivers	p = .000	Not applicable
(H6) Size (£ million)	p = .011	p = .010
(H7) Extent of use of lean production techniques (including JIT techniques	p = .001	P = .045
(H8) Extent of the use of total quality management approaches	p = .053	Not significant
(H9) Influence in determining selling prices	Not significant	Not significant
(H10) Quality of information technology	Not significant	Not significant
(H11) Extent that target costing is applied	Not significant	Not significant
(H12) Importance of cost information	p = .000	p = .000
(H13) Extent of use of innovative/strategic management accounting techniques.	p = .000	p = .001
(H14) Corporate sector	p = .001	p = .016 Financial sector only

9.9 Factors influencing the successful adoption of ABC systems

In Chapter 5 (section 5.5) studies undertaken in the USA examining the factors influencing the successful adoption of ABC were described. The literature review did not identify any similar surveys undertaken outside the USA that had examined the influence of various factors on ABC success. Question B5 was used to measure ABC success. The respondents were asked to indicate on a 7-point scale how successful they considered the ABC system had been in providing improved decision-making or cost management information. The scale was anchored from '1 = not very successful' to ' 7 = totally successful' with the mid-point anchored ' moderately successful.' The mean score was 4.79 (standard deviation = 1.25) with 10% of the respondents assigning a score of less than 4 and 67% more than 4. In Question B8 the respondents were given a list of 22 statements associated with the influence of ABC success and asked to indicate the strength to which they agreed/disagreed regarding their own business unit. For each statement a 7-point scale was used anchored 1 = strongly disagree, 7 = strongly agree and 4 = neutral.

The potential explanatory variables influencing the success of ABC identified in the hypotheses developed in Chapter 6 (section 6.6) and the questions used to measure them are listed in Table 9.5. In order to compare the findings directly with Shields (1995) composite scores are not used. Where more than one question is used to capture the dimensions of a construct separate measures are used for each question. [1] Therefore, Cronbach alphas are not computed. However, factor analysis is used and the resulting factors are used for further statistical tests.

Table 9.5:Details of questions used relating to potential explanatory variables influencing ABC success

Hypothesis/ independent variables	Questions	Number of questions
H1 Non-accounting Ownership	B8 (p, q, l, m)	4
H2 Clarity of objectives	B8v	1
H3 Adequate training in implementing and operating ABC	B8 (s, t, u)	3
H4 Top management support	B8 (j, k)	2
H5 Linkage to competitive strategy, performance evaluation and compensation	B8 (o, r)	2
H6 Provision of adequate resources	B8n	1
H7 Size of the organisation	D18	1
H8 Period of time that ABC has been in operation	B2	1

[1]Shields (1995) used 17 questions to test the variables influencing ABC success and did not attempt to combine them using composite scores.

Table 9.6 presents a correlation matrix for the measure of ABC success derived from Question B5 and the 22 potential explanatory factors of ABC success. This table indicates that only one item is not significantly correlated ($p < .05$) with ABC success – item (d) in question B8 (the costs reported by the ABC system matched my intuition about the relative costs of products and services). Six items listed in Question B8 had correlations in excess of 0.5 which, according to Miles and Shelvin (2001) and Cohen (1988) represent high correlations (see section 9.5). They were:

(b) The benefits of ABC data outweigh the costs of installing (.567);

(e) Data from the ABC model provides an accurate assessment of the costs of our firm (0.739);

(f) ABC costs seem reasonable to me based on what I know about my business unit (0.631);

(g) Information from the ABC system has had a noticeable positive impact on our firm (0.620);

(k) Support for ABC in this company is widespread (0.642);

(l) The managers of this business unit understand and are knowledgeable about ABC information (0.606);

(m) Most managers are capable of using ABC information for decision making/cost management (0.583);

(u) Adequate training was provided for using ABC (0.53);

(s) Adequate training was provided for designing ABC (0.641).

(v) When ABC began its purposes were clear (.585).

Correlations are subject to a number of limitations. In particular they are subject to spuriousness whereby the relationship between two variables is not a true relationship, in that it only appears because a third variable causes each of the variables making up the pair (Bryman and Cramer; 1999, p.236). To overcome the fact that many of the variables listed in Question B8 are related to each other, multiple regression analysis is used to enable the impact of a specific variable to be isolated with the remaining variables controlled (i.e. partialled out). The factors/variables measured by the 22 statements in Question B8 were entered as independent variables into a regression model with ABC success derived from Question B5 as the dependent variable. Because the output of the initial model indicated that the variance inflation values for the training variables exceeded the maximum threshold value, the absence of multicollinearity could not be assured. Therefore, a single training variable representing the average score for the three training variables was entered into the model.

Table 9.6: Correlation coefficients of ABC success and factors influencing ABC success (Spearman)

	B5	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v
(B5) Success of ABC system	1																						
(a) ABC is the right tool to manage costs and improve the accuracy of reported costs	.47**	1																					
(b) The benefits of ABC data outweigh the costs of installing	.57**	.49**	1																				
(c) In general ABC is a good thing for our company	.40**	.46**	.45**	1																			
(d) The reported costs matched my intuition	.15	-.26*	.08	.25	1																		
(e) Data from the ABC model provides an accurate assessment of costs	.73**	.45**	.42**	.46**	.12	1																	
(f) ABC costs seem reasonable based on what I know about my unit (Reverse coded)	.63**	.40**	.52**	.20	.03	.53**	1																
(g) Information from the ABC system has had a noticeable positive impact	.62**	.26	.53**	.42**	.32*	.60**	.40**	1															
(h) Information from the ABC system is widely used within our firm (Reverse coded)	.27*	.09	.34**	.28*	-.05	.15	.14	.44**	1														
(i) Information from the ABC system is widely used for special cost studies	.32*	.06	.32*	.27*	.13	.25	.13	.33*	.39**	1													
(j) ABC receives strong active support from top managers	.47**	.17	.41**	.06	.06	.36**	.33*	.51**	.31*	.25	1												
(k) Support for ABC in this company is widespread	.64**	.11	.36**	.24	.12	.52**	.3*	.52**	.36**	.23	.61**	1											
(l) The managers are knowledgeable about ABC information	.61**	.14	.24	.25	.22	.58**	.31*	.49**	.35**	.18	.52**	.68**	1										
(m) Most managers are capable of using ABC information for decision-making/cost reduction.	.58**	.14	.19	.16	-.01	.48**	.37**	.42**	.42**	.21	.48**	.54**	.80**	1									
(n) Upper management provided adequate resources for implementation and operation of ABC	.33**	.14	.33**	12	-.03	.23	.28*	.24	.11	-.18	.38**	.30*	.26	.31*	1								
(o) ABC has been closely tied to the competitive strategies	.46**	.16	.38**	.09	.01	.33*	.29*	.53**	.40**	.11	.58**	.55**	.47**	.41**	.48**	1							
(p) Departments outside accounting have shown interest in supporting ABC's success	.50**	.26*	.39**	.26	.00	.33*	.40**	.43**	.21	.23	.64**	.52**	.38**	.40**	.43**	.57**	1						
(q) The ABC implementation team was truly cross functional	.28*	.14	.24	-.03	.12	.19	.29*	.28*	.04	.23	.40**	.28*	.18	.24	.33*	.47**	.53**	1					
(r) ABC data has been linked to performance evaluations of non-accounting personnel	.37**	-.02	.24	.01	.18	.21	.29*	.18	.18	.15	.21	.22	.29*	.34*	.31*	.48**	.30*	.51**	1				
(s) Adequate training was provided for designing ABC	.64**	.38**	.34**	.23	-.03	.58**	.40**	.40**	.16	.39**	.21	.40**	.41**	.45**	.28*	.42**	.33*	.47**	.29*	1			
(t) Adequate training was provided for implementing ABC	.43**	.40**	.38**	.10	-.12	.29*	.41**	.23	.08	.16	.18	.23	.28*	.29*	.46**	.40**	.28*	.44**	.35**	.83**	1		
(u) Adequate training was provided for using ABC	.53**	.23	.18	.22	-.00	.35**	.30*	.28*	.16	.25	.15	.28*	.45**	.62**	.17	.21	.16	.27*	.21	.7**	.62**	1	
(v) When the ABC initiative began, its purposes were clear	.59**	.32*	.40**	.20	-.03	.37**	.44**	.15	.18	.17	.18	.28*	.30*	.31*	.47**	.28*	.17	.17	.40**	.54**	.56**	.40**	1

** Correlation significant at .01 level (2-tailed); * Correlation significant at .05 (2-Tailed)

Table 9.7 reports the output from the model. Appropriate tests were undertaken for multicollinearity as described in section 9.7 for logistic regression. The variance inflation factors (see VIF's in Table 9.7) and the collinearity diagnostics indicated that multicollinearity was not present. Table 9.7 shows that the model is significant and explains 81% of the variation in ABC success. The following six variables provided statistically significant ($p < .05$) explanations of ABC success:

- (a) ABC is the right accounting tool in our firm to help us in managing our costs and improving the accuracy of reported product/service costs;
- (k) Support for ABC is widespread in this company;
- (q) The ABC implementation team was truly cross-functional;
- (r) ABC has been linked to performance evaluations of non-accounting personnel;
- (s) Adequate training was provided for designing, implementing and using ABC; and
- (v) When the ABC initiative began, its purposes were clear.

Three items in the above list were also significant variables in Shield's study : (r) the link to performance evaluation, (q) non-accounting ownership and (s) the provision of adequate training. However, the remaining specific three variables in Shield's study of (j) top management support, (o) integration with competitive strategies and the (n) provision of adequate resources were not significant variables in the multiple regression model and were not ranked within the sixth highest correlation rankings.

It could be argued that points (a) to (i) in Question B8 listed in Table 9.7 represent measures rather than explanations of success. However, only one item within this range (item a) is listed above as significant within the multiple regression model. To examine the impact of including items (a) to (i) in the multiple regression model the analysis was performed without these items. Thus, only items (j) to (v) in Question B8 were included in the second regression analysis. All of the above listed items k, q, r, v, and s were still significant. In addition, item (p) 'departments outside accounting have shown an interest' was significant. Including all of the three training variables in this model did not result in any multicollinearity problems so the model included each training variable. Only adequate training for designing ABC (item s) was significant ($p = .013$, one-tailed). The two training variables for implementation and using ABC were not significant.

To ascertain whether there were any patterns in the degree of factors being present in the responses to the 22 statements listed in Question B8, factor analysis with Varimax rotation was used. The factor analysis (see Table 9.8) identified six factors with Eigenvalues greater than 1 that in total explained 73 percent of the variation in the 22 variables listed in the statements. The six components listed in Table 9.8 are labelled as follows:

Component 1 - Managerial understanding and ability to use ABC information;

2 - Positive attitudes by accounting staff towards ABC;

3 - Broad-based organisational support;

4 - ABC adequate training and a clear understanding of its purposes;

5 - Widespread use of information throughout the firm, and

6 - Reported costs matched the accountants' intuition of the reported costs.

It can be seen that items (a) to (i) referred to above load on to three factors (1,5 and 6) that do not include any of items (j) to (v).

A further multiple regression analysis was performed to ascertain which of the six factors from the factor analysis identified in Table 9.8 provided statistically significant explanations of ABC success. The output of the regression model is shown in Table 9.9 The regression model was significant and the adjusted R^2 indicated that the model explained 77% of the variance in ABC success. Factors 1, 2 and 4 provided statistically significant explanations of ABC success ($p < .01$). In other words, ABC success increased with increases in managerial understanding and ability to use ABC information, positive attitudes by the accounting staff towards ABC, training in ABC and a clear understanding of its purposes.

Finally, statistical tests were performed to ascertain whether ABC success was related to firm characteristics, such as size and cost structure, or any of the contextual and other factors influencing ABC adoption listed in Table 9.3 (e.g. the extent of the use of TQM, importance of cost information etc.). In addition, the period that ABC had been in operation was included in the analysis. At the 5% level ABC success was positively correlated (Spearman) with the period that ABC had been in operation ($r = .328$), the importance of cost information ($r = .300$) and the extent of JIT usage ($r = .532$). ABC success was also found to be negatively correlated with the percentage of indirect costs in the cost structure ($r = -.338$) at the 1% level. A multiple regression analysis was also performed with ABC success as the dependent variable and the items influencing ABC adoption listed in Table 9.3 as the independent variables. None of the variables was significant. Also, the regression model was not significant at the 5% level. The adjusted R^2 was .132. The variables were also entered into a step-wise model that resulted in a model of two significant variables. They were the importance of cost information (Standardised beta coefficient = .338, $p < .01$) and the percentage of indirect costs in the cost structure (Standardised beta coefficient = .288, $p < .01$). The other relevant statistics for the model were adjusted $R^2 = .132$, $F = 8.139$, Sig. = .001.

Table 9.7:Regression analysis for variables influencing ABC success (Dependent variable = B5)

	Unstandardised coefficients		Standardised coefficients		One tailed	VIF
	B	Std. Error	Beta	t-value	p-value	
Constant	-1.101	.772		-1.428	.162	
(a) ABC is the right tool to manage costs and improve the accuracy of reported costs	.261	.132	.229	1.981	.027	3.923
(b) The benefits of ABC data outweigh the costs of installing	.110	.105	.122	1.053	.144	3.937
(c) In general ABC is a good thing for our company	-.020	.100	-.024	-.237	.203	3.002
(d) The reported costs matched my intuition	.056	.091	.052	.620	.270	2.099
(e) Data from the ABC model provides an accurate assessment of costs	.067	.118	.060	.573	.285	3.235
(f) ABC costs seem reasonable based on what I know about my unit (Reverse coded)	.104	.094	.091	1.108	.137	1.956
(g) Information from the ABC system has had a noticeable positive impact	.152	.092	.180	1.650	.054	3.493
(h) Information from the ABC system is widely used within our firm (Reverse coded)	-.074	.067	-.101	-1.118	.135	2.377
(i) Information from the ABC system is widely used for special cost studies	-.033	.072	-.042	-.472	.318	2.281
(j) ABC receives strong active support from top managers	.017	.081	.022	.213	.416	3.029
(k) Support for ABC in this company is widespread	.308	.087	.356	3.533	.001	2.972
(l) The managers are knowledgeable about ABC information	-.073	.115	-.084	-.643	.262	5.044
(m) Most managers are capable of using ABC information for decision-making/cost reduction.	.097	.089	.127	1.091	.141	3.981
(n) Upper management provided adequate resources for implementation and operation of ABC	-.115	.073	-.129	-1.570	.062	1.967
(o) ABC has been closely tied to the competitive strategies	-.085	.076	-.108	-1.125	.134	2.675
(p) Departments outside accounting have shown interest in supporting ABC's success	.081	.069	.111	1.192	.120	2.523
(q) The ABC implementation team was truly cross functional	-.115	.070	-.159	-1.635	.048	2.774
(r) ABC data has been linked to performance evaluations of non-accounting personnel	.102	.055	.150	1.859	.035	1.906
(s) Training (average score)	.188	.088	.211	2.137	.019	2.867
(v) When the ABC initiative began, its purposes were clear	.161	.072	.192	2.229	.016	2.178
Adjusted R^2	.809					
F	12.845					
Significance	.000					

Table 9.8: Factor analysis rotated component matrix (Factors influencing ABC success)

	Component					
	1	2	3	4	5	6
(l) The managers understand and are knowledgeable about ABC information	.857					
(m) Most managers are capable of using ABC information for decision-making/cost reduction.	.829					
(k) Support for ABC in this company is widespread	.703					
(a) ABC is the right tool to manage costs and improve the accuracy of reported costs		.780				
(c) In general ABC is a good thing for our company		.768				
(b) The benefits of ABC data outweigh the costs of installing		.760				
(e) Data from the ABC model provides an accurate assessment of costs		.565				
(g) Information from the ABC system has had a noticeable positive impact		.473				
(f) ABC costs seem reasonable based on what I know about my unit (Reverse coded)		.459				
(q) The ABC implementation team was truly cross functional			.782			
(r) ABC data has been linked to performance evaluations of non-accounting personnel			.650			
(o) ABC has been closely tied to the competitive strategies			.638			
(p) Departments outside accounting have shown interest in supporting ABC's success			.627			
(j) ABC receives strong active support from top managers			.563			
(n) Upper management provided adequate resources for implementation and operation of ABC			.552			
(s) Adequate training was provided for designing ABC				.833		
(u) Adequate training was provided for using ABC				.811		
(t) Adequate training was provided for implementing ABC				.804		
(v) When the ABC initiative began, its purposes were clear				.507		
(i) Information from the ABC system is widely used for special cost studies					.822	
(h) Information from the ABC system is widely used within our firm (reverse coded)					.678	
(d) The reported costs matched my intuition						.903
Eigen values	3.45	3.27	3.21	2.95	1.83	1.36
Percentage of variance explained	37.60	9.70	8.30	6.80	5.50	5.30

Table 9.9: Regression analysis on factors derived from the factor analysis influencing ABC success (Dependent variable = B5)

	Unstandardised coefficients		Standardised coefficients	t-value	One tailed p-value	VIF
	B	Std. Error	Beta			
Constant	-1.029	.565		-1.822	.074	
Factor 1 - Managerial understanding and ability to use ABC information	.302	.083	.320	3.630	.000	1.919
Factor 2 - - Positive attitudes by accounting staff towards ABC	.674	.119	.513	5.650	.000	2.034
Factor 3 - Broad-based organisational support	- .001	.089	-.001	-.010	.486	1.739
Factor 4 - ABC adequate training and a clear understanding of its purposes	.276	.079	.285	3.489	.000	1.650
Factor 5 - Widespread use of information throughout the firm	-.087	.068	-.097	-1.287	.102	1.417
Factor 6 - Reported costs matched the accountants' intuition of the reported costs	-.003	.070	-.003	-.051	.480	1.050
Adjusted R^2	.773					
F	32.850					
Significance	.000					

9.10 Summary of the research findings relating to factors influencing ABC success

In terms of the hypotheses presented in Chapter 6 (section 6.6) and summarised in Table 9.5, two of the questions relating to the first hypothesis - non-accounting ownership (represented by items l and m), had high significant correlations and one of the questions (item q) was significant in the multiple regression analysis. The clarity of objectives hypothesis (H2), represented by item (v), had a significant high correlation and was also significant within the multiple regression analysis. The variables for the third hypothesis relating to adequate training (s, t and u) also had high correlations and were significant in the multiple regression analysis. However, the findings suggested that training for designing ABC was the most important variable in influencing ABC success and training for implementing ABC was the least important. Both the correlation coefficients and the multiple regression analysis supported the fourth hypothesis (top management support) using the variable ' support for ABC in this company is widespread' as measured by item (k). However, the more specific measure ' ABC receives strong support from top managers', as measured by item (o) was not strongly supported by any of the statistical tests. For hypothesis 5(b) relating to linkage to performance evaluation (item r) there was a modest significant correlation (0.37) but the variable was significant in the multiple regression analysis. However, for hypothesis 5(a) relating to the linkage to competitive strategy (item o), the variable was not significant within the multiple regression analysis. The final hypothesis relating to the organisational factors (H6) concerning the provision of adequate resources was not significant within the multiple regression analysis and also did not have a high correlation coefficient.

For the hypotheses relating to contextual variable (size) and ABC characteristics (period that ABC had been in operation) there was no evidence to support size and only weak evidence to support the period that ABC had been in operation. In summary, the findings provided strong evidence to indicate that non-accounting ownership (H1), clarity of objectives (H2), adequate training (H3) and linkage to performance evaluation (H5b) influence ABC success. The findings provided weaker evidence, in terms of significant modest correlation coefficients, to support top management support (H4), linkage to competitive strategy (H5a) and provision of adequate resources (H6). The findings also supported Shield and Young's (1989, 1994) claims that organisational factors are more important than contextual factors in influencing the success of ABC systems.

9.11 Summary/conclusion

This chapter has described how the variables have been measured and justified the use of the various statistical tests that have been used to test the hypotheses. Because different statistical tests are subject to several weaknesses, different tests were used to ascertain how sensitive the results are to the different tests. Given that the findings relating to factors influencing the adoption of ABC were summarised in section 9.8 and those relating to factors influencing the success of ABC in section 9.10, they are not summarised again here. This chapter has concentrated on presenting the research findings and no attempt has been made to discuss them. A discussion of the major research findings will be presented in the next and final chapter.

CHAPTER 10

CONCLUSION

CHAPTER 10

CONCLUSION

10.1 Introduction

This chapter begins with a summary and discussion of the research findings. The summary and discussion section contains six sub-sections each relating to one of the six objectives specified in Chapter 1. This is followed by a section that describes the distinguishing features and contribution of the research. The limitations of the study are discussed in the next section and, in the final section, areas for future research are identified and discussed.

10.2 Summary and discussion of the major research findings

The objectives of this study were listed in Chapter 1 (section 1.4) and chapter 6 (section 6.3). They were:

1. To examine the nature, content and purposes of costing systems operated by UK organisations;

2. To examine the importance of specific motives for implementing ABC systems; in particular the extent to which the four perspectives that are described in Chapter 4 (efficient choice, forced selection, fad and fashion perspectives) explain the diffusion of accounting innovations (with specific focus on ABC as the accounting innovation);

3. To determine the reasons and factors which have discouraged firms from adopting ABC;

4. To examine the extent to which other accounting innovations and strategic management accounting practices are associated with the adoption/non-adoption of ABC systems;

5. To investigate the extent to which the different potential explanatory variables influence the adoption of ABC systems; and

6. To ascertain the views of the respondents on the degree of success or failure of ABC systems; and the impact of various factors on the determinants of that success.

The findings relating to each of the above objectives are summarised and discussed in the following sub-sections.

10.2.1 The nature, content and purposes of costing systems

The following summary describes the major research findings:

- There was a statistically significant difference in the cost structures for the different business sectors. For the manufacturing sector direct and indirect costs represented on average 75% and 25% of total costs respectively. In contrast, indirect costs accounted for 51% in the financial and commercial sector and 32% in the service sector.

- 36% of all organisations either had no formal costing system or operated a direct costing system and did not assign indirect costs to products/services. An analysis of responses by size indicated that, for organisations with an annual sales turnover of less than £100 million,the corresponding percentage was 53%.

- 29% of all organisations have implemented an ABC system but the analysis by size and business sector indicated an adoption rate of 43% for the larger organisations (annual sales turnover in excess of £300 million) and 68% for the financial and commercial sector[1]. The adoption rate was 20% for the manufacturing sector.

- Only 5% of those organisations that operated absorption costing systems used very simplistic approaches (i.e. blanket overhead rates) to assign indirect cost to products/services.

- Approximately 50% of manufacturing organisations did not assign non-manufacturing indirect costs to products for decision-making.

- The number of cost pools and cost drivers used by ABC users was significantly less than that envisaged by Kaplan and Cooper (1998). They refer to simple ABC systems as having 30-50 first stage cost pools and many second stage cost drivers. Only 19 of the 46 ABC users had more than 30 cost pools and 5 different types of cost drivers.

- In terms of the respondents' satisfaction with the accuracy of their costing system ABC users attributed a statistically significant higher rating than non-users. The mean score for the ABC users was towards the 'extremely satisfied' end of the scale, whereas for non-users the mean score was towards the 'not very satisfied' end of the scale.

- In addition to the respondents that had adopted ABC, a further 24% of all of the respondents stated that activity analysis was undertaken but the activities were not costed.

- 85% of ABC users used ABC to both assign costs to products/services for decision-making and cost control/cost management purposes.

- ABC was used for many different purposes but profitability analysis and cost reduction/cost management represented the most frequent applications. Stock valuation and design stage use for new products/services were the least widely used applications. In terms of the importance attributable to ABC information for different purposes profitability analysis was considered to be the most important

[1]The ABC adoption rate of 29% is likely to represent an over estimate. See Chapter 8 (section 8.4) for an explanation.

and product/service discontinuation decisions and new product/service introduction decisions were considered to be the least important.

- 63% of ABC users had implemented it within the last 5 years. Of those respondents that had operated ABC for more than 5 years, 77% used it as the sole costing system.

- 9% of the respondents considered ABC to have been less than moderately successful and 67% considered it to be greater than moderately successful.

The findings relating to the cost structures of the different business sectors indicate that on average 75% of the total costs in manufacturing organisations are direct. Thus, many manufacturing companies are likely to be able to accurately assign a large proportion of costs to products even with very unsophisticated costing systems. The findings partially support Kaplan and Cooper's (1998) comments that manufacturing companies can directly trace important components of costs to products and that service companies have a greater need for more sophisticated costing systems because they have a greater proportion of indirect costs. However, they state that 'virtually all of their costs are indirect' (p.231). Based on the current findings this represents an overstatement of the situation and to be more applicable to one type of service organisation: finance and commercial organisations. For other types of service organisations, indirect costs on average represented only 32% of total costs. Service organisations comprise many different types of organisations and there is likely to be a wide variation in their cost structures. Reference to Table 8.2 in Chapter 8 indicated that, compared with other sectors, the service sector had the highest standard deviation.

Without undertaking any statistical analysis the findings would seem to suggest that a considerably higher proportion of financial and commercial organisations have implemented ABC systems because they have the largest proportion of indirect costs. Similarly, manufacturing organisations have the lowest ABC adoption rate but they also have the lowest proportion of indirect costs. Although some writers have suggested that relatively few companies have adopted ABC (Gosselin, 1997) and that the rate of implementation has been slow (Langfield-Smith, 1998), the adoption rates are fairly high when smaller organisations are excluded from the analysis. Table 8.4 in Chapter 8 indicated that the adoption rate for larger organisations was 43%. The prospects for smaller organisations implementing ABC would seem to be small. Approximately 50% of the organisations with an annual sales turnover did not assign indirect costs to products/services. They either did not operate a formal costing system or operated a direct costing system. For these organisations, moving from a situation where they have either no costing system, or a direct costing system, to implementing an ABC system is likely to represent a major change and a large incremental investment in staff resources.

External financial accounting regulations require that manufacturing companies only assign manufacturing costs to products for stock valuation and profit measurement. Assignment of indirect costs is required for decision-making but the findings indicated that approximately 50% of manufacturing organisations do not assign indirect non-manufacturing costs for decision-making. Possible reasons for this are that Johnson and Kaplan's claim that management accounting is dominated by financial accounting applies and that the same rules are applied for accumulating costs for both decision-making and stock valuation. Alternatively, non-manufacturing costs may represent a relatively low proportion of total costs or most of them may fall within the facility-sustaining category. Therefore, assigning such costs may not be justifiable on costs versus benefits grounds. A final reason is that they are informally taken into account by ensuring that profit margins are high enough to cover a fair share of indirect costs. To ascertain the reasons why some companies assign non-manufacturing costs and others do not, interview or case study research is required.

The findings indicate that those organisations that have implemented ABC are generally satisfied with it although it is surprising that approximately 20% (n = 4) of those organisations that had implemented it for more than 5 years did not use it as their sole costing system. Further analysis indicated that the organisations were not within the manufacturing sector so it was not a case of manufacturing organisations using more simplistic systems for stock valuation. There was a statistically significant difference between the responses of ABC users and non-users in terms of satisfaction with the accuracy of the reported costs. However, care should be exercised in interpreting the responses since the ABC respondents are likely to have been heavily involved in the decision to implement ABC and they are likely to have been heavily committed to it. It would have been more meaningful to have obtained responses on the satisfaction with ABC from the users rather than the management accountants.

In terms of the applications of ABC, the findings indicated that ABC is no longer used just as a means for producing more accurate product/service costs that was promoted as the justification for originally implementing ABC in the late 1980s and early 1990s. Most companies use ABC for both decision-making and cost management. Profitability analysis and cost reduction/cost management were the most frequent applications. For the importance attributable to ABC information, profitability analysis was considered to be the most important and product discontinuation decisions the least important. A possible interpretation of this finding is that ABC information is used for routine attention-directing profitability analysis to identify potentially unprofitable products. If many unprofitable products are not identified, ABC information will have little importance for discontinuation decisions. Even when unprofitable products are identified, other information besides cost information will be important for making discontinuation decisions. For example, in Question D13 (e) approximately 40% of ABC users assigned a score of 6 or 7 on a scale of 1 = strongly disagree to 7 = strongly agree (with the mid-point anchored 'neutral') to the statement that product/service introduction, discontinuation and mix decisions are based on strategic decisions rather than reported costs/profitability. The mean score was 4.89.

The findings provide some support for Malmi's observation (see section 5.6 in Chapter 5) that ABC information is used as surveillance function for searching for surprises. He observed in the companies that he studied that top management needed interactive control systems to monitor the strategic uncertainties they believe are critical to achieving organisational goals. Thus, profitability analysis may be used for these purposes. The findings also support Cooper's (1997) claims (see section 3.8.2 in Chapter 3) that the major role of ABC is to develop profitability maps (i.e. periodic profitability analysis) that are used for attention-directing purposes. He argues that a major attribute of ABC is that they provide more accurate profitability analysis information than traditional costing systems.

10.2.2 The motives for implementing ABC systems

The dominant motives for implementing ABC in order of ranking were:

1. The existing system did not provide useful information to management;

2. It was necessary to update the existing costing information system, and

3. The existing costing system was not reliable.

The three lowest rankings were:

1. Other units within the company had benefited from implementing ABC;

2. The competitors were using ABC; and

3. Advice from parent or headquarters.

The dominant motives for implementing ABC, therefore, related to the deficiencies of the existing system and the least important motives were concerned with fad/imitation motives. The results were analysed by the time periods that ABC had been in operation to ascertain whether the motives for adoption varied over time. The findings did not provide any strong evidence to suggest that motives change over time.

The findings suggested that motives within the efficient choice category were the dominant motives and those within the fashion/fad and forced selection categories were not considered to be important. There was little evidence to support Malmi's (1999) findings that the driving force for accounting change resides outside the group of adopting organisations. It is possible that the research method has overstated the efficient choice as being the dominant perspective. Reference to Table 8.13 indicates that the respondents were given a choice of eight efficient choice, three fad/fashion and two forced selection motives. Thus, there was a greater chance of some of the motives within the efficient choice category being rated towards the 'vitally important' end of the scale. However, four out of the five fad/fashion or forced selection motives were ranked the lowest of the 13 motives and towards the 'very unimportant' end of the scale for the individual questions. Also, it may be inappropriate to ask the respondents to list the motives for adoption several years after the event particularly if they were not involved in the decision to adopt ABC. Furthermore, the respondents may consider fad/fashion behaviour as irrational and seek to explain their, or their predecessors' behaviour as rational after the event. Therefore, care must be taken in interpreting the importance scores assigned by the respondents for each of the potential motives for implementing ABC.

10.2.3 The reasons or factors that have discouraged firms from adopting ABC

The respondents were given 20 statements (see Table 8.14) and asked to indicate the extent to which they agreed with the statements relating to the reasons for their business units not implementing ABC. In order of ranking the five items that the respondents most strongly agreed with were:

1. The perceived benefits of ABC do not justify the cost of implementing it;

2. The control of overheads is already adequate;

3. Most of the costs in our business unit are fixed;

4. Insufficient support from top management;

5. Lack of individuals to act as champions to support the introduction of ABC.

The items that they most strongly disagreed with were:

1. Resistance to change by the accounting function (rank 17);

2. ABC has never been considered because most of the accounting staff do not understand the concept (rank 18);

3. The relatively small size of our firm does not justify implementing an ABC system (rank 19);

4. We do not operate in a very competitive environment so an ABC system is not required (rank 20).

The most important reason for not implementing ABC is that the perceived benefits do not justify the cost of implementing it. The strong agreement with the statement that most of the costs of the business unit are fixed provides further support that meeting the costs versus benefits test is an important reason for not implementing ABC. Other important reasons for not implementing ABC were that the existing system is considered to be satisfactory for controlling overheads and a .general lack of support from top management or for individuals to act as champions. The lack of knowledge by the accounting staff and the resistance to change by the accounting function do not appear to be important factors inhibiting the adoption of ABC. However, because the responses were given by management accountants, there is a possibility that their replies were biased because of their unwillingness to admit to these two reasons being important in the decision not to implement ABC systems.

The agreement with the statement that 'the control of overheads is already adequate' suggests that many respondents have not implemented ABC because they are satisfied with their existing costing systems. However, it was also noted that the main reasons for implementing ABC related to dissatisfaction with existing costing systems. A more detailed study of the factors that cause some of the respondents to be satisfied with traditional systems and not to implement ABC and others to implement ABC because of their dissatisfaction with their existing systems would seem to be appropriate based on the findings of this study. It is likely that more meaningful results would be obtained from case studies of a small number of companies rather than a large scale survey.

The ABC adopters were asked within one of the questions relating to the factors influencing ABC success (Question B8b) whether the benefits of ABC outweighed the costs of installing the system. There was strong agreement for this statement with 80% assigning a score above the neutral level (mean = 5.66). This contrasts with the strong agreement score for the non-adopters that the benefits of ABC do not outweigh the costs of implementing it. The findings, therefore, support those of Innes *et al.* (2000), that while the ABC users considered that the financial benefits outweighed the costs, the opposite view was common among non-users. The experience of using ABC does appear to influence perceptions of its worth.

Finally, it was pointed out above that, for the potential reasons for not implementing ABC, there was strong agreement with the statements that there was insufficient support from top management and a lack of individuals to act as champions. It is possible that these reasons are side-effects arising from other reasons rather than being the direct reasons for non-implementation. For example, if the benefits of ABC were considered to exceed the costs, top management support and the presence of champions may have been prominent but the absence of 'such factors' resulted in a lack of top management support or champions for implementing ABC.

10.2.4 The extent to which other accounting innovations and strategic management accounting practices are associated with the adoption of ABC systems

The research findings indicated that there was a statistically significant higher usage rate for ABC adopters compared with non-adopters for each of the following accounting innovations or strategic management accounting practices:

- Value chain analysis;
- Shareholder value analysis;
- Benchmarking of processes and activities with outside organisations;
- Performance measurement based on the balanced scorecard;
- Competitor cost assessment; and

- Strategic costing.

The only accounting innovation for which there was no significant differences between ABC adopters and non-adopters was target costing. The findings, therefore, seem to indicate that some organisations tend to be more innovative in terms of using accounting innovations, whereas others tend to be less innovative. However, it is possible that the findings may be due to spurious relationships whereby the relationship between ABC adoption and the use of innovative/strategic techniques appears because another variable (e.g. size) is the cause of both variables. To account for such potential spurious relationships logistic regression was used with the other variables controlled. The findings reported in the next section using logistic regression suggest that there is a positive relationship between ABC usage and innovative or strategic management accounting techniques. This positive relationship is measured using a composite measure for innovative/strategic management accounting techniques rather than examining each individually, as previously.

10.2.5 The influence of potential explanatory variables on the adoption of ABC

In Chapter 6 (section 6.6), the literature was drawn off to develop hypotheses influencing the adoption of ABC. Two types of statistical tests were used : tests that compare if there is a statistically significant difference between the scores of ABC adopters and non-adopters for the identified explanatory variables and logistic regression. The former has the disadvantage of not controlling for the impact of 'other variables', whereas the latter suffers from the disadvantage that, ideally, the explanatory variables should be measured on an interval scale. To overcome the disadvantage that neither measure is perfect, the results were analysed using both types of statistical tests. The following variables were statistically significant for both statistical tests:

- Intensity of the competitive environment;
- Size (measured in £ million sales turnover);
- Extent of the use of lean production techniques (including JIT techniques);
- Importance of cost information;

- Extent of the use of innovative/strategic management accounting techniques, and
- Corporate sector.

The following variables are significant for only one of the two statistical methods:

- Support diversity, and
- Volume diversity.

Finally, the following variables were not significant for both of the statistical methods employed:

- Cost structure;
- Degree of customisation;
- Extent of use of total quality management approaches;
- Influence in determining selling prices;
- Quality of information technology, and
- The extent that target costing is employed.

With the exception of the variable 'intensity of the competitive environment' all of the statistically significant variables were in the predicted direction. The Mann-Whitney test examined the difference between the scores for intensity of competition for ABC adoption and non-adoption. There was a statistically higher level for the 'intensity of competition' score for the ABC users compared with non-users. However, for the logistic regression test the coefficient sign for 'intensity of competition' was negative, thus indicating that, as the variable increases, an organisation is less likely to adopt ABC. It would appear that when all of the other variables outlined above are 'controlled for' the negative relationship emerges but when the non-parametric test is used the relationship is positive. A possible explanation for the negative relationship is that firms facing strong competition might be more cost conscious and reluctant to invest in costly accounting systems when it cannot be clearly demonstrated that such investments will yield positive short-term returns. In contrast, firms facing less competition may have more resources to explore new innovations, such as fashions or fads. Another possible explanation is that barriers to entry for firms operating in a simple environment may be less than those operating in a more complex environment. Thus, because ABC can better capture the costs of complexity it may be more likely to be adopted by firms operating in a more complex but less competitive environment. Whether a negative relation actually exists or is due to some deficiency in the statistical tests would appear to be an appropriate area for investigation. Given that the directional results of the two statistical tests conflict, no attempt will be made to justify the negative relationship from one of the tests.

Difficulties applied in measuring support diversity. Three questions were used but no combination of questions produced an acceptable Cronbach Alpha score. Therefore, the responses for each question were used separately. One question was significant with the Mann Whitney test but not with the logistic regression test. For the second question the measure was significant with the logistic regression test but not for the Mann Whitney test. Both tests were insignificant when the third question was used as a measure. The lack of consistency in the statistical tests and the difficulty in finding a reliable composite measure suggests that there is a need to develop better measures of support diversity.

The firm's cost structure was not significant for either statistical test although it was significant at the 10% level when the differences between the percentage of indirect costs was examined for ABC adopters and non-adopters. The fact that cost structure was not significant at the 5% level is surprising, given that the literature suggests that companies with high indirect costs should implement sophisticated ABC systems. Cost structure has been examined in previous surveys to ascertain whether it influenced the adoption/non-adoption of ABC systems. In common with this study, the previous studies found that cost structure was not a significant variable. It is possible that this, and other studies, have used an inappropriate measure of cost structure. In this study cost structure was measured by indirect costs as a percentage of total costs. It would have been preferable to measure cost structure by the percentage of indirect costs that can be more accurately assigned to cost objects using ABC and which fluctuate in the longer-term according to the demand for them. Thus, a more appropriate measure of cost structure should exclude infrastructure or facility-sustaining costs since there would have to be a dramatic change in activity before the cost of supplying these resources would be affected by changes in demand for them.

It is also surprising that the extent of use of target costing was not a significant explanatory variable. It was pointed out in the hypothesis development that target costing provides the opportunity to manage costs at the product/service design stage and the importance of it being supported by an accurate costing system based on cause-and-effect cost drivers. Only one question was used to measure the extent of target costing so it is possible that measurement problems arising from the use of a single measure did not produce a sufficiently accurate measure of the extent of the use of target costing. Future research should seek to develop composite measures that result in high reliability scores. It is also possible that most target costing exercises focus mainly on managing direct costs, particularly if it is applied mainly in manufacturing organisations where direct costs are the dominant costs. Under these circumstances the extent of target costing usage is unlikely to influence the type of absorption costing system operated.

10.2.6 Factors influencing the success of ABC systems

Two statistical tests were used to measure the extent to which ABC success was influenced by 22 potential explanatory factors. They were correlation coefficients and multiple regression analysis. The latter involved the responses from the 22 statements being entered as independent variables into a regression model with ABC success (derived from a 7-point measure) representing the dependent variable. The following variables had high statistically significant correlations ($r < .05$) and were also significant ($p < .01$) in the multiple regression model:

- Support for ABC is widespread in this company;
- Adequate training was provided for designing ABC;
- When ABC began its purposes were clear.

The first item above represents can be interpreted as representing a measure of either top management support or non-accounting ownership, the second item is self-explanatory and the third item represents clarity of objectives.

In order to provide a more meaningful interpretation of the 22 statements, factor analysis was used and six factors were extracted that explained 73% of the variation in the 22 statements. The composite scores for the six factors were entered as independent variables into a multiple regression model with ABC success representing the dependent variable. Three factors were significant at the 1% level. They were:

- Managerial understanding and ability to use ABC information;
- Positive attitudes by accounting staff towards ABC;
- ABC adequate training and a clear understanding of its purposes.

The findings also indicated that the contextual factors had little impact on ABC success and supported Shields and Young's (1989, 1994) claims that organisational factors are more important than contextual factors in explaining ABC success. However, three of the variables identified by Shields (1995) as influencing ABC success - top management support, integration with competitive strategies and provision of adequate resources were not strongly supported in this study.

10.3 Distinguishing features and contribution of the research

The factors that prompted the researcher to undertake further ABC research also represent some of the distinctive features of the research. Most of the previous studies that have examined factors influencing the adoption of ABC (see Table 5.4 in Chapter 5) have defined adoption in questionable ways. Adoption has often been defined as 'implemented or wishing to implement ABC'. The general impression is that, because the sample of ABC users has been small, researchers have had to broaden their definition of the term 'adoption' to establish a large enough sample to undertake statistical tests. Because a greater number of firms have now implemented ABC, this research has had the opportunity to obtain a sufficiently large sample by defining adoption as representing actual implementation. This is considered to be a more appropriate measure to explain the factors influencing the adoption of ABC than the measures used in previous studies.

Most of the previous studies have relied on the respondents self-rating their systems as ABC or non-ABC. It can be difficult to establish the dividing line where a traditional system becomes an ABC system and, in Chapter 6 (section 6.2), it was pointed out that some respondents' claims that their organisations are operating ABC systems are questionable. A distinguishing feature of this study was that several control questions were included in the questionnaire to check the respondents' claims that they were operating ABC systems. Where the responses to the control questions did not match the researcher telephoned the respondents to clarify their responses. Therefore, compared with previous studies, there is a much higher probability with this study that those respondents claiming to use ABC were actual ABC users.

Another limitation of the previous research that this study has attempted to resolve relates to the use of measures of independent variables derived from a single question. This research has sought to improve the measures used for the independent variables by using a composite score derived from aggregating the scores for multiple questions and subjecting these measures to appropriate reliability checks. Thus, compared with previous studies, the research findings from this study should be subjected to less measurement error for both the dependent and independent variables.

Previous studies that have examined the factors influencing the adoption of ABC have generally used bivariate statistical tests to examine whether the difference between the scores for explanatory variables for ABC adopters and non-adopters is statistically significant. There is a danger of the results being contaminated by spurious relationships when bivariate tests are used. There is a need for tests to be undertaken using higher powered multivariate statistical tests that control the impact of the other factors that have been identified as potentially influencing the adoption of ABC. The research has addressed this issue and has applied a form of sensitivity analysis by using both bivariate and multivariate statistical tests to test the sensitivity of the hypotheses.

It is, therefore, argued that, because of the steps that have been taken to (i) reduce measurement error, (ii) use more refined statistical methods, and (iii) report how sensitive the variables are to different statistical tests, greater confidence can be attached to the findings of this research in relation to factors influencing ABC adoption. In addition, the research has focused on issues that have not been directly studied by other researchers. Examples include an examination of the relative importance of factors discouraging firms from adopting ABC, the treatment of non-manufacturing costs and details of costing systems operated by ABC adopters and non-adopters in terms of cost pools and cost drivers. In addition the research has provided a more detailed classification of costing systems (e.g. direct, traditional absorption, ABC and no formal system) by size and business sector. Finally, although factors affecting ABC success and the influence of efficient choice, fad, fashion and forced selection motives on ABC adoption have been examined in the USA and Finland ,these issues have not been directly addressed by previous UK studies.

10.4 Limitations of the research

In common with all research, this study is subject to a number of limitations. However, every attempt was made to minimise the limitations so as to be able to generalise the findings. Many of the limitations relate to those applying to all postal questionnaire surveys (see section 7.4.3 in Chapter 7) and are not repeated here. In particular, the researcher is not able to get the respondents to explain their responses or, for a particular response, ask the question 'why?' For example, one of the responses for the treatment of different types of non-manufacturing costs enabled the respondents to indicate that they were not assigned to products for decision-making. Such responses only provide limited information and it would have also been preferable to ascertain why indirect costs are not assigned to products.

It should be pointed out here that it might be more appropriate to focus on users, to obtain their views on the statements listed in some of the questions, such as the satisfaction level and intensity of competition. However, it is an extremely difficult task to target users separately to complete questionnaires or conduct interviews. This may be an interesting area for future case study research, whereby the questions are targeted at different users to obtain more meaningful responses.

Most of the remaining limitations relate to the application of the contingency theory theoretical framework. These limitations are not confined to this study since they also apply to other studies that have adopted a contingency theory approach. The limitations mostly relate to how the theory has been applied rather than the underlying theoretical framework. Figure 10.1, adapted from Otley (1980), is used to provide a model of how the contingency framework is generally applied and the theoretical ideal of how it should be applied. Figure 10.1 suggests that contingent variables affect organisational design/structure which, in turn, influence the design of accounting information systems and organisations that achieve a fit between the contingent variables and structure and accounting information system design to achieve a more effective performance.

Figure 10.1 A simple linear framework for AIS design

Contingent variables
(e.g. technology environment)

↓

Organisational design /structure
(e.g. shape , centralisation interdependencies)

↓

Type of accounting information system
(e.g. technical and behavioural characteristics)

↓

Organisational effectiveness

Adopted from Otley.1980 p. 420

Fisher (1995) states that most of the contingency theory studies have not combined all four stages. They have tended to focus only on the relationship between contingent variables and accounting information system design without considering organisational structure/design as an intervening variable. Also, no attempt is made to assess whether the correlation between an identified contingent variable and accounting information system design has any effect on firm outcomes (i.e. performance).

The concept of organisational effectiveness is also extremely difficult to define and measure. Some studies (e.g. Gul, 1991; Gul and Chua, 1994) have preferred to use the notion of managerial effectiveness rather than organisational effectiveness. Other studies (e.g. Simons, 1987) have used only financial measures (e.g. ROI) to measure effectiveness. The few ABC studies that have examined the impact of ABC on performance have concentrated only on financial performance (see Chapter 5, section 5.8). Relying only on financial measures has been widely criticised as a proxy measure of effectiveness because they tend to be short-term and adopt a narrow focus. Various researchers have called for the use of a multiplicity of dimensions to be incorporated in order to measure effectiveness.

In terms of the current study, only two stages of the model shown in Figure 10.1 were considered. Contingent variables were identified based on the literature review and the relationship between these contingent variables and characteristics of the product costing systems (ABC or traditional costing system) and the success of ABC were examined. It could be argued that some variables (e.g. the intensity of competition) influence the choice of strategy, organisational structure and the decision to adopt ABC. Thus, the decision to adopt ABC may be influenced by the direct effects of the intensity of competition and indirect effects via strategy and structure. However, even though Gosselin (1997) has examined the relationship between elements of organisational structure and the adoption of ABC, the theoretical relationship is uncertain and it is possibly premature at this point in time for the inclusion of this stage in a contingency theoretical framework relating to product costing. The final stage in Figure 10.1, examining the relationship between identified contingent variables and the adoption of ABC and the effect on firm performance, has not been examined in this research. Because many different variables are likely to affect firm performance, besides the sophistication of the product costing system and the difficulty in holding these 'other variables' constant, performance was not incorporated into the model.

Problems also apply in defining and measuring the contingent variables. Many of the contingent variables are abstract or theoretical constructs that are not capable of direct measurement, such as intensity of competition, product diversity and the quality of information technology. In this situation proxy measures have to be used. Therefore, the variables are subject to measurement error and this has important implications when statistical analysis is used to test the contingency theory models. Where there is measurement error, the observed statistical relationship will be subject to misstatement of the true relationship. This may have implications for theory in terms of drawing incorrect inferences of the true relationships between the variables. There is, also, always the danger that variables that are extremely difficult to measure are omitted or the possibility that important contingent variables may not have been identified and, thus, omitted from the contingency model.

Considerable effort, however, was given to minimising the measurement problems, as indicated in the previous section. Extensive use was made of multiple item questions to derive a composite score. For the questions applying to most of the variables, where objective and factual responses were not possible, there were high levels of internal consistency reliability with high Cronbach Alpha scores being recorded.

A further problem is that many organisations generally face a diversity of environments in respect of the identified contingent variable and, where diversity is high, it may be inappropriate to develop measures which aggregate to the organisational level. For example, if an organisation faces a diversity of competitive environments for its activities, with some being subject to low competition and others to intensive competition, it is questionable whether a meaningful aggregate measure can be established. In these circumstances, a more company situation-specific contingent case study approach, focusing on a single company or a small number of companies, may be preferable.

Fisher (1995) states that one of the major weaknesses of contingent control research is that it examines only one contingent variable and one control attribute at a time. He argues that understanding interactions between multiple contingent variables and multiple control system characteristics is required to determine the effectiveness of control system design. Most of the contingency theory management accounting research has attempted to correlate one contingency variable with one control factor. Fisher concludes that the ultimate goal of contingency theory control research should be to develop and test a model that simultaneously examines multiple contingent variables, multiple control systems and multiple outcome variables.

In common with most previous studies, a simplistic contingency framework was used in this study whereby it examined the relationship between only one contingent variable at a time and the product costing system. The interactions between the variables have not been incorporated into the framework. For example, variables might have a direct effect and indirect effects through other variables on the product costing system, as indicated previously, relating to the relationship between the intensity of competition, strategy, structure and the product costing system. To examine more complex models that incorporate such interactions requires the use of structural equation modelling. However, when applied to accounting research, this technique is still in its infancy and it generally requires samples with more than 200 cases for it to be successfully applied (Smith and Langfield-Smith, 2001).

A final limitation of the contingency framework is that its objective is to provide general theories relying extensively on statistical generalisations for simplifying and understanding the empirical observations. Thus, exceptions are possible but the statistical generalisations do not provide explanations of the exceptions or practices of individual companies. This provides little guidance to practitioners whose product costing system is one of the exceptions.

Given the above limitations, some researchers have chosen to adopt a more situation-specific contingent approach. The rationale for this approach is that factors affecting the design of accounting information systems are unique to each firm so general models cannot be established. The researcher must study each firm and accounting system individually and generalisation to other firms is likely to be questionable. Adopting this approach requires case study research because the design of the accounting information system depends on an understanding of the unique factors affecting the firm. Because the possible combination of contingent factors is so large it is considered inappropriate to attempt to establish broad classes of contingent variables.

Despite the limitations of the contingency theory studies, the statement made in Chapter 1 is repeated here. Most of the limitations apply to the difficulty in applying the framework rather than the underlying theoretical framework. The underlying idea that there is no universally optimal accounting information system and that 'it all depends' upon the situational factors is intuitively appealing and explains why researchers continue to seek to find a match between contingent variables and characteristics of accounting information systems. The conclusion by Otley (1980, p. 425) is still pertinent today:

> A contingency theory of management accounting has a great deal of appeal. It is in accord with practical wisdom and appears to afford a potential explanation of the bewildering variety of management accounting systems actually observed in practice.... There thus appears to be a *prima facie* case for the development of a contingency framework of management accounting.

10.5 Suggestions for future research

As a result of undertaking this research it is possible to identify several areas for future research. The research identified several stages in the process of ABC adoption and implementation. Of the 153 respondents, 35% had not seriously considered ABC, 17% had considered and rejected it, 2% had approved ABC for implementation but abandoned it prior to implementation and 3% had implemented it but later abandoned it. Because of the small numbers within some of these categories it was not possible to undertake any statistical analysis. More in depth case studies should be undertaken to examine relevant issues that are appropriate to each stage. Case studies that seek to explain why some firms have not seriously considered ABC or other accounting innovations would be appropriate. For example, do the reasons relate to perceived deficiencies of ABC, suitability of the existing costing system, lack of resources, weak professional knowledge, etc? Such studies should attempt to identify the circumstances under which the existing costing system is considered to be suitable. For those firms that have considered ABC and rejected it, interviews with the relevant personnel identifying the important factors leading to rejection would be of interest. Within the previous two categories emphasis should be given to examining why some companies continue to operate unsophisticated systems when the contextual factors within which they operate suggest that they should implement sophisticated costing systems.

Few studies have examined the abandonment of ABC systems either before or after implementation. It is likely that case studies will be more appropriate for studying abandonment. Based on the findings of this research, the numbers falling within either or both categories is likely to be too small to undertake statistical analysis. Such studies should examine whether abandonment represents a failure or whether ABC has met the objectives that were specified resulting in there being no further need to maintain the system. In addition, Malmi (1999) has suggested that there is a need to study the incentives which existing systems create, and the threats which the new system poses to these incentives and the current distribution of power, to clarify some of the motives for resisting new accounting systems and accounting change. Malmi concludes that a better understanding of resistance to ABC implementation may require specific attention to the relationship of the new system to the existing formal and informal accounting and control systems.

In terms of applying the contingency theory framework, the characteristics of the product costing system are measured by two discrete alternatives, either traditional or ABC systems. Such a classification does not adequately capture the diversity of practices that exist. Traditional costing systems vary from simplistic (consisting of a single cost pool and cost driver) to sophisticated, consisting of hundreds of first-stage cost pools and a small number of different types of second-stage volume-related cost drivers. Similarly, ABC systems can also vary from very simplistic, consisting of a small number of highly aggregated first-stage cost pools and a small number of different types of second-stage drivers (say, two volume-related and one non-volume related driver), to many pools and many different types of cost drivers. Because of such diversity, future research adopting a contingency theory framework should consider developing alternative measures of the characteristics of the product costing system that better capture the diversity of practices.

There is also a need for future case study research to address the costs and benefits from investing in increments of increasing levels of product costing system sophistication. Such research should focus on examining the specific costs and benefits associated with alternative choices in cost system design.

Most of the research relating to product costing has been survey-based involving cross-sectional studies. Such studies only identify relationships between the studied variables at one point in time. However, they provide little information as to how the observed costing systems and their relationships with specific contingent variables came about, what motives people in organisations had in actually choosing one systems design rather than another and how the systems are actually used. To answer such questions, longitudinal case study research is required that examines the interaction of the potential explanatory variables over time and that also draws on a wide range of theoretical frameworks including social theory.

A study by Drury and Tayles (2000) relating to the design of product costing systems reported that one of the respondents interviewed suggested that his organisation had operated for many years in a very favourable economic environment generating high profits and, therefore, little attention was given to the costing system resulting in a very unsophisticated system being used. However, as the economic environment became more hostile and profitability declined, considerably more attention was given to designing and improving the costing system. Another respondent also pointed out that the implementation and development of more sophisticated costing systems is likely to be affected by the extent to which a person who can influence the design and use of the costing system (such as a member of top management, the financial director or the management accountant) has the characteristics of a good champion. He had observed that the presence of a good champion influenced the design and use of the costing system. Further case study research to examine the impact of such factors on cost system design would seem to be appropriate.

The findings indicated that profitability analysis was the most widely used ABC application and that the greatest importance was attributable to ABC information for this purpose. However, little information is available on the nature, content and role of profitability analysis and future research should seek to remedy this situation. The research also indicated that respondents tended to agree with the statement that 'decisions tend to be based on strategic reasons rather than reported costs/profitability' (see Question D13e). Where profitability analysis is used as an attention-directing mechanism for undertaking more detailed studies, the role that cost information plays in these studies would be a useful topic for further study.

Other areas arising from the study that are worthy of future research include a study of firm characteristics and potential explanatory factors that attempts to explain why some firms choose not to operate formal costing systems or only assign direct costs to products. Also those respondents that had not adopted ABC were asked to indicate in section C of the questionnaire the extent to which they agreed with various statements relating to ABC in general and reasons for non-adoption. It would have also been of interest if the ABC adopters had responded to the same statements and compared the differences in the responses between adopters and non-adopters. Such a comparison should indicate whether usage of ABC results in more positive views and also provide an indication of the extent to which potential barriers to implementation are based on expectations rather than reality (Innes *et al.*, 2000).

The literature review also indicated that only a few studies had examined the impact of ABC on performance. These studies used cross-sectional surveys but such surveys cannot fully hold constant 'other factors' ; there is scope for future research involving longitudinal studies that investigates the improvement in performance within firms before and after the implementation of ABC. Future research should seek to address the limitations applying to this research that have been identified in section 10.4 of this chapter.

Finally, it should be noted that the sample selection process excluded smaller companies and not-for-profit organisations. This sample selection process is also likely to exclude a greater proportion of service companies since manufacturing companies tend to be larger. The findings cannot be generalised to the entire population and are applicable only to organisations that meet the criteria that were used to establish the sample.

Despite the limitations that have been identified in section 10.4, this study has provided many additional insights into areas relating to ABC. Generally all research, even if performed well, will be subject to limitations and extend the scope for future research. Considerable efforts have been taken to minimise the limitations and remedy some of the deficiencies of previous research. It is also hoped that this research will motivate researchers to undertake future research in the areas suggested in the previous discussion.

REFERENCES

Abdel-Kader, M. G. and D. Dugdale. (1998). "Investment in advanced manufacturing technology: a study of practice in large U.K. companies." Management Accounting Research 9(3): 261-284.

Abrahamson, E. (1991). "Managerial fads and fashions: the diffusion and rejection of innovations." Academy of Management Review 16(3): 586-612.

Abrahamson, E. (1996). "Management fashion." Academy of Management Review 21(1): 254-286.

Abrahamson, E. and L. R. Bartner (1990). "When do bandwagon diffusions roll? how far do they go? and when do they roll backwards: a computer simulation." Academy of Management Proceedings: 155-60.

Abrahamson, E. and L. Rosenkopf (1993). "Institutional and competitive bandwagons: using mathematical modeling as a tool to explore innovation diffusion." Academy of Management Review 18(3): 487-517.

Aiken, M., S. B. Bacharach and a. J. L. French (1980). "Organizational structure, work process, and proposal making in administration bureaucracies." Academy of Management Journal 23(4): 631-652.

Aiken, M. and J. Hage (1971). "The organic organization and innovation." Sociology 5: 63-82.

Alreck, P. and R. Settle (1995). The survey research handbook. Chicago, Irwin.

Anderson, S. W. (1995). "A framework for assessing cost management system changes: the case of activity based costing implementation at General Motors, 1986-1993." Journal of Management Accounting Research 7: 1-51.

Anderson, S. W. and S. M. Young (1999). "The impact of contextual and process factors on the evaluation of activity-based costing systems." Accounting Organizations and Society 24(7): 525-559.

Anthony, R. N. (1989). "Reminiscences about management accounting." Journal of Management Accounting Research 1: 1-20.

Argyris, C. and R. S. Kaplan (1994). "Implementing new knowledge: the case of activity-based costing." Accounting Horizons 8(3): 83-105.

Armitage, H. M. and R. Nicholson (1993). Activity based costing: a survey of Canadian practice, Society of Management Accountants of Canada.

Ask, U., Ax, C. and S. Jonsson (1996). Cost management in Sweden: from modern to post-modern, in Bhimani, A. (ed.) Management Accounting: European Perspectives. Oxford, Oxford University Press: 199-217.

Ask U. and Ax. C. (1992). Trends in the development of product costing practices and techniques -a survey of the Swedish manufacturing industry. European Accounting Association Annual Congress, Madrid, Spain.

Atkinson, A. A., R. J. Banker, R. S. Kaplan and S. M. Young (1997). Management accounting. New Jersey, Prentice-Hall, Upper Saddle River.

Atkinson, A. A., U. o. Waterloo, R. Balakrishnan, U. o. Iowa, P. Booth;, J. M. C. T. Groot;, T. Malmi;, H. Roberts;, E. Uliana; and A. Wu. (1997). "New directions in management accounting research." 9: 79-108.

Attewell, P. (1992). "Technology diffusion and organizational learning: the case of business computing." Journal of the Institute of Management Sciences 3(1): 1-19.

Attewell, P. and J. Rule (1991). Survey and other methodologies applied to IT impact research, Harvard Business School Research Colloquim.

Ballas, A. and G. Venieris (1996). A survey of management accounting in Greek firms', in Bhimani, A. (ed) Management Accounting: European Perspectives, Oxford University Press: 123-39.

Banerjee, J. and W. Kane (1996). "Report on CIMA/JBA survey." Management Accounting (UK) 74(9): 30- 37.

Banker, R. D., G. Potter and R. G. Schroeder. (1993). "Reporting manufacturing performance measures to workers: an empirical study." Journal of Management Accounting Research 5: 33-55.

Barbato, M. B., P. Collini and Quagli.A. (1996). Management accounting in Italy, in Bhimani, A. (ed.) Management Accounting: European perspectives. Oxford, Oxford University Press: 140-163.

Berlant, D. and R. Browning (1990). "How Hewlett-Packard gets numbers it can trust." Harvard Business Review 68(1): 178-183.

Berliner, C. and J. A. Brimson (1988). Cost management for today's advanced manufacturing. Boston, Harvard Business School Press.

Bescos, L. and E. Cauvin (2001). The implementation of ABCM in Canada, France and Japan: a cross-national study. the 24th Annual Congress of the European Accounting Association, Athens, April 18-20.

Bhimani, A. (1993). "Performance measures in UK manufacturing companies: The state of play." Management Accounting (UK) 71(11): 20-22.

Bjornenak, T. (1997). "Conventional wisdom and costing practices." Management Accounting Research 8(4): 367-382.

Bjornenak, T. (1997). "Diffusion and accounting: the case of ABC in Norway." Management Accounting Research 8(1): 3-17.

Bjornenak, T. and F. Mitchell. (2000). A study of the development of the activity based costing journal literature 1987-1998. Report to the annual EAA conference in München. Annual EAA Conference, München.

Blau, J. R. and W. McKinley (1979). "Ideas, complexity, and innovation." Administrative Science Quarterly 24(2): 200-220.

Böer, G. and D. Jeter. (1993). "What's new about modern manufacturing? empirical evidence on manufacturing cost changes." Journal of Management Accounting Research 5: 61-83.

Booth, P. and F. Giacobbe (1998). Predicting the adoption of activity-based costing in Australian manufacturing firms. The 21st Annual Congress of the European Accounting Association, Antwerp.

Bouwens, J. (1998). The use of management accounting systems in functionally differentiated organizations. Center for Economic Research, Tilburg University.

Bradford, M. G. and W. A. Kent (1977). Human geography, theories and their applications. Oxford, Oxford University Press.

Brewer, P. C. (1998). "National culture and activity-based costing systems: a note." Management Accounting Research 9(2): 241-260.

Brierley, J. A., C. J. Cowton and C. Drury (2001). "Research into product costing practice: a European perspective." European Accounting Review 10(2): 215-256.

Bright, J., R. E. Davies, C. A. Downes and R. C. Sweeting (1992). "The deployment of costing techniques and practices: a UK study." Management Accounting (UK) 3(3): 201-212.

Brimson, J. A. (1991). Activity accounting, John Wiley &Sons, Inc.

Bromwich, M. and S. A. Inoua (1994). Management practices and cost management problems in Japanese-Affiliated companies in the United Kingdom. London, Chartered Institute of Management Accountants.

Bruggeman, W., R. Slagmulder and D. Waeytens (1996). Management accounting changes: the Belgium experience', in Bhimani, A. (ed.), Management Accounting: European Perspectives. New York, Oxford University Press: 1-30.

Brummet, L. R. (1957). Overhead costing, Ann Arbor, University of Michigan.

Brummet, R. L. (1971). "Discussion of LIFO and the diffusion of innovation." Journal of Accounting Research, (Supplement) 9(3): 225-227.

Bruns, W. J., Jr., (1987). A field study of an attempt to change an embedded cost accounting system, in Bruns, W.J. Jr. and Kaplan (eds) accounting and management: field study perspectives, Harvard Business School Press: 97-118.

Bruns, W. J. J. and R. S. Kaplan (1991). Accounting and management: field study perspectives. Boston, MA, Harvard Business School Press.

Bryman, A. and D. Cramer (2001). Quantitative data analysis with SPSS release 8 for Windows: a guide for social scientists. London and New York, Routledge.

Business Week (1989). Is your company too big? 84-94.

Cagwin, D. and M. J. Bouwman. (2002). "The association between activity-based costing and improvement in financial performance." Management Accounting Research 13(1): 1-39.

Cantril, H., ed (1944). Gauging public opinion. Princeton., Princeton University Press.

Carlson, R. O. (1965). Adoption of educational innovations. Eugene, OR, Center for the advanced study of educational administration.

Chenhall, R. H. and K. Langfield-Smith (1998). "Adoption and benefits of management accounting practices: an Australian perspective." Management Accounting Research. 9(1): 1-20.

Chenhall, R. H. and K. Langfield-Smith (1998). "The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach." Accounting Organizations and Society 23(3): 243-264.

Child, J. (1975). "Managerial and organizational factors associated with company performance." Journal of Management Studies 12(1): 12-27.

CIMA (1996). Management accounting: Official terminology. London, the Chartered Institute of Management Accountants.

Cinquini, L., P. Collini, Marelli, A., A. Quagli, and R. Silvi (1999). A survey on cost accounting practices in Italian large and medium size manufacturing firms. The European Accounting Association Annual Congress, Bordeaux, France.

Clarke, P. J. (1992). Management accounting practices and techniques in Irish manufacturing firms. The 15th Annual Congress of the European Accounting Association, Madrid, Spain, 22-24 April 1992.

Clarke, P. J., N. Thorley Hill and K. Stevens (1999). "Activity-based costing in Ireland: barriers to, and opportunities for change." Critical Perspectives on Accounting 10(4): 443-468.

Cobb, I., J. Innes, F. Mitchell and A. Chartered Institute of Management (1992). Activity based costing: problems in practice. London, Chartered Institute of Management Accountants.

Cobb, I., Innes, J. and F. Mitchell (1992). Activity-based-costing-problems in practice. London, Chartered Institute of Management Accountants.

Coleman, J. S., E. Katz and H. Menzel (1966). Medical innovation: a diffusion study. New York, Bobbs Merrill.

Comiskey, E. E. and R. E. V. Groves (1972). "The adoption and diffusion of an accounting innovation." Accounting and Business Research ((winter)): 67-75.

Cooper, D. R. and C. W. Emory (1995). Business research methods. Chicago, Irwin.

Cooper, R. (1986). Mmmueller-Lehmkuhl Gmbh, Harvard Business School.

Cooper, R. (1988). "Cost management concepts and principles: the rise of activity based costing - part one what is an activity-based cost system?" Journal of Cost Management 2(1): 45-54.

Cooper, R. (1988). "The rise of activity-based costing- part two: when do I need an activity-based cost system?" Journal of Cost Management 2(3): 41-48.

Cooper, R. (1988). "The rise of activity-based costing-part three: how many cost drivers do you need, and how do you select them?" Journal of Cost Management 3(winter): 34-46.

Cooper, R. (1990). "Cost classifications in unit-based and activity-based manufacturing cost systems." Journal of Cost Management 4(3): 4-14.

Cooper, R. (1990). "Implementing an activity-based cost system." Journal of Cost Management 4(spring): 69-78.

Cooper, R. (1996). "Costing techniques to support corporate strategy: evidence from Japan." 7(2): 219-246.

Cooper, R. (1997). Activity-based costing: theory and practice, in Brinker, B.J. (ed), Handbook of Cost Management, Warren, Gorham and Lamont, B1-B33.

Cooper, R. and R. S. Kaplan (1987). How cost accounting systematically distorts product costs. In Bruns, W. J and Kaplan R.S. (eds.) Accounting and Management: Field Study Perspectives. Cambridge, Harvard University Press.

Cooper, R. and R. S. Kaplan (1988). "How cost accounting distorts product costs." Management Accounting (USA) LXIX (10): 20-27.

Cooper, R. and R. S. Kaplan (1988). "Measure costs right: make the right decision." Harvard Business Review 66(5): 96-105.

Cooper, R. and R. S. Kaplan (1991). The design of cost management systems. New Jersey and London. Prentice Hall International Editions, Englewood Cliffs,.

Cooper, R. and R. S. Kaplan (1992). "Activity-based systems: measuring the costs of resource usage." Accounting Horizons 6(3): 1-13.

Cooper, R., R. S. Kaplan, L. S. Maisel, E. Morrissey and R. M Oehm (1992). Implementing activity-based cost management: Moving from analysis to action. Montvale, New Jersey, Institute of Management Accountants.

Cooper, R. and P. B. Turney (1989). Hewlett-Packard: the Roseville Network Division. Boston, MA, Harvard Business School, (Case No. 9-189-117).

Cooper, R. and K. H. Wruk (1988). Siemens (A). Boston, MA, Harvard Business School, Case 9-189-089.

Cooper R. (1988). "The rise of activity-based costing- part two: when do I need an activity-based cost system?" Journal of Cost Management (fall): 41-48.

Cooper, R. P. and R. W. Zmud (1990). "Information technology implementation: A technological diffusion approach." Management Science 36(2): 156-172.

Copeland, R. M. and J. K. Shank (1971). "LIFO and the diffusion of innovation." Journal of Accounting Research, (Supplement) 9(3): 196-224.

Cortina, J. M. (1993). "What is coefficient alpha? An examination of theory and applications." Journal of Applied Psychology 78(1): 98-104.

Creswell, J. W. (1994). Research design: qualitative and quantitative approaches, Thousand Oaks, CA: Sage.

Cronbach, L. J. (1951). "Coefficient alpha and the internal structure of tests." Psychometrika 16: 297-333.

Daft, R. L. (1978). "A dual -core model of organizational innovation." Academy of Management Journal 21(2): 193-211.

Daft, R. L. (1978). The innovative organization. New York, Elsevier.

Damanpour, F. (1987). "The adoption of technological, administrative, and ancillary Innovations: impact of organizational factors." Journal of Management 13(4): 675-688.

Damanpour, F. (1991). "Organizational innovation: a meta-Analysis of effects of determinants and moderators." Academy of Management Journal 34(3): 555-590.

Damanpour, F. (1992). "Corporate culture and organizational effectiveness (Book Review)." Journal of Management 18(1): 175-176.

Damanpour, F. (1992). "Organizational size and Innovation." Organization Studies 13(3): 375-402.

Damanpour, F. and W. M. Evan (1984). "Organizational innovation and performance: the problem of 'organizational lag." Administrative Science Quarterly 29(3): 392-409.

Dane, F. (1990). Research methods. California, Brooks/Cole Publishing Company.

David, J. S. (1994). An empirical analysis of REA accounting systems, productivity, and perceptions of competitive advantage. Michigan State University.

Davies, R. E. and R. C. Sweeting (1993). Accounting innovations and the development of manufacturing cost systems. The European Accounting Association Annual Congress, Turku.

Davies, S. (1979). The diffusion of process innovation. Cambridge UK, Cambridge University Press.

De Brabander, B., G. Thiers and C. Augustijns (1984). "Successful information system development in relation to situational factors which affect effective communication between MIS users and EDP-specialists." Management Science 30(2): 137-155.

De Vaus, D. A. (1990). Surveys in social research. London, Unwin Hyman.

De Vellis, R. F. (1991). Scale development: theory and applications, Newbury Park, Sage.

Delone, W. H. (1981). "Firm size and the characteristics of Computer use." MIS Quarterly 5(4, December): 74-75.

DeLone, W. H. and E. R. McLean (1992). "Information systems success: the quest for the dependent variable." Information Systems Research 3(1): 60-95.

Dess, G. (1987). "Consensus on strategy formulation and organisational performance: competitors in a fragmented industry." Management Journal 8(3): 259-277.

Dewar, R. D. and J. E. Dutton (1986). "The adoption of radical and incremental innovations: an empirical analysis." Management Science 32(11): 1422-1433.

Dhavale, D. G. (1989). "Product costing in flexible manufacturing systems." Journal of Management Accounting Research 1: 66-88.

Dickson, J. P. and D. L. Maclachlan (1996). "Fax surveys: return patterns and comparison with mail surveys." Journal of Marketing Research 33(1): 108-113.

Dillman, D. A. (1978). Mail and telephone surveys: total design method. New York, Wiley.

Dillman, D. A. (1993). Mail and telephone surveys: the total design method. New York, Wiley.

DiMaggio, P. and W. Powell (1983). "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields." American Sociological Review 48: 147 - 160.

Drury, C. (1989). "Activity based costing." Management Accounting, UK 76(8): 60-66.

Drury, C. (2000). Management & Cost Accounting. London, 5th Edition, Thomson Learning.

Drury, C., S. Braund, P. Osborne and M. Tayles (1993). A survey of management accounting practice in UK manufacturing companies. London, Chartered Association of Certified Accountants.

Drury, C. and M. Tayles (1994). "Product costing in UK manufacturing organizations." European Accounting Review 3(3): 443-469.

Drury, C. and M. Tayles (1995). "Issues arising from surveys of management accounting practice." Management Accounting Research 6(3): 267-280.

Drury, C. and M. Tayles (2000). Cost system design and profitability analysis in UK companies. London, Chartered Institute of Management Accountants.

Dugdale, D. and T. C. Jones (1997). "How many companies use ABC for stock valuation? A comment on Innes and Mitchell's questionnaire findings." Management Accounting Research 8(2): 233-240.

Dunk, A. S. (1989). "Management accounting lag." Abacus 25(2): 149-154.

Easton, G. S. and S. L. Jarrell (1998). "The effects of total quality management on corporate performance: an empirical investigation." Journal of Business 71(2): 253-307.

El-shishini, H. and C. Drury (2001). Divisional performance measurement in the UK companies. The 24th Annual Congress of the European Accounting Association, Athens, April 18-20.

Emory, C. W. and D. R. Cooper (1991). Business research methods. Boston, Richard D. Irwin, Homewood.

Ernst and Young (1994). Activity -based costing as survival strategy. Working paper. Marcel Thirylaan, Belgium.

Estrin, T. L., J. Kantor and D. Albers (1994). "Is ABC suitable for your company?" Management Accounting (UK) 75(10): 40-45.

Ettlie, J. E., W. P. Bridges and R. D. O'Keefe (1984). "Organizational strategy and structural differences for radical versus incremental innovation." Management Science 30(6): 682-695.

Evan, W. M. (1966). "Organizational Lag." Human Organization 25(1): 51-53.

Evans, H. and G. Ashworth (1996). "The role of management accountants, survey conclusions: wakeup to the competition." Management Accounting (UK) 74(5): 16-18.

Feltham, T., J. Barnett and J. Bowey (1999). Are Canadian family business an endangered species?, The first success reading survey of Canadian family owned business. Deloitte and Touche, The Delotte and Touche Centre for Tax Education and Research.

Field, A. (2000). Discovering statistics using SPSS for Windows. London, SAGE.

Firth, M. (1996). "The diffusion of managerial accounting procedures in the People's Republic of China and the influence of foreign partnered joint ventures." Accounting Organizations and Society 21(7/8): 629-654.

Foster, G. and M. Gupta (1990). Activity accounting: an electronics industry implementation. In R.S. Kaplan, measures for manufacturing excellence. Boston, MA, Harvard Business School Press: 291-305.

Foster, G. and M. Gupta (1990). "Manufacturing overhead cost driver analysis." Journal of Accounting & Economics 12(1-3): 309-337.

Foster, G. and D. W. Swenson (1997). "Measuring the success of activity-based cost management and its determinants." Journal of Management Accounting Research 9: 104-141.

Foster, J. J. (1998). Data analysis using SPSS for Windows: a beginner's guide. London, Sage.

Foster., B. P. and T. J. Ward (1994). "Theory of perpetual management accounting innovation lag in hierarchical organizations." Accounting Organizations and Society 19(4-5): 401-411.

Frankfort-Nachmias, C. and D. Nachmias (1996). Research methods in the social sciences. London, Arnold.

Friedman, A. L. and S. R. Lyne (1995). Activity-based techniques: the real Life consequences. London, The Chartered Institute of Management Accountants.

Friedman, A. L. and S. R. Lyne (1998). Implementing activity-based techniques: a long run study of success and failure. New Directions in management accounting: innovation in practice and research, Brussels, December10-12.

Friedman Andrew, L. and R. Lyne Stephen (1999). Success and failure of activity-based techniques: a long-term perspective. London, CIMA, 1999.

Fuller, M. K. and E. B. Swanson (1992). "Information centers as organizational Innovation: exploring the correlates of implementation success." Journal of Management Information Systems 9(1): 47-67.

George, D. and P. Mallery (2000). SPSS® for window® step by step: a simple guide and reference 9.0 update, Allyn and Bacon, Needham Heights, Massachusetts.

Goetz Billy, E. (1949). Management planning and control: a managerial approach to industrial accounting. New York, McGraw-Hill 1949.

Gonsalves, F. A. J. and R. G. Eiler (1996). "Managing complexity through performance measurement." Management Accounting: Official Magazine of Institute of Management Accountants 78(2): 34-39.

Gordon, L. A. and K. J. Silvester (1999). "Stock market reactions to activity-based costing adoptions." Journal of Accounting & Public Policy 18(3): 229-51.

Gosselin, M. (1997). "The effect of strategy and organizational structure on the adoption and implementation of activity-based costing." Accounting Organizations and Society 22(2): 105-122.

Gould, J. and W. Kolb (1964). A dictionary of the social sciences. London, Tavistock Publications.

Green, F. B. and F. E. Amenkhienan (1992). "Accounting innovations: a cross sectional survey of manufacturing firms." Journal of Cost Management 6: 58-64.

Groot, L. C. M. T. (1999). "Activity-based costing in US and Dutch Food Companies." Advances in Management Accounting 7: 47-63.

Guilding, C. (1999). "Competitor-focused accounting: an exploratory note." Accounting Organizations and Society 24(7): 583-595.

Hair, J. F., R. E. Anderson, R. L. Tatham and W. C. Black (1998). Multivariate data Analysis. New Jersey, Prentice Hall.

Haka, S. F., L. A. Gordon and G. E. Pinches (1985). "Sophisticated capital budgeting selection techniques and firm performance." Accounting Review 60(4): 651-669.

Hamilton, S. and N. L. Chervany (1981). "Evaluating information system effectiveness-part1: comparing evaluation approaches." Management Information System Quarterly 5(3): 55-69.

Hankinson, H. and S. Lloyd (1992). Change management, in Handbook of cost management, edited by Brinker. New York, Warren Gorham Lamont.

Hansen, R. and M. Mowen (2000). Cost management: accounting and control, South-Western College Pub.

Hollander, M. and D. A. Wolfe (1973). Nonparametric statistical methods. New York, London, Sydney and Toronto, John Wiley & Sons.

Holzer, H. P. and H.Norreklit (1991). "Some thought on cost accounting developments in the United State." Management Accounting Research 2(1): 3-13.

Hopwood, A. G. (1987). "The archeology of accounting systems." Accounting Organizations and Society 12(3): 207-234.

Hoque, Z. (2000). "Just-In-Time production, automation, cost allocation practices and importance of cost information: an empirical investigation in New Zealand-based manufacturing organizations." The British Accounting Review 32(2): 133-159.

Hoque, Z. and W. James (2000). "Linking balanced scorecard measures to size and market factors: impact on organizational performance." Journal of Management Accounting Research 12: 1-17.

Horngren, C. T., A. Bhimani, G. Foster and S. M. Datar (1999). Management and cost accounting. New Jersey, Prentice Hall, Upper Saddle River.

Howell, J. K., S. R. S. Shank and J.Fisher (1992). Cost management for tomorrow, seeking the competitive edge. Morristown, NJ: Financial Executives Research Foundation.

Howell, R. and S. Soucy (1987). "The new manufacturing environment: major trends for management accounting." Management Accounting (USA) LXIX (1): 21-22.

Howell, R. and S. Soucy (1988). "Management reporting in the new manufacturing environment." Management Accounting LXIX (8): 22-29.

Hrisak, D. (1996). "The controller as a business strategist." Management Accounting (USA) LXXVIII (6): 48-49.

Hussein, M. E. (1981). "The innovative process in financial accounting standards setting*1." Accounting Organizations and Society 6(1): 27-37.

Hussey, J. and R. Hussey (1997). Business research: a practical guide for undergraduate and postgraduate students. London, Macmillan.

Innes, J. and F. Mitchell (1989). Management accounting: the challenge of technological innovation. London, CIMA 1989.

Innes, J. and F. Mitchell (1990). "The process of change in management accounting: Some field study evidence." Management Accounting Research 1(1): 3-19.

Innes, J. and F. Mitchell (1991). "ABC: a survey of CIMA members." Management Accounting (UK) 69(9): 28-30.

Innes, J. and F. Mitchell (1995). "ABC: a follow-up survey of CIMA members." Management Accounting (UK) 73(7): 50-53.

Innes, J. and F. Mitchell (1995). "A survey of activity based costing in the UK's largest companies." Management Accounting Research 6(2): 137-153.

Innes, J. and F. Mitchell (1997). "The application of activity-based costing in the United Kingdom's largest financial institutions." Service Industries Journal 17(1): 190-203.

Innes, J. and F. Mitchell (1997). "Survey research on activity-based costing: a reply to Dugdale and Jone." Management Accounting Research 8(2): 241-249.

Innes, J., F. Mitchell and D. Sinclair (2000). "Activity-based costing in the U.K.'s largest companies: a comparison of 1994 and 1999 survey results." Management Accounting Research 11(3): 349-362.

Inns, J. and N. G. (1997). The use of activity-based information -a managerial perspective. London, Chartered Institute of Management Accounting.

Israelsen, P., M. Andersen, C. Rohde and P. E. Sørensen (1996). Management accounting in Denmark: theory and practice', in Bhimani, A. (ed), Management Accounting: European Perspectives. Oxford, United Kingdom, Oxford University Press.

Ittner, C. D., W. N. Lanen and D. F. Larcker (2002). "The association between activity-based costing and manufacturing performance." Journal of Accounting Research 40(3): 711-726.

Ittner, C. D., D. F. Larcker and T. Randall (1997). "The activity-based cost hierarchy, production policies and firm profitability." Journal of Management Accounting Research 9: 143-162.

Jensen, M. C. (1983). "Organization theory and methodology." Accounting Review 58(2): 319-339.

Jensen, R. (1982). "Adoption and diffusion of an innovation of uncertain profitability." Journal of Economic Theory 27(1): 182-193.

Jensen, R. L., J. W. Brackner and S. C.R. (1995). Management accounting in support of manufacturing excellence: profiles of a ward-Winning Organizations. Utah State University.

Johansson, H. J. (1990). "Preparing for accounting system changes." Management Accounting (UK) LXXII (1): 37-41.

Johnson, H. T. (1990). "Activity management: reviewing the past and future of cost management." Journal of Cost Management 3(4).

Johnson, H. T. (1990). The decline of cost management: a reinterpretation of 20th-century cost accounting history, emerging practices in cost management edited by Barry J. Brinker.Warren, Gorham and Lamont.Bostion.

Johnson, H. T. and R. S. Kaplan (1987). "The rise and fall of management accounting." Management Accounting (USA) LXVIII (7): 22-30.

Johnson, T. and R. S. Kaplan (1987). Relevance lost: the rise and fall of management accounting. Boston, Massachusetts, Harvard Business School Press.

Jones, C. and D. Dugdale (2000). The ABC Bandwagon and the Juggernaut of Modernity, Unpublished Working Paper, University of the West of England.

Jones, T. C. and D. Dugdale (2002). "The ABC bandwagon and the juggernaut of modernity." Accounting Organizations and Society 27(1-2): 121-163.

Joshi, P. L. (1998). "An explanatory study of activity-based costing practices and benefits in large size manufacturing companies in India." Accounting and Business Review 5(1): 65-93.

Joye, M. C. and P. J. Blayney (1990). Cost and management accounting practice in Australian manufacturing companies: survey results. Sydney, The Accounting and Finance Foundation within the University of Monograph No. 7.

Joye, M. P. and P. J. Blayney (1991). Strategic management accounting survey, Monograph, University of Sydney.

Judd, C. M., E. R. Smith and L. H. Kidder (1991). Research methods in social relations, Harcourt Brace Jovanovich, Fort Worth.

Kaplan, R. S. (1984). "The evolution of management accounting." Accounting Review 59(3): 390-418.

Kaplan, R. S. (1984). "Yesterday's accounting undermines production." Harvard Business Review 62(4): 95-102.

Kaplan, R. S. (1985). Accounting lag: the obsolescence of cost accounting systems, reprinted in Cooper R. and Kaplan R.S. 1991 , the design of cost management systems: text, cases and readings, Prentice Hall: 63-79.

Kaplan, R. S. (1986). "Accounting lag: the obsolescence of cost accounting systems." California Management Review 28(2): 174-199.

Kaplan, R. S. (1989). Kanthal (A) and Kanthal (B). Harvard Business School Case 9-190-002/3. Boston, Harvard Business School Publishing.

Kaplan, R. S. (1990). "Contribution margin analysis: no longer relevant." Journal of Management Accounting Research (USA) Fall: 2-15.

Kaplan, R. S. (1994). "Flexible budgeting in an activity-based costing framework." Accounting Horizons 8(2): 104-109.

Kaplan, R. S. (1995). "New roles for management accountants." Journal of Cost Management 10(3): 6-13.

Kaplan, R. S. (1998). "Innovation action research: creating new management theory and practice." Journal of Management Accounting Research 10: 89-118.

Kaplan, R. S. and A. A. Atkinson (1989). Advanced management accounting. New Jersey, Prentice Hall.

Kaplan, R. S. and R. Cooper (1998). Cost and effect: using integrated systems to drive profitability and performance. Boston, Massachusetts, Harvard Business School Press.

Kaplan, R. S. and A. March (1987). HBS Case series: John Deere Component Works. Boston, Harvard Business School Press.

Kelly-Newton, L. (1980). "A sociological investigation of the U.S.A. mandate for replacement cost disclosures." Accounting Organizations and Society 5(3): 311-321.

Kennedy, T. and J. Affleck-Graves (2001). "The impact of activity-based costing techniques on firm performance." Journal of Management Accounting Research 13: 19-45.

Kerlinger, F. N. (1986). Foundations of behavioral research. New York, Holt, Rinehart and Winston International Edition.

Kerremans, M., H. Theunisse and G. V. Overloop (1991). "Impact of automation on cost accounting." Accounting and Business Research 21(82): 147-155.

Kervin, J. B. (1992). Methods for business research. New York, HarperCollins.

Khandwalla, P. (1972). "The effects of different types of competition on the use of management controls." Journal of Accounting Research 10(2): 275-285.

Kim Soina, W. Sealb and J. Cullenc (2002). "ABC and organizational change: an institutional perspective." Management Accounting Research 13(2): 249-271.

Kimberly, J. R. a. E., Michael J. (1981). "Organizational innovation: the influence of individual, organizational, and contextual factors on hospital adoption of technological and administrative innovations." Academy of Management Journal 24(4): 689-713.

King, W. R. and J. I. Rodriguez (1978). "Evaluating management information systems." MIS Quarterly 2(3): 43-51.

King, W. R. and J. I. Rodriguez (1981). "Participative design of strategic decision support systems: an empirical assessment." Management Science 27(6): 717-726.

Kinnear, P. R. and Gray, C .D, 1999. *SPSS for Windows made simple*, 3rd Edition, Psychology Press, East Sussex, UK.

Knight, K. E. (1967). "A descriptive model of the intra-firm innovation process." Journal of Business 40(4): 478-496.

Kovac, E. J. a. T., H.P (1989). "Getting transfer prices right: What Bellcore did." Harvard Business Review 67(5): 148-154.

Krumwiede, K. R. (1998). "The implementation stages of activity-based costing and the impact of contextual and organizational factors." Journal of Management Accounting Research 10: 239-277.

Krumwiede, K. R. and H. P. Roth; (1997). "Implementing information technology innovations: the activity-based costing example." S.A.M. Advanced Management Journal; Cincinnati 62(4): 4-13.

Labovitz, S. (1970). "The assignment of numbers to rank order categories." American Sociological Review 35: 515-524.

Langfield-Smith, R. H. C. a. K. (1998). "Adoption and benefits of management accounting practices: an Australian study." Management Accounting Research 9(1): 1-19.

Lawrence, P. R. and J. W. Lorsch (1967). Organization and environment: managing differentiation and integration, Richard D. Irwin, Homewood.

Lehmann, E. L. and H. J. M. D'abrera (1975). Nonparametrics: statistical methods based on ranks. San Francisco, Holden-Day, Inc.

Lessler, J. and W. Kalsbeek (1992). Non-sampling error in surveys. U.S.A., John Wiley & Sons, Inc.

Libby, T. and J. H. Waterhouse (1996). "Predicting change in management accounting systems." Journal of Management Accounting Research 8: 137-150.

Llitwin, M. S. (1995). How to measure survey reliability and validity. London, Sage.

Lucas, H. (1973). "User reactions and the management of information systems." Management Information System Quarterly 2(4): 165-172.

Lukka, K. a. G., Markus (1996). "Cost accounting in Finland: current practice and trends of development." European Accounting Review 5(1): 1-28.

Malmi, T. (1995). Activity-based costing in Finnish Metal and firms engineering industries; Working Paper.

Malmi, T. (1996). "Activity-based costing in Finnish metal and engineering industries." The Finnish Journal of Business Economics 45(3): 243-264.

Malmi, T. (1997). "Towards explaining activity-based costing failure: accounting and control in a decentralized organization." Management Accounting Research 8(4): 495-480.

Malmi, T. (1999). "Activity-based costing diffusion across organizations: an exploratory empirical analysis of Finnish firms." Accounting Organizations and Society 24(8): 649-672.

March, J. G. (1978). "Bounded rationality, ambiguity and the engineering of choice." Journal of Economics 9: 587-608.

Margaret A. Abernethya, A. M. L., Peter Brownella, and Paul Cartera (2001). "Product diversity and costing system design choice: field study evidence." Management Accounting Research 12(3): 261-279.

Mason, E. J. and W. J. Bramble (1989). Understanding and conducting research: applications in education and the behavioral sciences. New York, McGraw-Hill.

McGowan, A. S. (1998). "Perceived benefits of ABCM implementation." Accounting Horizons 12(1): 31-50.

McGowan, A. S. and T. P. Klammer (1997). "Satisfaction with activity-based cost management implementation." Journal of Management Accounting Research 9: 217-238.

Meer-Kooistra, J. V. D., and Vosselman, E, G, J., (1999). The economic rationality of the balanced scorecard. Working paper. University van Groningen, University van Groningen.

Meyer, J. W. and B. Rowan (1977). Institutionalized organizations; formal structure as myth and ceremony. J.W. Meyer, W. R. Scott (Eds), Organizational environments, 45-67. Berverly Hills, CA: Sage.

Mia, L. and Clarke B. (1995). Intensity of market competition, use of strategic management accounting systems and business unit performance. Management Conrol Conference, London.

Michael D. Shields, F. J. D. a. Y. K. (2000). "The design and effects of control systems: tests of direct- and indirect-effects models." Accounting Organizations and Society 25(2): 185-202.

Miles, J. and M. Shevlin (2001). Applying regression & correlation: a guide for students and researchers. London, Sage.

Mohr, L. (1982). Explaining organizational behaviour: the limits and possibilities of theory and research.

Monden, Y. (1993). Toyota production system. Norcross, GA: Industrial engineering and Management Press.

Moores, K. and R. C. Chenhall (1994). Framework and MAS evidence, in Moores, K. and Booth, P. (eds) Strategic Management Accounting: Australian Cases, John Wiley, Brisbane, pp12-26.

Moser, C. A. and G. Kalton (1989). Survey methods in social investigation, Gower, Aldershot.

Mosteller, F., H. Hyman, P. J. McCarthy, E. S. Marks and D. B. Truman (1949). The pre-election polls of 1948: report to the committee on analysis of pre-election polls and forecasts. U.S. New York, Social Science Research Coucil (Bulletin, no .60).

Murphy, J. C. and S. L. Braund (1990). "Management accounting and new manufacturing technology." Management Accounting (UK) 68(2): 38-40.

Nachmias, D. and C. Nachmias (1976). Research methods in the social sciences. London, Edward Arnold.

Nathan Josepha, S. T., John Burnsa, Linda Lewisb, Robert Scapensa and Alan Southwortha (1996). "External financial reporting and management information: a survey of U.K. management accountants." Management Accounting Research 7(1): 73-93.

Newell, R. (1999). Questionnaires. in Gilbert, N. (ed.), researching social life. London, Sage.

Nicholls, B. (1992). "ABC in the UK - A status report." Management Accounting (UK) 70(5): 22-23.

Nord, W. R. and S. Tucker (1987). Implementing routine and radical innovation. Lexington, MA, Lexington Books.

Noreen, E. (1991). "Conditions under which activity-based cost systems provide relevant costs." Journal of Management Accounting Research 3: 159-168.

Norusis, M. J. (1999). SPSS regression models 10.0, Prentice-Hall.

Norusis, M. J. (2000). SPSS® 10.0 guide to data analysis, Prentice-Hall.

Nunnally, C. J. and I. H. Bernstein (1994). Psychometric theory. New York, McGraw-Hill.

Nunnally, J. D. (1978). Psychometric theory. New York, McGraw-Hill.

O'Dea W. and Clarke P. (1994). "Management accounting systems: some field evidence from sixteen multi-national companies in Ireland." Irish Accounting Review 1: 199-216.

Oppenheim, A. N. (2001). Questionnaire design, interviewing and attitude measurement. London, Printer Publishers.

Otley, D. (1994). "Management control in contemporary organizations: towards a wider framework." Management Accounting Research 5(3/4): 289-299.

Otley, D. T. (1980). "The contingency theory of management accounting: Achievement and prognosis." Accounting Organizations and Society 5(4): 413-428.

Pedhazur, E. J. and L. P. Schmelkin (1991). Design and analysis: an integrated approach. Lawrence Erlbaum Associates, Hillsdale.

Player , R. S. and D. E. Keys (1995). "Lessons from the ABM battlefield: getting off to the right start." Journal of Cost Management 9(4): 26-38.

Porter, M. (1980). Competitive strategy. New York, The Free Press.

Porter, M. (1985). Competitive advantage: creating and sustaining superior performance. New York, the Free Press.

Powell, T. C. (1992). "Organisational alignment as competitive advantage." Strategic Management Journal 13(2): 119-134.

Powell, T. C. (1995). "Total quality management as competitive advantage: a review and empirical study." Strategic Management Journal 16(1): 15-37.

Raffish, N. (1990). "How much does that product really cost." Management Accounting LXXI (9): 36-39.

Raffish, N. and Turney P. (1991). "Glossary of activity based management." Journal of Cost Management 5(3): 36-39.

Ramadan, S. (1985). The allocation of central overhead costs for the purpose of performance evaluation, University Of Glasgow.

Reeve, J. M. (1995). Projects, models, and systems--Where is ABM Headed? Working paper, the University of Tennessee.

Roberts, G. K. (1971). A dictionary of political analysis. London, Longman.

Roberts, R. W. S. a. J. (1993). "Accounting and control: a case study of resistance to accounting change." Management Accounting Research 4(1): 1-32.

Rogers, E. M. (1995). Diffusion of innovations. New York, The Free Press.

Ryan, B., Scapens R.W. and M. Theobold (2002). Research method and methodology in finance and accounting, 2nd Edtion, Thomson.

Saes-Torrecilla, A., A. Fernandez-Fernanez, J. Texeira-Quiros and M. Vaquera-Mosquero (1996). Management accounting in Spain: trends in thought and practice', in Bhimani, A(ed) Management Accounting: European Perspectives. Oxford, Oxford University Press, 180-98.

Scapens, R. W. (1984). Management accounting: a survey In Scapens, R.W., Otley, D.T., and Lister, R.J. (eds), management accounting, organizational behaviour and capital budgeting, London: Macmillan/ESRC, pp.15-95.

Scapens, R. W. (1991). Management accounting: a review of contemporary developments, Macmillan.

Scapens, R. W. and J. Arnold (1986). Economics and management accounting research in Bromwich, M.and Hopwood, A. (eds) research and current issues in management accounting London: Pitman, 78-102.

Scapens, R. W. and J. Roberts (1993). "Accounting and control: a case study of resistance to accounting change." Management Accounting Research 4(1): 132.

Scapens, R. W. and J. T. Sale (1985). "An international study of accounting practices in divisionalized companies and their associations with organizational variables." Accounting Review 60(2): 231-247.

Scherrer, G. (1996). Management accounting: a German perspective', in Bhimani, A(ed) management accounting: European perspectives. Oxford, Oxford University Press, 100-22.

Scruton, R. (1982). A dictionary of political thought. London, Macmillan 1982.

Sekaran, U. (1992). Research methods for business: a skill-building approach. New York, John Wiley & Sons.

Shank, J. K. a. G., Vijay (1988). "The perils of cost allocation based on production volumes." Accounting Horizons 2(4): 71-79.

Shannon, D. M. and M. A. Davenport (2001). Using SPSS® to solve statistical problems: a self-instruction guide. New Jersey, Merrill Prentice-Hall, Upper Saddle River.

Shields, M. D. (1995). "An empirical analysis of firm's implementation experiences with activity-based costing." Journal of Management Accounting Research 7(Fall): 148-166.

Shields, M. D. (1997). "Management accounting practices in Europe: a perspective from the States." Management Accounting Research 9(4): 501-513.

Shields, M. D. (1997). "Research in management accounting by north Americans in the 1990s." Journal of Management Accounting Research 9: 3-62.

Shields, M. D. and M. McEwen (1996). "Implementation activity-based costing systems successfully." Journal of Cost Management 10(4): 15-22.

Shields, M. D. and S. M. Young (1989). "A behavioral model for implementation cost management systems." Journal of Cost Management 2(4): 17-27.

Shields, M. D. and S. M. Young (1994). Behavioural and organisational issues. In Handbook of Cost Management, edited by R. Brinker. New York, Warren Gorham Lamont.

Shim, E. and E. Sudit (1995). "How manufactures price products." Management Accounting (UK) LXXVI (8): 37-39.

Siegel, S. (1956). Nonparametric statistics for the behavioral sciences. New York, McGraw-Hill.

Siegel, S. and N. J. Castellan (1988). Nonparametric statistics for the behavioural sciences, McGraw-Hill International Editions.

Simons, R. (1990). "The role of management control systems in creating competitive advantage: New perspectives." Accounting Organizations and Society 15(1-2): 127-143.

Simons, R. (1995). Levers of control: How managers use innovative control systems to drive strategic renewal. Boston, Massachusetts, Harvard Business School Press.

Sorensen, P. E. and P. Israelsen (1996). The diffusion of ' cost management' techniques in Danish manufacturing companies. The Annual Congress of the European Accounting Association, Bergen, Norway.

Spencer, C. and G. Francis (1998). Divisional measures: EVA® as a proxy for shareholders wealth. In Neely, A. D. and Waggoner, D. B. (eds.), Performance Measurement - Theory and Practice, Centre for Business Performance, University of Cambridge, 349-356.

Spicer, B. H. and G. Colbert (1990). A field based study of the management of internal sourcing and transfer pricing in a high technology company. The 2nd International Conference on Managing the High Technology Firm, Boulder University, Colorado.

Staubus, G. J. (1990). "Activity costing: twenty years on." Management Accounting Research 1(4): 249-264.

Stuart Burchell, C. C., Anthony Hopwood ,John Hughes and Janine Nahapiet (1980). "The roles of accounting in organizations and society." Accounting Organizations and Society 5(1): 5-27.

Swenson, D. (1995). "The benefits of activity-based cost management to the manufacturing industry." Journal of Management Accounting Research 7: 167-180.

Swenson, D. (1997). "Best practices in activity-based cost management." Journal of Cost Management 11(6): 6-14.

Szendi , J. and R. Elmore (1993). "Management accounting: are new techniques making in-roads with practitioners?" Journal of Accounting Education 11: 61-76.

Teece, D. J. (1980). "The diffusion of an administrative innovation." Management Science 26(5): 464-470.

Thomson and Graefe (1989). "CIM-a manufacturing paradigm,in." International Journal of Computer Integrated Manufacturing 2(5): 290-297.

Tolbert, P. S. and L. G. Zucker (1983). "Institutional sources of change in the formal structure of organizations: the diffusion of civil service reform, 1880-1935." Administrative Science Quarterly 28(1): 22-39.

Tornatzky, L. and M. Fleischer (1990). The process of technological innovation, Lexington: MA, Books.

Tornatzky, L. G. and K. J. Klein (1982). "Innovation Characteristics and Innovation Adoption-Implementation: A Meta-Analysis of Findings." IEEE Transactions on Engineering Management 29(1): 28-46.

Tritschler, C. A. (1970). "Sociological perspective on accounting innovation." International Journal of Accounting Education and Research (spring): 39-67.

Turney , P. B. B. (1991). "How activity -based costing helps reduce costs." Journal of Cost Management 4(4): 29-35.

Ugras, J. Y. (1994). "Factors affecting allocation of noncontrollable costs for performance evaluation use: a survey." Advances in Management Accounting 3: 255-278.

Utterback, J. M. and W. J. Abernathy (1978). "Patterns of Industrial Innovation." Technology Review 80(7): 40.

Utterback, J. M. and J. A. William (1975). "A dynamic model of process and product innovation." OMEGA 3: 639-656.

van de Ven and A. H. (1986). "Central problems in the management of innovation." Management Science 32(5): 590-617.

Van de ven, A. (1993). Managing the process of organizational innovation. In G.P.Huber and W.H. Glick, organizational change and redesign. New Your, Oxford University Press.

Virtanen, K., T. Malmi, J. Vaivio and E. Kasanen (1996). Drivers of Management accounting in Finland. in Management Accounting .European Perspectives ,Bhimani,A. New York, Oxford University Press: 54-73.

Vosselman, E. (1998). Making a professional controller visible in management accounting research: towards a pragmatic research paradigm. EIASM workshop on New Directions in management accounting: innovation in practice and research, Brussels.

Waeytens, D. and W. Bruggeman (1994). "Barriers to successful implementation of ABC for continuous improvement: a case study." International Journal of Production Economics 36(1): 39-52.

Watts, R. L. and J. L. Zimmerman (1986). Positive accounting theory, Englewood Cliffs: Prentice Hall.

Webster Jr. and F. E. (1971). "Communication and diffusion processes in industrial markets." European Journal of Marketing 5(4): 178-188.

Weinberg, E. (1983). Data collection: planning and management. Handbook of survey research, edited by Rossi, P.H., Wright, J.D. and Anderson, A.B. London, Academic Press,.

Wolfe, R. A. (1994). "Organizational innovation: review, critique and suggested research directions." Journal of Management Studies 31(3): 405-531.

Yakou, M. and V. P. Dorweiler (1995). "Advanced cost management systems: an empirical comparison of England, France, and the United States." Advances in International Accounting 8: 99-127.

Young, S. M. (1996). Survey research in management accounting: a critical assessment, in A. J. Richardson (ed), Research Methods in Accounting: issues and Debates. Vancouver, BC:, CGA Canada Research Foundation.55-68.

Zaltman, G., R. Duncan and J. Holbek (1973). Innovations and organizations. New York, Wiley.

Zikmund William, G. (2000). Business research methods. Fort Worth, Tex., Dryden.

Zmud, R. W. (1984). "An examination of 'push-pull' theory applied to process innovation in knowledge work." Management Science 30(6): 727-738.

Appendix

Appendix A

PRODUCT COSTING SYSTEMS QUESTIONNAIRE

(With specific emphasis on factors influencing the adoption, non-adoption and success of activity-based costing systems)

This survey seeks to document the content of product/service costing systems in UK organisations. In addition, it aims to determine the factors that influence the adoption (or rejection) of activity-based costing (ABC) systems and ascertain the views of management accountants on the degree of success of ABC systems, and the determinants of that success. The responses you give are confidential. The information shown in the top right hand corner will be used only to identify who has returned the questionnaire. It will not be disclosed to third parties under any circumstances.

You should answer the questionnaire from the perspective of the business unit that most clearly defines where you work (e.g. a head office of a divisionalised company, a division of a non-divisionalised company, a non-divisionalised company, etc.). Please answer only those sections that are relevant to your business unit and please feel free to omit any questions that you do not know the answer or where the information is too time-consuming to obtain. ***If your business unit does not have a formal system for assigning costs to products please proceed to page 7 and answer only section D.*** In return for participating you will receive a copy of our research findings.

When you have completed the questionnaire please return it in the enclosed prepaid envelope.

Thank you for your co-operation.

Professor Colin Drury
Huddersfield University Business School
Department of Accountancy and Finance
Queensgate
Huddersfield
HD1 3DH
E-mail j.c.drury@hud.ac.uk
Tel. 01484 472840

Mohammad Al-Omiri
Huddersfield University Business School
Department of Accountancy and Finance
Queensgate
Huddersfield
HD1 3DH
E-mail M.Al-Omiri@hud.ac.uk
Tel. 01484 472840

SECTION A - GENERAL QUESTIONS RELATING TO THE COSTING SYSTEM OF YOUR BUSINESS UNIT

(A1) Does your business unit assign indirect costs (overheads) to products (or services) Please tick one of the boxes below

If your business unit does not have a formal system for assigning costs to products please proceed to page 7 and answer only section D Yes [ ] No [ ]

If you have answered 'No' to Question A1 please answer only questions A5 and A9 in Section A.

(A2) The typical procedure for assigning indirect costs (i.e. overheads*) to products (or services)* involves a two-stage process. In the first stage indirect costs are allocated to cost centres (also known as cost pools). In the second stage indirect cost/overhead allocation rates are established for each cost centre to assign overheads to products/services. Please indicate below for the *first stage* approximately how many separate cost centres are used to assign indirect costs *to products/ services.* (For example, if your business unit does has 5 cost centres all of which use the same type of overhead allocation rate, such as direct labour hours, please insert 5 in the space below to indicate that 5 separate cost centres have been established. Where your unit does not establish separate cost centre overhead rates but uses a single rate for the unit as a whole you should insert 1 in the space below).

______ cost centres (PLEASE RECORD THE APPROXIMATE NUMBER HERE)

(A3) Please indicate below how many different types of indirect cost/overhead allocation recovery methods are used in the *second stage* of the two-stage procedure described in Question A2 for assigning indirect costs to products/services. (For example, if your business unit has five separate cost centres all using direct labour hours as the indirect cost/overhead recovery method, then please insert 1 in the space below to indicate that a single method is used. Alternatively, if your unit has 5 cost centres and uses two methods as overhead recovery allocation bases, such as direct labour hours and machine hours, you should tick 2 in the space below).

_______ different types of overhead recovery methods (PLEASE RECORD THE APPROXIMATE NUMBER HERE)

(A4) For the second stage of the two-stage allocation procedure described in Question A3 above please indicate the relative percentage usage of the following indirect cost/overhead rates to calculate product or service costs for decision-making purposes. For example, if your business unit only uses direct labour hours and machine hours and direct labour hours account for 60% and machine hours for 40% of the rates used, please insert these percentages in the spaces below:

	% usage
(a) Direct labour hour or cost based rates	
(b) Machine hour based rates	
(c) Material cost based rates	
(d) Production or cell time based rates	
(e) Rates based on units produced or sold	
(f) A variety of other rates (excluding those outlined above) associated with using an activity-based costing system.	
(g) Other (please specify and insert percentages) ……………………………………………………………… ………………………………………………………………	
Total	100

(A5) Over a typical year, approximately how many different products (or services) does your cost system assign costs to?

_______ (PLEASE RECORD THE APPROXIMATE NUMBER HERE)

(A6) For each of columns 1-3 below please circle one row to indicate how the *majority* of indirect selling, distribution and administrative costs are normally dealt with for determining the costs of products for discontinuation or product mix decisions **(Please omit this question if your business unit is a non-manufacturing organisation)**

	(1) Selling costs	(2) Distribution costs	(3) Administration costs
(a) Not allocated to products	1	2	3
(b) Allocated to products on the basis of the manufacturing cost of each product	1	2	3
(c) Allocated to products on the basis of the selling cost of each product	1	2	3
(d) Allocated to products on the basis of direct labour hours/cost or machine hours	1	2	3
(e) Assigned on the basis of the cause (identified as the cost driver) for each type of non-manufacturing cost	1	2	3
(f) Other (please specify)	…………………………………………………………………		
	…………………………………………………………………		

(A7) For each of columns 1-3 below please circle one row to indicate how the *majority* of indirect selling, distribution and administrative costs are normally dealt with for determining the costs of products or services for use in cost-plus pricing. **(Please omit this question if your unit does not use cost-plus pricing to determine selling prices).**

	(1) Selling costs	(2) Distribution costs	(3) Administration costs
(a) Not allocated to products	1	2	3
(b) Allocated to products using appropriate overhead recovery methods	1	2	3

(A8) Please indicate on a scale of (1) to (7) how satisfied you are with the accuracy of your cost system relating to the assignment of overheads (indirect costs) to your products or services for decision making purposes.

Not very accurate			Neutral			Extremely accurate
1	2	3	4	5	6	7
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

(A9) Regarding activity-based costing (ABC), please *tick one row* below to indicate which of the following stages best describes your business unit's current situation:

(a) Not considered: ABC has not been seriously considered	
(b) Considering: ABC is being considered and implementation is possible, but implementation has not yet been approved	
(c) Considered then rejected: ABC has been considered (not implemented) and rejected as a cost assignment method	
(d) Approved for implementation: Approval has been granted to implement ABC and allocate the necessary resources, but implementation has not yet begun	
(e) Implementation is in process: The ABC implementation team is in the process of determining project scope and objectives, collecting data and/or analysing activities and cost drivers	
(f) ABC was approved for implementation but abandoned prior to implementation	
(g) Implemented then abandoned: ABC was implemented but later abandoned.	
(h) Implementation is complete and is in the process of gaining acceptance	
(i) Implemented and generally accepted: ABC information is commonly used by non-accounting staff for decision-making and/or cost management purposes. It is considered a normal part of the information system.	

IF YOU HAVE TICKED (G) – (I) ABOVE PLEASE ANSWER QUESTIONS B2 – B9 IN SECTION B ON PAGES 3-5. ALTERNATIVELY, IF YOU HAVE TICKED (A) – (F) PLEASE ANSWER QUESTION B1 AND THEN PROCEED TO SECTION C ON PAGE 6.

SECTION B – QUESTIONS APPLICABLE ONLY TO THOSE UNITS THAT HAVE IMPLEMENTED ABC

(B1) Although ABC has not been implemented activity analysis is undertaken but the activities are not costed (Please tick the appropriate box below)

Yes [ ] No [ ]

(B2) How long has an ABC system been in operation within your business unit

Less than 1 year	1-2 years	2-3 years	3-4 years	4-5 years	5-6 years	6-7 years	7-8 years	8-9 years	Over 9 years
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

(B3) Please tick one of the rows below to indicate which of the following currently best describes your ABC system:

(a) The ABC system is currently in a pilot testing stage [ ]

(b) An ABC system has been implemented but it is operated in parallel with the previous costing system [ ]

(c) The ABC system represents the sole costing system [ ]

(B4) Please tick one item for each of the rows below to indicate the nature of ABC in your business unit

(a) ABC is used to assign costs to products or services for decision-making Yes [ ] No [ ]

(b) ABC is used to cost activities for cost control/cost management purposes Yes [ ] No [ ]

(B5) On a scale of 1 (not very successful) to 7 (totally successful) please circle one of the numbers below to indicate how successful you consider your ABC system has been in providing improved decision-making and/or cost management information.

Not very successful			Moderately successful			Totally successful
1	2	3	4	5	6	7

(B6) Please tick the 'Yes' or 'No' column for each row below to indicate for what purposes you are using ABC. Also for each of the rows that you have ticked the 'Yes' column please circle one of the numbers based on a scale of 1 (very unimportant) to 7 (vitally important) to indicate the degree of importance attributable to ABC information for each of the purposes specified.

Purpose	Yes	No	Very unimportant			Neutral			Vitally important
(a) Stock valuation			1	2	3	4	5	6	7
(b) Product or service discontinuation decisions			1	2	3	4	5	6	7
(c) Product/service mix decisions			1	2	3	4	5	6	7
(d) Outsourcing decisions			1	2	3	4	5	6	7
(e) Determining the cost of products or services for use in cost-plus pricing			1	2	3	4	5	6	7
(f) New product or service introduction decisions			1	2	3	4	5	6	7
(g) Design stage use for new products/services									
(h) Profitability analysis			1	2	3	4	5	6	7
(i) Cost reduction/cost management			1	2	3	4	5	6	7
(j) Budgeting			1	2	3	4	5	6	7
(k) Activity performance measurement and improvement			1	2	3	4	5	6	7
(l) Other (please specify) …………………………………									

(B7) Potential motives for adopting ABC are listed below. On a scale of 1 (very unimportant) to 7 (vitally important) please circle for each row one of the numbers to indicate the degree of importance attributable to each motive in the decision to adopt ABC.

	Very unimportant			Neutral			Vitally important
(a) The existing costing system was not reliable	1	2	3	4	5	6	7
(b) The existing costing system did not provide useful information to management	1	2	3	4	5	6	7
(c) It was necessary to update the existing costing information system	1	2	3	4	5	6	7
(d) Our competitors were using ABC	1	2	3	4	5	6	7
(e) Other units within the company had benefited from adopting ABC	1	2	3	4	5	6	7
(f) The changing cost structure created the need to replace the existing system	1	2	3	4	5	6	7
(g) The changing manufacturing environment created the need to replace the existing system	1	2	3	4	5	6	7
(h) Advice from parent or headquarters	1	2	3	4	5	6	7
(i) Pressure from government or other regulatory authorities	1	2	3	4	5	6	7
(j) We wished to try a new accounting innovation	1	2	3	4	5	6	7
(k) Advice from auditors and/or consultants	1	2	3	4	5	6	7
(l) The changing competitive environment created the need to replace the existing system	1	2	3	4	5	6	7
(m) To be seen as having a sophisticated costing system that was comparable with best practice	1	2	3	4	5	6	7
(n) Other (Please specify):							
....	1	2	3	4	5	6	7
....	1	2	3	4	5	6	7

(B8) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements which relate to the implementation and use of ABC within your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) Despite the implementation challenges I am convinced that ABC is the right accounting tool in our firm for helping us manage our costs and improve the accuracy of reported product/service costs	1	2	3	4	5	6	7
(b) Overall, the benefits of ABC data outweigh the costs of installing a new system	1	2	3	4	5	6	7
(c) In general ABC is a good thing for our company	1	2	3	4	5	6	7
(d) The costs reported by the ABC system matched my intuition about the relative costs of products and services	1	2	3	4	5	6	7

(B8) (Continued)	Strongly disagree			Neutral			Strongly agree
(e) Data from the ABC model provides an accurate assessment of costs in our firm	1	2	3	4	5	6	7
(f) ABC costs do *not* seem reasonable to me based on what I know about my business unit	1	2	3	4	5	6	7
(g) Information from the ABC system has had a noticeable positive impact on our firm	1	2	3	4	5	6	7
(h) Information from the ABC system is *not* widely used within our firm	1	2	3	4	5	6	7
(i) Information from the ABC system is widely used for special cost studies	1	2	3	4	5	6	7
(j) ABC receives strong active support from top managers	1	2	3	4	5	6	7
(k) Support for ABC in this company is widespread	1	2	3	4	5	6	7
(l) The managers of this business unit understand and are knowledgeable about ABC information	1	2	3	4	5	6	7
(m) Most managers in this business unit are capable of using ABC information for decision-making and cost reduction	1	2	3	4	5	6	7
(n) Upper management provided adequate resources for the implementation and operation of ABC	1	2	3	4	5	6	7
(o) ABC has been closely tied to the competitive strategies of the business unit	1	2	3	4	5	6	7
(p) Departments outside accounting (e.g. manufacturing, marketing etc.) have shown an interest in supporting ABC's success	1	2	3	4	5	6	7
(q) The ABC implementation team was truly cross functional	1	2	3	4	5	6	7
(r) ABC data has been linked to performance evaluations of non-accounting personnel	1	2	3	4	5	6	7
(s) Adequate training was provided for designing ABC	1	2	3	4	5	6	7
(t) Adequate training was provided for implementing ABC	1	2	3	4	5	6	7
(u) Adequate training was provided for using ABC	1	2		4	5	6	7
(v) When the ABC initiative began, its purposes were clear	1	2	3	4	5	6	7

(B9) What software is used for your ABC system:

(a) A specialised commercial package (Please specify ....) [ ]

(b) Spreadsheet such as Lotus etc. (Please specify ....) [ ]

(c) In-house developed software [ ]

(d) Other (Please specify ....) [ ]

PLEASE PROCEED TO SECTION D ON PAGE 7

SECTION C – QUESTIONS APPLICABLE TO BUSINESS UNITS THAT HAVE NOT IMPLEMENTED ABC

(C1) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements which relate to the reasons why your business unit has not implemented ABC.

	Strongly disagree			Neutral			Strongly agree
(a) ABC has never been considered because most of the accounting staff do not understand the concept (If you indicate that this applies to your business unit by ticking strongly agree please omit items (b) to (u) below)	1	2	3	4	5	6	7
(b) The perceived benefits of ABC do not justify the cost of implementing it	1	2	3	4	5	6	7
(c) Insufficient support from top management	1	2	3	4	5	6	7
(d) Resistance to change by the accounting function	1	2	3	4	5	6	7
(e) Lack of acceptance by managers	1	2	3	4	5	6	7
(f) The relatively small size of our firm does not justify implementing an ABC system	1	2	3	4	5	6	7
(g) Overheads are a small proportion of total costs so we do not need an ABC system	1	2	3	4	5	6	7
(h) Most of the costs in our business unit are fixed	1	2	3	4	5	6	7
(i) We do not operate in a very competitive environment so an ABC system is not required	1	2	3	4	5	6	7
(j) We do not have the information technology software to support an ABC system	1	2	3	4	5	6	7
(k) Lack of relevant employee skills in designing and operating an ABC system	1	2	3	4	5	6	7
(l) Lack of individuals to act as champions to support the introduction of ABC	1	2	3	4	5	6	7
(m) ABC systems are too complex	1	2	3	4	5	6	7
(n) ABC is limited in its ability to explain cost variability	1	2	3	4	5	6	7
(o) ABC is limited in its ability to assist in cost control	1	2	3	4	5	6	7
(p) ABC is limited in its ability to generate more accurate costs for decision-making	1	2	3	4	5	6	7
(q) Our competitors are not introducing ABC	1	2	3	4	5	6	7
(r) We are fully satisfied with our current costing system	1	2	3	4	5	6	7
(s) The control of overheads is already adequate	1	2	3	4	5	6	7
(t) Most products or services consume similar quantities of resources so there is no need to implement an ABC system	1	2	3	4	5	6	7
(u) Other reasons for not implementing ABC (Please specify)							
....	1	2	3	4	5	6	7
....	1	2	3	4	5	6	7

SECTION D – THE CONTEXT/ENVIRONMENT IN WHICH YOUR BUSINESS UNIT OPERATES

(D1) The scale below relates to outputs of products or services ranging from (1) highly standardised to (7) totally customised. Please indicate the point on the scale, which most appropriately describes the whole range of products or services marketed by your business unit.

Highly standardised			Neutral			Totally customised
1	2	3	4	5	6	7

(D2) For your products or services please circle the appropriate number on the scale below to indicate how much variation there is in the sales *volume* between the top 20% of the best selling items and the bottom 20% of the lowest selling items.

Little variation			Moderate variation			Considerable variation
1	2	3	4	5	6	7

(D3) On a scale of 1 (strongly agree) to 7 (strongly disagree) please circle for each row below one of the numbers to indicate the extent to which you agree/disagree with the following statements relating to the complexity of manufacturing (or service) provision within your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) The products/services marketed by the business unit are quite diverse	1	2	3	4	5	6	7
(b) Most products/services require similar resources to design, manufacture/provide and distribute	1	2	3	4	5	6	7
(c) There are major differences in the sales volumes between the different products/services	1	2	3	4	5	6	7
(d) Costs of support department (e.g. purchasing, information processing, marketing) resources consumed by each product/service line are about the same	1	2	3	4	5	6	7

(D4) On a scale of 1 to 7 please circle the appropriate number below to indicate whether customer preferences for your products/services over approximately the past 10 years have become:

Much easier to predict			About the same			Considerably harder to predict
1	2	3	4	5	6	7

(D5) On a scale of 1 (low) to 7 (extremely intensive) please circle the appropriate number below to indicate the level of competition in the market place for the major products/services of your business unit.

Low			Moderate			Extremely intensive
1	2	3	4	5	6	7

(D6) On the scale below please circle the appropriate number to indicate how intensive price competition is within your industry

Of negligible intensity			Moderately intense			Extremely intensive
1	2	3	4	5	6	7

(D7) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements relating to your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) Future demand for the products or services marketed by this business unit is extremely uncertain	1	2	3	4	5	6	7
(b) This business unit faces intensive competition from outside companies for business	1	2	3	4	5	6	7
(c) Over approximately the past 10 years the proportion of overheads within our cost structure has significantly increased	1	2	3	4	5	6	7
(d) Over approximately the past 10 years the level of competition for our products/services has significantly increased	1	2	3	4	5	6	7
(e) Over approximately the past 10 years the diversity of our range of products or services has significantly increased	1	2	3	4	5	6	7

(D8) For your business unit please provide an approximate percentage breakdown of your cost structure by entering the percentage in the appropriate spaces below:

<u>Manufacturing Organisations</u> (Please enter in this section only if your business unit is a manufacturing organisation)

	%
Materials that can be directly traced to products	
Labour that can be directly traced to products	
Direct non-manufacturing costs that can be directly traced to products	
Production *overhead* that **cannot** be directly traced to products	
Non-manufacturing *overhead* that **cannot** be directly traced to products	
	100

<u>Non-Manufacturing Organisations</u> (Please enter below only if your business unit is a non-manufacturing organisation)

	%
Costs that can be directly traced to products/services	
Indirect costs that cannot be directly traced products/services	
	100

(D9) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements relating to the quality initiatives that have taken place within your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) Total quality management, whereby most business functions are involved in a process of continuous quality improvement, is an extremely high priority	1	2	3	4	5	6	7
(b) Experiments to improve the quality of processes are frequently conducted	1	2	3	4	5	6	7
(c) Quality benchmarking with other companies or business units is tracked	1	2	3	4	5	6	7
(d) Workers are rewarded for quality improvement	1	2	3	4	5	6	7

(D10) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements relating to your business units information technology.

	Strongly disagree			Neutral			Strongly agree
(a) The organisation's information systems (e.g. sales, purchasing, manufacturing etc.) are highly integrated with (i.e. accessible by) each other.	1	2	3	4	5	6	7
(b) The information system offers user friendly query capabilities to various users	1	2	3	4	5	6	7
(c) A wide array of cost and performance data is available within the system	1	2	3	4	5	6	7
(d) Manufacturing (or service) provision and other operating data in the information system are updated 'real time' rather than periodically	1	2	3	4	5	6	7

(D11) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements which relate to lean production initiatives within your business unit. **(Please omit this question if your business unit is a non-manufacturing organisation).**

	Strongly disagree			Neutral			Strongly agree
(a) Set-up times are frequently reduced	1	2	3	4	5	6	7
(b) Material or component parts are delivered as needed rather than in large batches	1	2	3	4	5	6	7
(c) The plant layout is organised in flexible manufacturing cells	1	2	3	4	5	6	7
(d) Production is automatically altered if defective work is produced	1	2	3	4	5	6	7
(e) Cross training and job rotation are required	1	2	3	4	5	6	7
(f) Just-in-time techniques have been implemented	1	2	3	4	5	6	7

(D12) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements which relate to the pricing of products or services of your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) My business unit has significant influence in determining the selling prices of most of the products or services (i.e. the unit is a price-setter for most of the products/services)	1	2	3	4	5	6	7
(b) Prices tend to be set by overall market and supply forces and my business unit has little influence in determining the selling prices of most of the products or services (i.e. the unit is a price-taker for most of the products/services)	1	2	3	4	5	6	7

(D13) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements which relate to the use of cost data within your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) The cost of products or services must be highly reliable to compete in our markets	1	2	3	4	5	6	7
(b) Cost data is extremely important because of our cost reduction efforts	1	2	3	4	5	6	7
(c) Cost information is the most important factor when making product/pricing service decisions	1	2	3	4	5	6	7
(d) The business unit performs many special studies relating to product/service introduction, discontinuation, redesign, mix or cost reduction decisions	1	2	3	4	5	6	7
(e) The decisions specified in (d) above tend to be based on 'strategic reasons' rather than reported costs/profitability	1	2	3	4	5	6	7

(D14) For the purpose of this survey target costing is defined as a method used during the design or planning stage for a product or service. It involves estimating a target cost derived from deducting a desired profit margin from an estimated (or market-based) price to arrive at a desired cost. The product or service is designed to meet the target cost. It is an iterative process, normally involving a team approach, with redesign continuing until the predicted actual cost is less than or equal to the target cost. If the target cost cannot be attained the product or service is not normally launched. On a scale of 1 (never used) to 7 (extensively used) please indicate the extent to which target costing, as defined above, is used in your business unit.

Never used	Rarely used		Sometimes used			Extensively used
1	2	3	4	5	6	7

(D15) On a scale of 1 (never used) to 7 (extensively used) please indicate the extent to which the following techniques are used in your business unit.

	Never used	Rarely used		Sometimes used			Extensively used
(a) Value chain analysis	1	2	3	4	5	6	7
(b) Shareholder value analysis	1	2	3	4	5	6	7
(c) Benchmarking of operational processes, management processes or support activities with outside organisations	1	2	3	4	5	6	7
(d) Performance measurement based on the balanced scorecard	1	2	3	4	5	6	7
(e) Competitor cost assessment	1	2	3	4	5	6	7
(f) Strategic costing involving the use of cost data based on strategic and marketing information to identify superior strategies that will sustain a competitive advantage	1	2	3	4	5	6	7

(D16) When answering this questionnaire, how have you defined your business unit? That is the place that most closely identifies where you work (E.g. a head office of a divisionalised company, a division of a divisionalised company, a non-divisionalised company, etc.). Please specify:

____

(D17) Please briefly describe the industry sector / type of business undertaken by your business unit.

____

(D18) Please tick one box to indicate the sector which most appropriately describes the activities of your business unit.

Manufacturing sector	[ ]	Retail sector	[ ]	Service sector	[ ]
Financial and commercial sector	[ ]	Conglomerate	[ ]	Other	[ ]

(D19) Please insert the approximate annual sales turnover (in £ million) of your business unit in the last financial year:

________ million (PLEASE RECORD THE APPROXIMATE AMOUNT HERE)

(D20) Approximately how many employees work in your business unit

________ (PLEASE RECORD THE APPROXIMATE NUMBER HERE)

(D21) Which of the following applies to the costing system that you have described in this questionnaire:
If your unit does not use a formal costing system to assign costs to products please insert this statement in (c) below

(a) It is applicable only to the business unit where I am employed [ ]

(b) It is applicable also to other business units within the organisation [ ]

(c) Other (Please specify) ____

(D22) If your costing system is applicable to other business units, besides your own unit, please insert the *approximate* annual sales turnover (in £ million) of all the business units that your costing system serves.

£________ million (PLEASE RECORD A ROUGH APPROXIMATION OF THE AMOUNT HERE)

(D23) On a scale of 1 (strongly disagree) to 7 (strongly agree) please circle for each row below one of the numbers to indicate the extent to which you agree or disagree with the following statements relating to the overall performance of your business unit.

	Strongly disagree			Neutral			Strongly agree
(a) Over the past three years our financial performance has been outstanding	1	2	3	4	5	6	7
(b) Over the last three years our financial performance has exceeded our competitors	1	2	3	4	5	6	7
(c) Over the last three years our sales revenue growth has been outstanding	1	2	3	4	5	6	7
(d) Over the last three years our sales revenue growth has exceeded our competitors	1	2	3	4	5	6	7
(e) Taking into consideration all of the performance criteria, other than that described above, that is relevant to the business unit (e.g. costs, delivery, market share, productivity, quality and sales volume) our performance has been outstanding.	1	2	3	4	5	6	7

(D24) Please check the label on the front of the questionnaire and ensure that your correct name, job title and compnany name and address is shown. Also please provide us with the following information which will only be used to contact you directly in the event of a query.

Your E-mail …………… Your telephone number …………………………………

(D25) Would it be possible for a short meeting to be arranged to discuss some of the issues raised by this questionnaire?

Meeting possible [ ] (but seems not to be very practical) Meeting not possible [ ]

Thank you for taking the time to complete the questionnaire

Appendix B

Dear

We are currently undertaking research relating to product costing. A major objective of the research is to describe the nature, content and use of costing systems within the present-day environment.

The research objectives can only be achieved and the role of management accounting enhanced with your co-operation. Therefore we are writing to ask you if you would be prepared to participate in the research and complete the enclosed questionnaire. The questionnaire should take less than 30 minutes to complete. You will find that it will not be necessary to complete every section of the questionnaire. Please also feel free to omit any questions where you are unsure about the answer or where the information required is too time-consuming to obtain. A partially completed questionnaire is preferable to a non-response.

In return for your participation, you will receive a report of the research findings. Our plan is to provide you with the report within the next 6 months. We believe that the report will provide useful information that will enable you to benchmark your costing system with your industry and all responding organisations.

We undertake to ensure the confidentiality of all information received. The names of individual respondents and their firms will not be released under any circumstances. If you feel you have been incorrectly identified because you do not have sufficient knowledge relating to the content of the questionnaire we would be grateful if you could pass the documentation to the appropriate colleague within your organisation. It would be helpful if you could return the questionnaire within two weeks of the receipt of this letter.

Finally, brief information is provided about ourselves to indicate our ability to produce a quality report. Colin is the author of Europe's best selling management accounting textbook. He has also acted as adviser on cost management to one of the UK's leading firms of management consultants and is the co-author of a recent report titled 'Cost systems design in UK companies' published by CIMA. Mohammad is a university lecturer and the content of the survey forms part of the PhD that he is currently undertaking. The success of his PhD will be dependent on a sufficient questionnaire response rate.

We hope you will agree to participate. Thank you for your co-operation.

Yours sincerely

Colin Drury

Colin Drury
Professor
Department of Accountancy and Finance

Mohammad Al-Omiri
Researcher
Department of Accountancy and Finance