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**THE INFLUENCE OF CONTEXTUAL FACTORS ON COST
SYSTEM DESIGN AND PRICING DECISIONS: A STUDY OF UK
COMPANIES IN THE FOOD PROCESSING AND OTHER
INDUSTRIES**

Huda Al-Hussari

**A Thesis Submitted to the University of Huddersfield in Partial Fulfilment of the
Requirements for the Degree of Doctor of Philosophy**

**The University of Huddersfield
Huddersfield University Business School**

February 2006

Abstract

In an attempt to provide a better understanding of product costing system design, this study utilises the contingency theory approach to investigate the contingent relationships between several contextual factors and the design of product costing system simultaneously. This study also investigates the contingent relationships between several contextual factors with the importance of cost-plus pricing, and the mediating effect of the importance attached to cost-plus pricing on the relationship between contingent factors and product costing system design. In addition, this study investigates the implications of fit, internal consistency or coalignment between the contextual factors and product costing system design on organisational effectiveness. This study also seeks to develop a wider and more comprehensive view of product costing system design than the approach that has generally been used by previous studies (i.e. classifying costing systems by two discrete alternatives, either traditional or ABC systems).

In addition, in today's competitive environment comprehensive product cost systems should provide increased accuracy for managerial decisions concerning products, pricing and discontinuing and/ or reengineering existing products. In markets where there is a generally accepted market price, firms have limited power to make pricing adjustments. Undoubtedly firms have to decide which products to sell and to determine the target product mix. Therefore, undertaking periodic profitability analysis is of vital importance. In the more common situation, where the market price is not given a priori, cost-plus pricing may be used whereby an appropriate percentage mark-up is added to the estimated cost to determine the proposed selling price. Therefore where cost information is used for cost-plus pricing decisions accurate cost information is likely to be crucial. While there is a substantial literature on costing systems, far less is known about the use of cost data in pricing decisions and profitability analysis. A distinguishing feature of the research is that it provides a contribution to the research literature on the understanding of the role that cost information plays in determining the selling prices and profitability analysis.

A cross-sectional survey employing a questionnaire method of data collection was adopted. A total of 152 usable responses were received representing a response rate of 17%. For purposes of analysis, the research utilises descriptive statistics and structural equation modeling (SEM) multivariate statistical techniques enabled by EQS 5.7 version software (Bentler, 1995). Thus, this study is one of the first studies in product costing systems and cost-plus contingency literature to utilise SEM for validating the research constructs, controlling measurement error and for testing the structural relationships between the constructs simultaneously. Also, this is the first study to investigate and compare product costing practices in a single industry (i.e. the food industry) with the other UK industries, and therefore, examining and controlling to some extent for industry effects for the observed practices.

The results of the descriptive analysis show that direct costing measures are extensively used for cost-plus pricing and profitability analysis purposes. Other absorption costing measures are also used but to a significantly lesser extent. Despite the popularity of the cost-plus pricing approach, only 50% of the companies report using it in their price setting with emphasis being more given to market factors such as competition and demand. The findings also emphasise that analysing the profitability of products and services at periodic intervals is considered to be a vitally important task. The results of structural equation modelling suggest a strong support for the influence in determining selling prices, importance of cost information, aspects relating to the intensity of competition, and the extent of the use of total quality management have a significant influence on the level of cost system sophistication. This research also provided insightful findings relating to the effectiveness of sophisticated costing systems. The results also indicate that market share, customisation, the influence in determining selling prices, aspects of differentiation strategy, intensity of competition, and the importance of cost information influence the importance of cost-plus pricing. Finally, this study contributes to the literature by utilising the structural equation modelling method, which has several advantages over other multivariate data analysis.

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Chapter 1 Introduction

- 1.1 Introduction**
- 1.2 Background to the study**
- 1.3 Motivation for undertaking the research topic**
- 1.4 Research rationale and significance**
- 1.5 Research objectives**
- 1.6 Alternative management accounting research approaches**
 - 1.6.1 Traditional (economic-based) management accounting research**
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1.1 Introduction

The aim of this chapter is to provide a general introduction to the thesis. It begins with a section that provides the background to the study covering how the changing environment resulted in claims that management accounting had lost its relevance and the resulting responses to these criticisms. This is followed by sections that discuss the motivation and reasons for conducting the research study and the significance of the study. The next section lists the major research objectives. This is followed by a description of the alternative approaches of management accounting research and a description of the theoretical framework for conducting this research. The final section presents the organisation of the thesis.

1.2 Background to the study

The development of management accounting can be traced from its 19th century emergence in response to the industrial revolution. According to Johnson and Kaplan (1987), most of the management accounting practices that were being used in the mid-1980's had been actually developed by 1925. In the intervening period they claimed that virtually no further developments had occurred despite the changing environment. Although Johnson and Kaplan drew attention to the lack of development of many different aspects of management accounting they particularly emphasised the lack of developments in relation to product costing. They attribute part of this stagnation in product costing to the dominance of financial accounting as corporate ownership increased and the demand for audited financial statements grew. The preparation of published external financial accounting statements required that costs be allocated between cost of goods sold and inventories. Cost accounting emerged to meet this requirement. Simple procedures were established to allocate costs to products that were objective and verifiable for financial accounting purposes. These simplistic procedures focused on providing total inventory and cost of sales calculations that were sufficiently accurate for profit measurement and little attention was given to the accuracy of individual product costs since accuracy at the individual product level was not essential for financial accounting purposes. Such costs, however, were not sufficiently accurate for decision-making purposes and for distinguishing between profitable and unprofitable products and services.

Johnson and Kaplan concluded that the situation arose because focusing on establishing more accurate product costs for decision-making was not worth the benefits. Thus, companies relied primarily on the same information as that used for external financial reporting to manage their internal operations. Johnson and Kaplan concluded that the lack of management accounting innovation over the decades and the failure to respond to its changing environment resulted in a situation in the mid-1980s where firms were using management accounting systems that were obsolete and no longer relevant to the changing competitive and manufacturing environment.

During the late 1980s, criticisms of current management accounting practices were widely publicised in the professional and academic accounting literature. In 1987 Johnson and Kaplan's book titled *Relevance Lost: The Rise and Fall of Management Accounting*, was published. This book highlighted the paradigm shift in the product costing environment and the need for firms to review their product costing system. An enormous amount of publicity has been given to the authors' criticisms of management accounting. Many other commentators also concluded that management accounting was in a crisis and there was a need for change (Drury, 2004).

In the past two decades considerable changes in the product-costing environment have occurred. During the early decades of the 20th century the norm was a simple manufacturing environment in which a single or few products were produced. Indirect cost structure was insignificant within the total cost structure and labour was considered to be an important element of cost as most of the manufacturing activities were labour-intensive. The costs of information accessibility and measurement were high. In addition, the level of competition was low and was mainly on a non-global basis.

In the last two decades of the 20th century there were a myriad of changes in the form of the need for many organisations to market many diversified products/services, the emergence of a complex manufacturing environment, advanced information technology, and global competition (Johnson and Kaplan, 1987). Generally the complex manufacturing environment led to the decrease in labour intensive manufacturing resulting in decreasing labour costs and an increase in indirect costs. Furthermore, information technology advancement took a great leap during this period, thus facilitating not only greater accessibility and reduced product measurement costs but also expediting and simplifying communication processes

both locally and globally. This improvement in communication facilities prompted increased local and global competition. To have a competitive edge firms were forced to look into satisfying the needs of customers resulting in the emergence a quality culture. These changes have brought about advanced production techniques in the form of just-in-time (JIT) systems, automation and computer-aided manufacturing/service and total quality management. It also became apparent that there was also the need to alter the management accounting systems to cope with the changing environment.

The decreasing information processing costs and the changing environment resulted in a few firms in the USA and Europe implementing innovative product costing systems during the 1980's. In a series of articles based on observations of these innovative product costing systems Cooper and Kaplan (1987, 1988, 1991, and 1992) conceptualised the ideas underpinning these systems and described these systems as activity-based costing (ABC) systems. These articles generated a considerable amount of publicity and consultants began to market and implement ABC systems in the late 1980's and 1990's.

The strong criticisms by Johnson and Kaplan relating to current management accounting practices and the extent of use of innovative ABC systems were based mainly on anecdotal evidence derived from companies in the USA. For example, Anthony (1989) stressed that in the USA information about management accounting practices was 'abysmally poor' and almost all was anecdotal. He argued that there was a need for survey information that provided statistical evidence relating to the actual use of management accounting techniques and criticised the often made assumption in the literature that a particular technique was widely used when no statistical evidence was available relating to its use. Similar views were expressed within a European context by Holzer and Norreklit (1991) who stated that cost accounting practices in industry were 'difficult to verify' since no reliable survey data is available. These developments have resulted in considerable more emphasis being given to survey related research of management accounting practices in many countries over the past two decades.

1.3 Motivation for undertaking the research topic

The considerable amount of publicity that has been given to product costing, and ABC in particular, provided the motivation for initially undertaking research relating to ABC. Because the agricultural and food processing industry is a prominent industry in my own country (Syria) my initial intention was to examine ABC within the food processing industry. However, it became apparent during the literature review and the development of the research proposal that focusing on a specific industry was too narrow and there was a danger that any postal questionnaire survey would result in insufficient responses for undertaking appropriate statistical analysis. It was also apparent that virtually all of the product costing research had focused on ABC and that hundreds of ABC articles had been published in practitioner and academic journals (see Bjornenak and Mitchell, 2002 and Jones and Dugdale, 2002). The literature review indicated that ABC research was close to a saturation point. Furthermore, ABC surveys (Innes et al., 2000) indicated that the majority of organisations continue to operate non-ABC systems. Thus, focusing only on ABC represented too narrow approach in relation to product costing and the area had already been extensively researched. The literature review also indicated that product costing systems varied from simplistic traditional to sophisticated ABC systems. Therefore it was decided to focus on product costing systems in general and not to restrict the survey to a single industry. The research, thus, examines product costing within the manufacturing and non-manufacturing sector but in order to examine any industry effects product costing within the food manufacturing industry is also examined. This was based on the conclusion made by Clarke and Mia (1993) that adoption rates as well as the reasons for adopting ABC may differ significantly between industry groups (The justification for examining and comparing a single industry (i.e. the food industry with the other UK industries) is provided in Chapter 6 section 6.4.)

Because product costing information is required for many different purposes (e.g. inventory valuation, pricing decisions, cost reduction etc.) a decision was taken to concentrate on one particular aspect – product costing information for pricing decisions. The initial literature review also revealed that many organisations do not make pricing decisions because prices are set by the markets or by dominant leaders. For such price-taking organisations product cost information is used for

product/service profitability analysis to identify loss making products/services that may require to be discontinued. Thus, to cover all aspects of cost information relating to pricing it was considered appropriate to examine the product cost information that is used for periodic profitability analysis and the role and purpose of profitability analysis within organisations.

1.4 Research rationale and significance

In the previous section it was pointed out that most of the empirical research relating to cost system design has focused on activity-based costing systems. Little research has, however, been conducted on product costing apart from ABC. Few survey-based studies could be found from the literature review that adopted a wider perspective in examining the characteristics of the product costing systems. It was apparent from the literature review that product costing research has been mostly descriptive and there has been little attempt to explain how potential explanatory variables influence differences in observed practices. There was also a lack of consistent findings from the few empirical surveys that had been undertaken. In the light of this apparent gap and the lack of coherent findings from the ABC contingency studies this study adopts a broader perspective and examines cost system design choices that vary along a continuum ranging from very simplistic to highly sophisticated costing systems. Therefore, this study answers the recent calls from several academics to develop and adopt a wider and more comprehensive definition of product costing system design (Abernathy et al., 2001; and Drury and Tayles, 2005) rather than the narrow and partial definitions considered in product costing ABC contingency studies. The recognition of a wider definition of product costing system design adopted in this study (a detailed discussion on product costing design dimensions and the logic for considering them is provided in Chapter 2, section 2.5) is expected to provide a better description of the characteristics of product costing systems and assist in the interpretation of some of the earlier findings.

A major feature of this research is that it adopts a contingency theory framework approach to seek to explain the observed product costing practices. Although a contingency approach had been adopted with previous ABC research this research seeks to enhance the approach by considering the impact of several contingent variables together using structural equation modelling (SEM). Previous research has tended to focus on each contingent variable individually using more simplistic

bivariate statistical analysis. Additional insights can be gained by considering contextual variables together because when they are examined individually, the relations between particular contextual variables and product costing system design can be difficult to interpret. These relations could reflect a causal connection between a contextual variable and product costing system design, or alternatively, they could be spurious and merely reflect mutual relations with other contextual variables. In addition, the limited empirical studies are subject to the limitations discussed in section 1.6 such as not incorporating organisational effectiveness in their models. This study, therefore, responds to many calls from management accounting researchers (e.g. Otley, 1980; Otley and Wilkinson, 1988; Chenhall, 2003) to include organisational effectiveness within contingency based models.

It is widely noted in the normative literature that cost information can play a key role in determining selling prices (Drury, 2000; Horngren et al., 2000; Langfield-Smith et al., 1998). The literature review revealed a lack of development and knowledge on the role of cost information in pricing decisions and the need for systematic empirical research on this topical area have provided a major motivation for undertaking the current study. Therefore, a further contribution of this study relates to the fact that most of the cost-plus pricing studies, as evidenced from the literature reviewed in Chapter 4, have been undertaken prior to the mid 1980's. Therefore, it is of interest to ascertain whether the findings of previous studies also continue to apply to the UK current environment. In addition, these studies have mostly relied on descriptive statistics such as percentages, cross tabulations, and so on. Only few studies have examined the significance of the contextual factors that might affect the widespread use of cost-plus pricing. Thus, in an effort to provide better understanding of this topic this study aims to shed light on pricing decisions and costing practices used in UK companies, and to determine to what extent pricing is determined by full cost versus direct cost data and to what extent contextual factors affect the importance of cost in pricing decisions.

In addition, where cost information is used for cost-plus pricing decisions accurate cost information is likely to 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. Although improved costing information for making pricing decisions was identified as an important factor in the decision to

adopt ABC systems (see Chapter 4) previous research has mostly studied cost-plus pricing in isolation of product costing system and, therefore, there is only a limited understanding of the possible relationships between the importance attached to cost-plus pricing and the level of product cost system sophistication. Thus, there is a need for research that examines the relationship between the importance attached to cost-plus pricing and product costing systems and to determine whether the importance of cost-plus pricing has a mediating effect on the relationship between the contextual variables and product costing system design.

When prices are set by the market a firm has to decide which products to sell given their market prices. The management accounting system, therefore, has an important role to play in providing information for undertaking periodic profitability analysis to determine the relative profitability of different products and services so that management can determine the target product mix to which its marketing effort should be directed. Recent research into management accounting practices suggests that profitability analysis is considered to be one of the most important management accounting functions. The writings of Cooper and Kaplan have stressed that periodic profitability analysis provides the foundation for managing the existing mix of activities and that it provides a strategic review of the costs and profitability of a firm's products, customers and sales outlets. 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. Kaplan and Cooper (1998) also point out that one of the major benefits of ABC systems relates to the improved quality of profitability analysis. There is also evidence to suggest that companies are placing increasing emphasis on profitability analysis. Despite the increasing importance that has been attributed to profitability analysis both within the literature and in practice a literature search was unable to identify any prior empirical work concerned with appraising the incidence or the nature, content and role of profitability analysis. The lack of empirical research on profitability analysis has also provided the motivation to identify the nature, content, and role of product/service profitability analysis in the UK companies.

Addressing the above-mentioned issues provided the significance and motivation for undertaking this study. In addition, it is also observed that most of the surveys relating to product costing were conducted in the USA. There is a scarcity of

empirical contingency product costing research that has been undertaken in the UK. In particular, little attention has been given to examining the influence of the potential explanatory variables on the cost system design and cost-plus pricing in the UK. This motivated the researcher to conduct research relating to product costing within the UK.

1.5 Research objectives

The research aims to achieve a number of objectives:

1. To investigate and compare the level of sophistication of management accounting systems for product costing purposes in price-taking and price-making organisations;
2. To appraise the incidence, nature and role of profitability analysis and to ascertain the information that is used/extracted from within the profitability analysis for attention-directing and decision-making purposes;
3. To examine the relationship between hypothesised contextual/contingent variables and the importance of cost information in making pricing decisions;
4. To examine the *direct* relationship between hypothesised contextual/contingent variables and the level of sophistication of product costing systems;
5. To examine the *indirect* relationship between hypothesised contextual/contingent variables specified in (3) above, acting through the importance of cost information for pricing decisions, and the level of sophistication of product costing systems
6. To examine the relationship between the contingent variables, the level of product cost system sophistication and organisational performance.

1.6 Alternative management accounting research approaches

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) management accounting research can be classified by 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.

The above classifications represent only broad general categories. Therefore, some of the types of research may clearly be classified within one of these categories but other research has the potential to be classified within more than one of the categories.

1.6.1 Traditional (economic-based) management accounting research

Prior to the 1970s, management accounting research was mostly normative in nature and based primarily on neoclassical economics (Scapens, 1984). The normative neoclassical economic framework was based on the assumptions of certainty and costless information, whereby the decision-maker had available all of the required information 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 1960's and 1970's researchers started to refine the normative models to incorporate uncertainty. However, costless information was still assumed to be available. Later in the 1970's researchers began to incorporate information economics into the models (Scapens, 1991). Scapens 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. Therefore, 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 1980's anecdotal evidence suggested that there was a wide gap between the theory and practice of management accounting, as many of the

techniques appeared to be little used in practice. 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 al., 2002, p.75)

The positive theories were based on empirical data and concerned with either explanation or prediction. Ryan et al. (2002) 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.

Although positive theories informed by neoclassical economics might be useful for predicting general trends they were not helpful in explaining individual behaviour (Ryan et al., 2002). Therefore, some researchers in the late 1960's started to draw off behavioural science, psychology (behavioural research), and organisational theory to explain management accounting practices.

1.6.2 Behavioural accounting research

Behavioural accounting research is mainly concerned with examining the effects of accounting control systems, such as budgetary control techniques, on individual behaviour and organisational performance. This stream of research attempts to identify variables that can be manipulated in the design of budget systems, such as budget targets, budget participation so as to improve performance. 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 was that it considered people to be an important element in influencing the operations of a budget system in organisations. Ryan et al. (2002) pointed out that 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.

1.6.3 Research drawing off organisational theory

During the 1970's researchers began to explain the organisational aspects of management accounting drawing off organisational theory. Different elements of organisational theory (e.g. contingency theory, systems theory and organisational and behavioural decision theory) were used by management accounting researchers to explain management accounting practices. However, according to Otley (1984) 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 directly using empirical data.

In response to Otley's criticisms a considerable amount of work has been undertaken using 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). 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.

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

1.6.4 Research drawing off social theory

The main argument for using social theory for explaining accounting practices came from an article by Burchell et al. (1980) by which accounting researchers were encouraged to incorporate insights from the social sciences, in particular the work of critical social theorists into their research. This resulted in the 1980's in a management accounting research theme that drew off the work of social theorists. This research

can be divided into two main strands - interpretive and critical research (Ryan et al., 2002).

Ryan et al. (2002) 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.

1.6.5 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.(2002) state that since the late 1980's a considerable amount of research has been undertaken that concentrates on describing management accounting practice without attempting to develop or test any existing theory. Ryan et al. (2002) 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. Therefore, much of this research concentrated on 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 the identified gap between theory and practice of management accounting. Practice-oriented research is therefore deemed important to obtain a general picture of management accounting practices and identify the extent of usage and purposes of new techniques.

The enormous amount of publicity given to Johnson and Kaplan's (1987) criticisms of management accounting practice provided a further motivation for undertaking practice-oriented research. Most of Johnson and Kaplan's criticisms were derived either from a lack of knowledge of practice and the reliance on 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 validity of these criticisms.

A further aspect of research falling within practice-oriented research 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.

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 authored 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.

In terms of this research the first objective (to investigate the level of sophistication of management accounting systems for product costing purposes in price-taking and price-making organisations) and the second (to investigate the incidence, nature and role of profitability analysis and to ascertain the information that is used/extracted from within the profitability analysis for attention-directing and decision-making purposes) can be classified as descriptive practice oriented research. To achieve the final four objectives listed in section 1.4 a contingency theory theoretical framework is adopted. Contingent variables are identified from the literature and appropriate statistical tests are undertaken to ascertain their influence.

The contingency theory framework research has mostly involved the use of cross-sectional studies (in which measures of the relevant variables are obtained by mail or interview-based questionnaires) and attempting to identify statistical relationships between the contingent variables and aspects of the management accounting control systems. Because this study adopts a contingency theory theoretical framework this framework is discussed in more detail in the next section.

1.7 Contingency theory framework

In the mid 1970s, the contingency theory approach emerged to explain the contingent nature of accounting information system design. According to Otley (1980, 1999) the contingency theory framework to management accounting advocates that there are no universally applicable management control and accounting systems, but the choice of an appropriate system will depend on the circumstances surrounding organisations. The contingency approach assumes that the appropriateness of different management control systems depends on the settings or context of the organisation and failure to match management control systems with the context of the organisation is likely to lead to organisational decline in the long run. In other words, the contingency approach maintains that organisations that achieve a fit or alignment between management control systems and contextual factors are in some way more effective. Thus, organisational effectiveness and fit are two key notions or concepts that need to be emphasised and considered by researchers adopting the contingency approach in order to produce concrete research findings.

Management accounting research adopting a contingency theory framework has mostly focused on explaining observed practices in relation to different characteristics

of management accounting control systems, however, it has recently been 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 (see Figure 1.1) 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), and knowledge and observability factors (Fisher, 1995).

Figure 1.1: Contingent variables grouped by major categories

- **The external environment**
 - Uncertain and certain
 - Static and dynamic
 - Simple and complex
 - Turbulent and calm

- **Competitive strategy and strategic mission**
 - Low cost and differentiation
 - Defender and prospector
 - Product life cycle (build, hold, harvest, and divest)

- **Technology**
 - Small batch, large batch, process production, mass production
 - Interdependence (pooled, sequential, reciprocal)

- **Business unit, firm and industry variables**
 - Firm size
 - Firm diversification (single product, related diversified and unrelated diversified)
 - Organisational structure
 - Industry variables

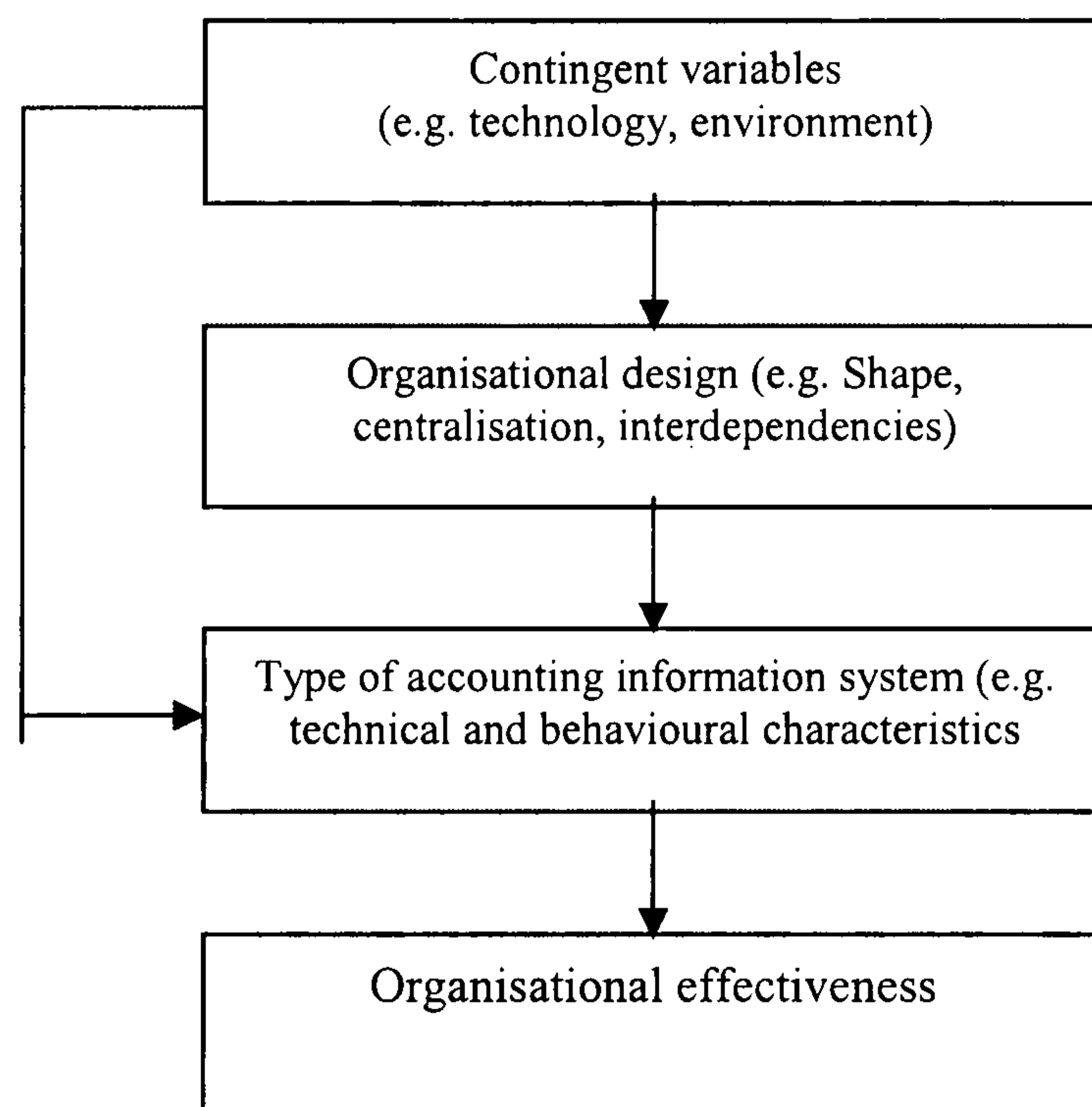
- **Knowledge and observability factors**
 - Knowledge of the transformation process
 - Outcome (output) observability
 - Behaviour (effort) observability

Source: Fisher (1995, p. 30)

Management accounting using a contingency approach has attempted to relate a range of contextual factors such as perceived environmental uncertainty (e.g. Gordon and Narayanan, 1984; Govindarajan, 1984), technology (e.g. Chenhall and Morris, 1986), strategy (e.g. Govindarajan and Gupta, 1985; Simons, 1987) with the design of

management accounting system. Researchers such as Hayes (1977) and Waterhouse and Tiessen (1978) have argued that the nature of an appropriate accounting system depends on several circumstances in which an organisation finds itself. In this context, Waterhouse and Tiessen (1978) suggested a model for contingency research on management accounting system design, which is concerned with illustrating the possible relationships between organisational design and the effective design of management accounting system and organisational effectiveness (see Figure 1.2).

Figure 1.2: A model for contingency research on management accounting system design



Source: Otley (1980, p. 420)

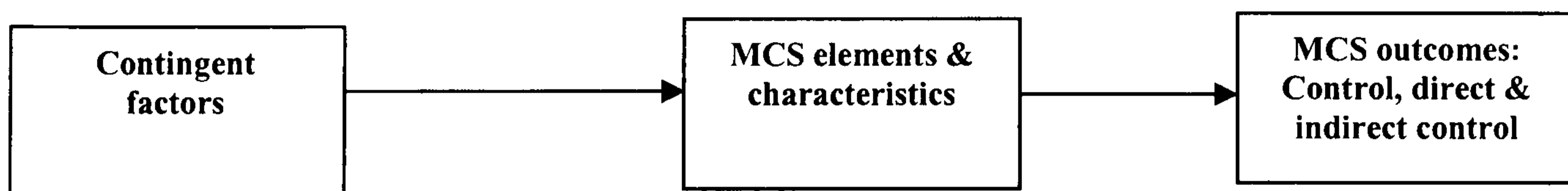
In relation to this model, several researchers (e.g. Kandwalla, 1972; Hayes, 1977) have considered the possibility of a direct relationship between the contingent variables and accounting information design either alone or in conjunction with organisational structure. In addition, Chenhall (2003) argued that several studies have used the effectiveness as a dependent variable and other studies have not. He also indicated that researchers use both approaches, but care is required in following either approach. It should also be noted that no single study had combined all four stages in the model shown in Figure 1.2 (Otley, 1980). The debate concerning contingency-based accounting control studies has therefore focused on whether organisational structure should be included as an intervening variable and also whether organisational effectiveness should be incorporated as the dependent variable.

However, contingency-based research has not yet developed a comprehensive contingency theory of accounting (Chapman, 1997). Thus, it can be noted that there is no comprehensive approach for contingency studies. However, the contingency theory framework is adopted to assist managers in achieving organisational objectives, but this depends on the appropriate design of management control system. The appropriate design of management control system will be influenced by a set of contextual factors. Otley (1980, p.425) concludes that:

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

Merchant (1998) indicated that the contingency theory of management accounting, which is mainly concerned with control systems design, implies that there is no universally best management control system which applies to all situations in all organisations. He also argued that managers must consider different contingent variables while they are designing, implementing and using management control systems. Thus, Merchant (1998) has depicted a general contingency framework (see Figure 1.3), in which the contingent variables influence the design of management control system and the match between the contingent variables and management control system characteristics will result in various control outcomes.

Figure 1.3: A general management control system contingency framework



Source: Merchant (1998, p. 728)

As mentioned earlier, there is no best management control system design that is applicable to all situations in all organisations. Thus, it is expected that different organisations will have several organisational design and processes. However, several contingent variables have been suggested in the literature of management accounting to influence the choice and design of management control system.

It should be noted that contingency theory has resulted in a continuing stream of studies seeking to explore the contingent nature of accounting. Two streams of contingency studies of accounting were presented by Chapman (1997). The first stream of studies has concentrated on the role of the use of accounting information in performance evaluation (e.g. Hopwood, 1972; Otley, 1978). The second stream of studies has been concerned with how accounting systems might be affected by a variety of contingent variables (e.g. Gordon and Miller, 1976; Gordon and Narayanan, 1984; Gul and Chia, 1994). In addition, the application of the contingency theory framework to the analysis and design of organisational control systems has generated a considerable amount of interest. Thus, accounting researchers have invoked contingency theory when studying the relationship between organisational factors and the design of management control system (Widener, 2004).

Management accounting systems, which are considered to be a subsystem within the control system of the organisation, have been the subject of many empirical studies, but these studies have several limitations. Most of the limitations of contingency theory studies relate to how the theory has been applied (the research designs and models) rather than to the contingency approach itself. Several academics and researchers (e.g., Otley, 1989 and 1999; Dent, 1990; Chapman, 1997; Langfield-Smith, 1997; Ittner and Larcker, 2001; Chenhall, 2003) concluded that addressing the limitations of earlier contingency research in future research would provide more concrete and clear conclusions about the appropriateness of management control systems under various organisational settings and, thus, advance the current knowledge of this topical area. A key limitation of management accounting contingency research (Fisher, 1995) relates to the tendency of researchers to use simple bivariate models (i.e. attempting to correlate a single contingent variable with a single control attribute - e.g., Govindarajan and Gupta, 1985; Simons, 1987; Gul, 1991). Fisher (1995, 1998) further argues that the effects of some variables that are significant in a bivariate analysis might fail to show significance in systematic multivariate analysis. Much of the richness and complexity of management control systems design may not be uncovered if multiple contingent factors are not examined simultaneously.

Moreover, several writers have criticised previous management control contingency studies for their insufficient attention to the concept of organisational effectiveness

which is considered as one of the key notions of the contingency approach (Otley, 1980; Miller, 1981; Drazin and Van de Ven, 1985; Pennings, 1992; Dent, 1990; Fisher, 1998). Unfortunately, although the literature on contingency theory emphasises the need to consider organisational effectiveness as a vital part of a contingency control system design many of management control contingency studies have either not explicitly considered organisational effectiveness in their models (e.g., Bruns and Waterhouse, 1975; Gordon and Narayanan, 1984; Chenhall and Morris, 1986; Sim and Teoh, 1997) or have measured organisational effectiveness 'performance' using different questionable methods. For instance, some studies (Gul, 1991; Gul and Chia, 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., profits) to measure effectiveness. 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 (Miller, 1981; Langfield-Smith, 1997). Various researchers have emphasised the importance of using a multiplicity of dimensions (financial and non-financial measures) rather than any single dimension to measure organisational effectiveness (e.g., Govindarajan, 1984; Govindarajan and Fisher, 1990; Langfield-Smith, 1997; Hoque and James, 2000).

A further key limitation of contingency studies relates to the way researchers defined and measured the variables used in their studies. Many of the variables used are abstract or theoretical constructs that are not capable of direct measurement such as environment uncertainty, competitive strategy, organisational structure and organisational effectiveness constructs (Ittner and Larcker, 2001; Sharma, 2001). In addition, these theoretical constructs are subject to measurement error and this has negative implications on the significance and validity of results found (further details on this point are provided in Chapter 8). Only few contingency studies reviewed have controlled for measurement error prior to conducting their analysis. In addition, many studies in management accounting have not systematically demonstrated the validity of the constructs used in their studies (Ittner and Larcker 2001; Sharma, 2002; Smith and Langfield-Smith, 2002; Chenhall, 2003). Many of these studies simply conduct a reliability analysis without verifying statistically the validity of these constructs prior to aggregating the items into a single scale. Thus, researchers are required to develop

and refine constructs used in their studies in order to unravel some of the contradictory results found in management accounting contingency research.

The above brief review of the contingency theoretical framework has indicated that most of the research has been applied to explaining different aspects of management control. Chenhall (2003) has advocated that the contingency research should be extended to examine other aspects of management accounting including the contextual factors influencing the adoption of accounting innovations such as ABC and the balanced scorecard. Chenhall's review of the contingency theory accounting research and his directions for the extension and refinement of this research to other aspects of management accounting provided a further motivation to examine and seek to explain product costing and pricing practices within a contingency-based theoretical framework.

1.8 Thesis outline

In addition to this first chapter the thesis contains eight further chapters. Chapter 2 provides a literature review relating to the design of product costing systems. Alternative product costing/service costing approaches are described. In particular, the distinguishing features of variable costing, direct costing, traditional full costing and activity-based costing are reviewed. The chapter also discusses the alternative designs of costing systems in term of their level of sophistication.

Chapter 3 provides a broad overview of pricing, the contribution provided by economics, together with their practical application in marketing with the aim of highlighting the important issues addressed by the research. This chapter also considers the role that accounting information plays in determining the selling price by price setting firms. The different cost-plus pricing methods for deriving selling prices and the limitations and the justifications for the use of cost-plus pricing are also reviewed. Where prices are set by the market the chapter also examines the cost information that is required for product-mix decisions. In particular the focus is on profitability analysis.

A summary of the previous empirical research studies that are relevant to this study is presented in chapter 4. Chapter 5 draws off the previous chapters to formulate the detailed research hypotheses that are tested.

Chapter 6 provides a description of the research strategy. A discussion of the methodological approach adopted for the current study is provided and the detailed aspects of the data collection method, sample selection, the questionnaire content and the statistical analysis used in analysing the data are given.

Chapter 7 and 8 are concerned with the data analysis. Chapter 7 is intended to provide a broad description of the questionnaire responses and presents the findings relating to the first two objectives. Chapter 8 addresses the dominant objective of the study by applying the contingency theory framework to an examination of the relationship between the identified contingency factors and aspects of the product costing systems and cost-plus pricing. Finally chapter 9 describes the distinguishing features and findings of the study and also discusses its limitations and addresses areas for future research.

Chapter 2

Cost accounting systems

- 2.1 Introduction**
- 2.2 The purposes of cost and management accounting systems**
- 2.3 Types of costing systems**
 - 2.3.1 Direct costing systems**
 - 2.3.2 Traditional cost systems and activity based systems**
 - 2.3.2.1 A comparison between traditional and ABC systems**
 - 2.3.2.2 Criticisms of traditional costing systems**
- 2.4 Activity-based costing (ABC)**
 - 2.4.1 Definition of ABC systems**
 - 2.4.2 Implementing activity-based costing system**
 - 2.4.2.1 Identifying activities**
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 - 2.4.2.3 Determining the cost driver for each major activity**
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 - 2.4.4 Theoretical developments of activity based costing**
 - 2.4.4.1 Activity hierarchies**
 - 2.4.4.2 Activity-based costing profitability analysis**
 - 2.4.4.3 Resource consumption models**
 - 2.4.5 ABC in service organisations**
 - 2.4.6 Distinguishing ABC systems**
- 2.5 Cost accounting systems continuum**
- 2.6 How much/what kind of cost assignment is necessary**
 - 2.6.1 Direct costing**
 - 2.6.2 Direct costing plus the assignment of indirect costs using only cause-and-effect allocations**
 - 2.6.3 Direct costs plus the assignment of all indirect costs including those that do not rely on cause-and-effect relationships**
- 2.7 Cost-benefit issues**
- 2.8 Summary**

2.1 Introduction

To understand the management accounting issues that are addressed by this research the first section of this chapter aims to provide a broad overview of the alternative forms of the product costing systems. 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 including a comparison of the major features of traditional and ABC systems and the criticisms relating to traditional costing systems that influenced the emergence of ABC systems. In addition, the stages involved in designing and operating an ABC system and the developments in the theory of ABC systems that occurred during the early 1990s are described. The chapter further elaborates on the characteristics of product costing system adopted in this research in terms of sophistication in assigning indirect costs to products. The types and accuracy levels of cost information needed for the different decision making purposes are also briefly outlined. The chapter concludes with a brief discussion of the issues relating to costs versus benefits arising from implementing elaborate costing systems.

2.2 The purposes of cost and management accounting systems

According to Drury (2004) a cost and management accounting system should generate information for meeting the following requirements:

- Allocating costs between cost of goods sold and inventories for internal and external profit reporting;
- Providing relevant information to help managers make better decisions, and
- Providing relevant information for planning, control and performance measurement.

The first item above is required primarily for *profit measurement and inventory valuation*, by which the cost of all work in progress and unsold finished products should be extracted to ascertain the total cost of inventories for meeting external financial accounting requirements. All manufacturing costs of products sold should also be extracted and, thereafter, deducted from sales revenues in order to compute the cost of goods sold and profits. Drury and Tayles (1995) noted that most organisations, in addition to external reporting, produce internal profit statements for their business units at monthly intervals for management purposes. Thus, the first requirement is

necessary for both financial and management accounting profit measurement purposes.

The second requirement relates to *decision making*. There are three major reasons why a cost accumulation system is required to generate relevant cost information for decision-making (Drury, 2000):

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, and
3. Product decisions are not independent.

Direct costs are normally observable and how they will be affected by decisions is clearly measured. The difficulty is how indirect costs will be affected by decisions because they are not clearly observable. In the past, there has been a tendency to assume that these costs are sunk or fixed and will not change within a range of output, and therefore 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. Nevertheless, Drury (2004, p. 41) also noted that:

The classification of cost as relevant or irrelevant depends on the circumstances. In one situation a cost may be relevant, but in another the same cost may not be relevant. Cost can only be classified as relevant or irrelevant when the circumstances have been identified relating to a particular decision.

The second reason involves the reporting of routine and non-routine financial information. Routine attention-directing information is needed 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. Therefore, the cost accumulation system should be able to provide costs reported by categories of expenses and divided into their fixed and variable elements. According to Drury (2004) a good costing system enables costs to be accumulated by the required cost objects (such as products or services, departments, distribution channels, etc.), and also to be classified by appropriate categories. Non-routine financial information is also required for evaluating strategic decisions that are made at infrequent intervals such as the introduction of new products or services and long-term contraction with customers. It is worth noting, however, that accurate cost information is essential for decision-making since inaccurate costs can lead to incorrect decisions such as the continuation of marketing unprofitable products.

However, less accurate information relating to product costs may suffice for profit measurement for a company or business unit since costs are allocated between inventories and cost of goods sold at the aggregate level rather than the individual product level.

The third reason for using a cost accumulation system for better decision making is that many product-related decisions are not independent. The costs of many joint resources that are shared by many products fluctuate in the long-term according to the demand for them. Focusing only on individual products can result in treating them as being independent from other products for decision-making resulting in decisions being taken in isolation of decisions made on other products. For joint resources the incremental/avoidable costs relating to a decision relating to a *single* product introduction or discontinuation may be zero. Cooper (1990a) 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.

In other words, Cooper argues that product decisions are generally not independent and the multiplication of product costs that include a share of the cost of joint resources for product introduction/abandonment decisions may provide a better approximation of the change in long-term company costs arising from the decisions taken over a period of time.

Management accounting information also plays a crucial role in *cost control and performance measurement*. The control process involves the accounting function preparing responsibility centre performance reports at periodic intervals comparing budgeted and actual costs. Deviations from budget are then pinpointed and investigated. This aspect of management accounting is not examined in this research.

2.3 Types of costing systems

Costing systems vary in terms of what costs are assigned to cost objects (Drury, 2004). Traditionally, cost systems have been classified for inventory valuation purposes. However, this research is concerned with cost systems for routine profit reporting for providing attention-directing information and the provision of

information for pricing decisions. The following is a typical classification of cost systems for generating information for these purposes:

- Direct costing systems;
- Traditional absorption cost accounting systems;
- Activity-based absorption costing systems;

2.3.1 Direct costing systems

Direct costing systems only assign direct cost to cost objects. Because they do not assign indirect costs to cost objects they report contributions to indirect costs. Direct costing systems can therefore be classified according to Drury as partial costing systems. The disadvantage of direct costing systems is that they assume that product decisions are independent. Systems are therefore not in place to measure and assign those joint costs that fluctuate according to the demand for them (i.e. indirect costs) to cost objects. Thus, any attempt to incorporate indirect costs by adding them to the direct costs extracted from the costing system is likely to be based on guesswork and arbitrary estimates. Direct costing systems can therefore only be recommended where indirect costs are a low proportion of an organisation's total costs (Drury, 2004). However, it should also be noted that, because variable/direct costing systems represents 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.

It should be noted that many textbooks use the terms direct costing to imply variable costing. Drury (1996) criticises the use of such terminology. He argues that direct costs do not reflect variable costs, as direct costs may include fixed costs like direct labour. Whether or not direct labour costs are included within variable costs depends upon the time period under consideration. Therefore, adopting a narrow definition of variable costing; only short-term variable costs (excluding direct labour) are assigned to products or services whereas a broader definition generally includes the assignment of direct labour costs. The limitation of direct costing systems is that they consider only direct costs and ignore those avoidable joint fixed costs that fluctuate according to the demand for them and which are thus relevant for decision making and profitability analysis.

2.3.2 Traditional cost systems and activity based systems

While direct costing systems assign only direct costs to products, absorption costing systems (also known as full costing systems) assign both direct costs and indirect manufacturing costs to products. Indirect costs consist of the cost of joint resources and thus cannot be directly measured. For inventory valuation for external financial reporting the regulatory requirements specify that non-manufacturing costs are not assigned to products. 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, for decision-making it was pointed out in section 2.2 that there are strong arguments for assigning manufacturing and non-manufacturing indirect costs to products. Also, many service organisations do not hold inventories so they do not need to allocate costs between the cost of goods sold and inventories for external reporting but they do need to analyse profits by the services they provide. Therefore, for providing information for decision-making or routine profitability analysis organisations can choose to assign only direct cost to products/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 all cost systems can specifically trace direct cost to individual products or services. In contrast, indirect costs pose problems because they cannot be traced directly to a specific product because they are usually common to many products. Indirect costs must therefore be assigned to products using cost allocation bases. Cost allocation bases assign costs to products when a direct measure does not exist for the quantity of resources consumed by a particular product. Allocation bases, which are significant determinants of the costs, are described as cause-and-effect allocations. Where a cost allocation base is used that is not a significant determinant of its cost the term arbitrary allocation is often used. Arbitrary cost allocations do not recognise the actual causes of costs and thus fail to attribute costs to objects (products or services) based on cause-and-effect relations.

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

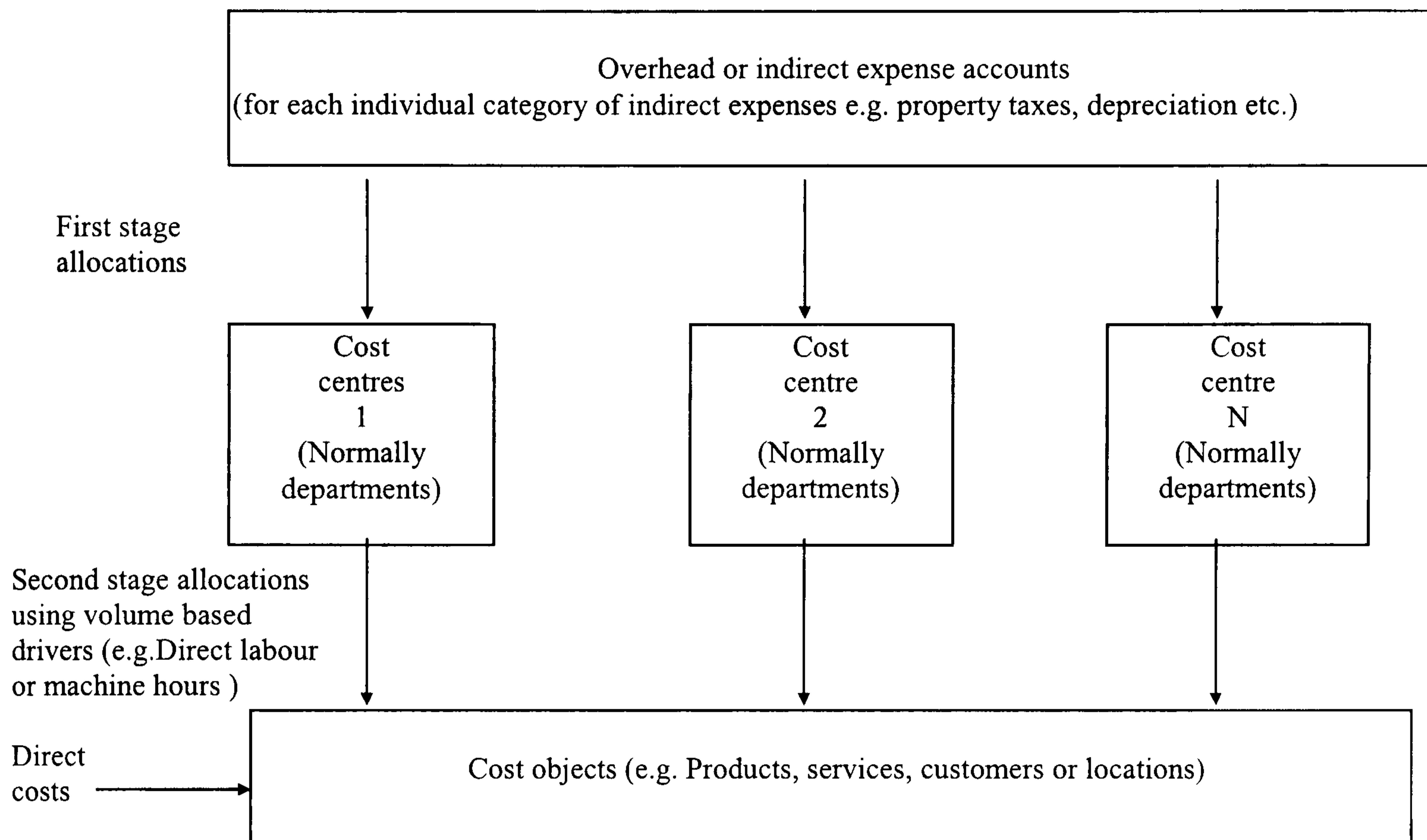
2.3.2.1 A comparison between traditional and ABC systems

Drury and Tayles (2000) illustrate the major differences between traditional and ABC systems (see Figure 2.1). 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 (called cost pools) 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.

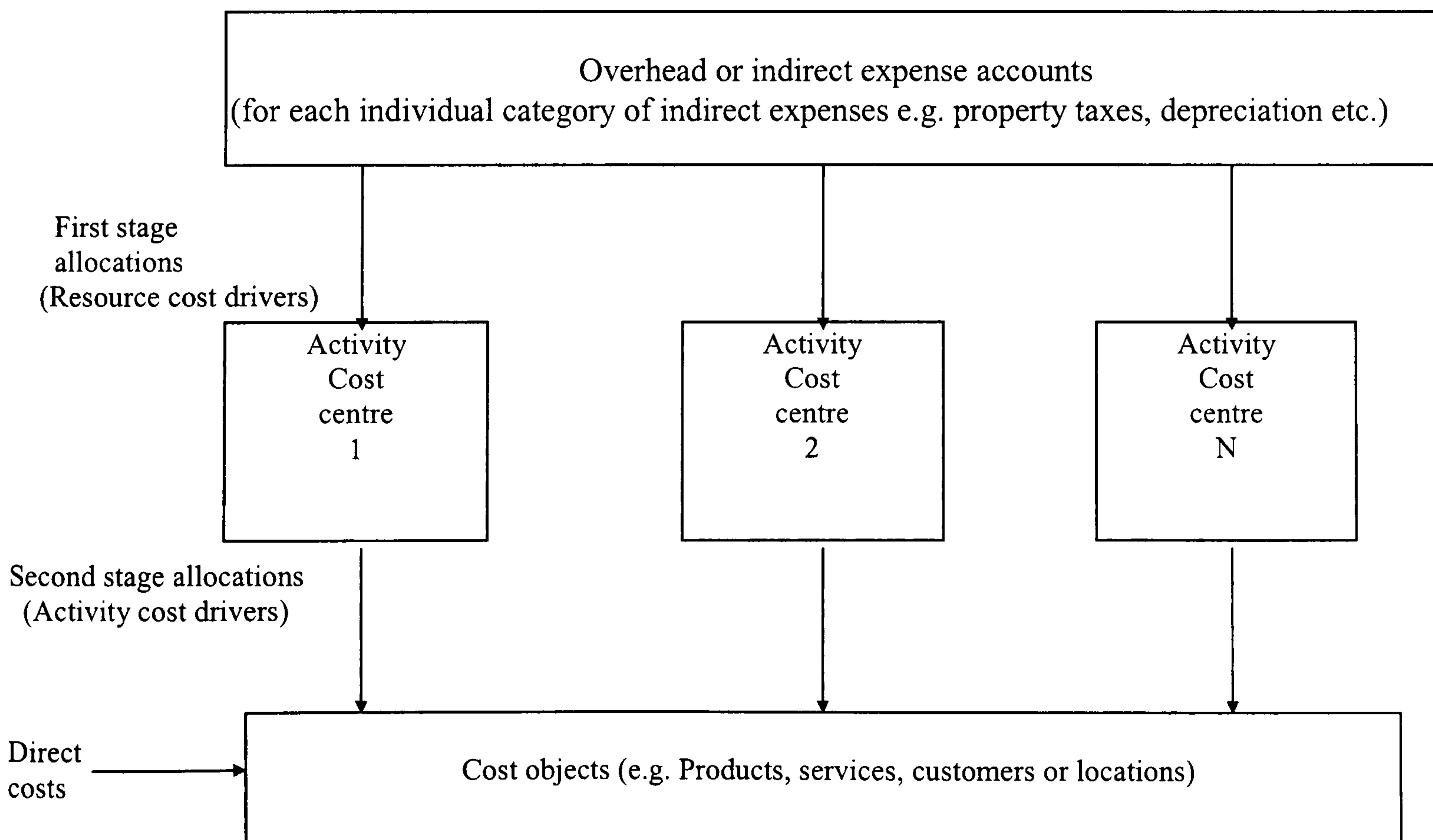
The second stage allocates costs accumulated in the cost centres to cost objects (e.g. products/services) using allocation bases (also known as cost drivers). Traditional cost accounting systems rely extensively on arbitrary allocations and either using the same basis for second-stage assignment for all cost centres (typically direct labour hours) or rely on a limited number of bases (e.g. direct labour and machine hours). By using such cost drivers these costing procedures are assuming that all costs are volume-driven. In other words, costs are assigned in proportion to the number of units of a product manufactured. Cooper and Kaplan (1987) refer to all such traditional overhead assignment systems as unit-based systems, since overhead costs are assumed to be proportional to the volume of units produced. 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 respectively allocating the costs of production scheduling and purchasing to cost objects. 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. Using a greater number of cost centres and cost drivers that are based on cause-and-effect allocations generally results in ABC systems reporting 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



Adopted from Drury and Tayles (2000)

Volume-based cost drivers used by traditional costing system do not measure accurately the cost of performing non-volume based activities and, hence, result in providing distorted product or service costs because they cannot be directly linked to the products for which these activities are performed. The next section discusses criticisms of traditional costing system, particularly, the distortions that a traditional volume based system might cause and their managerial implications.

2.3.2.2 Criticisms of traditional costing systems

The criticisms of traditional product costing systems relate mainly to the reporting of inaccurate costs for decision-making. Most traditional cost systems in use today were developed primarily to value inventories and to provide information for profit and loss statements (Kaplan, 1988). They were never intended to allow comparisons among individual products or product lines. Although traditional costing systems provide a reasonably accurate analysis of the total costs incurred during a period between cost of sales and inventories, Cooper and Kaplan (1988 a) claim that such costs are accurate enough for financial accounting, but are mostly inadequate in terms of accuracy for decision-making.

Johnson and Kaplan (1987) argue that traditional cost accounting systems were developed during the early years of the twentieth century but they were unable to cope with the developments which have occurred in the last decades of the century. These include changes in the business environment in the form of diversity of and complexity of products and processes, information technology, and global competition. They suggest that traditional (volume-based) cost accounting systems may have been appropriate in the past when labour was a dominant factor influencing product costs. However, the declining direct labour base together with the rise of automation, just in time (JIT) systems and total quality management have made these systems obsolete. By the mid-1980s, the prominent critics of traditional costing systems (Kaplan, 1985; Cooper and Kaplan, 1987) asserted that direct labour or other volume-based cost drivers failed to measure the consumption of non-volume based activities accurately and, hence, resulted in providing distorted product or service costs for the decisions made by management (particularly product mix, discontinuation and pricing decisions). In a similar vein, Brimson (1991) argues that

traditional cost accounting systems ignore important differences between products, services, markets and customers that incur different overhead costs. They also 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 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.

Many researchers agree with the assertion made by Johnson and Kaplan concerning the mismatch between the current manufacturing environment and traditional cost systems (Howell and Soucy, 1987, 1988; Kaplan, 1990; Dhavale, 1989; Drury, 1989; Raffish, 1991; Johansson, 1990). Therefore, the first limitation concerns the limited number of cost drivers used by traditional costing systems 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 in the long-term changes in overhead spending. The cost of these resources should be therefore, allocated according to Kaplan (1985) and Cooper and Kaplan (1987) using cause-and-effect relationships between the activities needed to produce the products or services and the consumption of the activity resources by products.

A major limitation of traditional costing systems suggested by recent cost accounting literature is that because product costs in traditional volume-based systems are poorly estimated traditional product cost systems may lead to distortion of product costs. A distortion can arise when products consumption of overhead activities and production volumes vary widely. If production volumes are fairly similar and all products consume overhead resources in similar proportions (i.e. product and volume diversity is low), reported product costs will probably be accurate. However, for a full line firm using volume-related allocation bases alone to trace costs to products, its costing system will not be able to differentiate between the overhead consumed by high and low volume products because it assumes that when the unit volume doubles, so does the input cost consumed by that product. This unit-level treatment may correctly depict the nature of some activities that are performed for each unit, however, some of the product related activities are unrelated to volume, such as ordering the parts, setting up machines, which require allocation bases that themselves are independent

of volume. Alternatively, using direct labour hours, or machines hours to allocate the cost of these resources, will result in reporting virtually identical indirect product costs for both high volume standard products and low volume specialty products, despite the fact that lower volume customised products place considerably higher demands on the volume-unrelated resources (on a per unit basis) than the high volume standard products (Cooper and Kaplan, 1987). A volume-based system does not reflect such complexity of input consumption, and will therefore significantly underestimate the cost of support resources required for low volume specialty products and overestimate the resource cost of high volume standard products. In other words, these simple allocations that do not capture accurately the consumption of the support resources by the cost centres tend to overcost high volume standard products and undercost specialty low volume products, particularly, if non volume related overhead costs are a large proportion of total overhead costs.

This view of costs might lead to a materially different assessment of the options being considered. In these circumstances, the intensely competitive high volume products are either overpriced or show low margins, and will not be able to compete with small focused niche strategy firms that might attack the high volume segment with aggressively low pricing because these firms will not have low volume products to subsidise. As the cost system indicates the competitor's low prices cannot be met on the standard items, a firm could decide to abandon the profitable large-volume product line and push even harder on the apparently profitable low volume items because the customised items always look very attractive at the margin. This strategy is likely to be disastrous since the high volume standard products are cheaper to make and proliferating their product line to offer customised low volume varieties will further increase the demands for overheads relating to the support activities. Not surprisingly even though the product mix is moving away from apparently lower margin products, overall profitability is declining. Furthermore, an effective strategic response to competitive problems cannot be prepared because of using seriously flawed profitability information. Shank and Govindarajan (1988, p78) echo this, stating:

Volume-based costing can seriously distort the way a firm looks at its strategic options and the way it assesses the profit impact of its pricing and product emphasis decision.

Distortions can be reduced by using a costing system that better measures the way products differently use the resources of the organisation. First, more cost centres can be created to accumulate overhead and production support expenses. This increases product costing accuracy by reducing the variety of production processes within each cost centre. Improving the accuracy of the first stage assignment process by defining more cost centres will increase the sophistication of the first stage of the two-stage procedure. Second, a more sophisticated approach can be used in the second stage of the two-stage allocation process to improve product costing accuracy by using more appropriate activity cost drivers to allocate these costs (i.e. using activity drivers that use cause-and-effect relationships) that can directly link the costs of performing organisational activities to the product for which these activities are performed. Therefore, it can be concluded that reducing distortions by increasing the number of cost pools and using appropriate cost drivers increases the accuracy and sophistication of costing systems. Cooper and Kaplan (1988a) explained the distortion introduced by volume-based cost systems and showed how this distortion can be corrected with activity-based costing systems.

So far the focus was mainly on product costing. Traditional costing systems have also been strongly criticised because of their failure to provide relevant information for cost control. 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 appropriate for controlling variable costs. They tend to be inappropriate for controlling support activities because there is less likelihood that indirect costs will be based on 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 merely serves as authorisation levels for certain levels of spending for each budgeted item of expense, so that performance reporting is only useful for the purpose of checking whether the budget has been exceeded. Therefore, according to Drury (2004) traditional budgets provide little relevant information for managing the cost of support activities.

Furthermore, traditional budgeting adopts an incremental approach for preparing budgets for indirect costs and support activities. Incremental budgeting is concerned mainly with the increment in operations or expenditure that will occur in the forthcoming budget period. Therefore, the budget expenses are first prepared based

on the previous 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 remain unchanged so that the cost of non-unit level activities past inefficiencies and waste are still incorporated into the budgeted costs.

Traditional accounting systems are not particularly helpful also in providing information on opportunities for cost reduction. As a result many organisations have resorted to actions to reduce costs undertaken without the use of cost information such as 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 (i.e. actions to reduce costs are not prioritised on the basis of information extracted from the accounting system) that discretionary costs such as expenditure on training, research and development and developing new products and markets will be reduced to increase 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 1990's.

2.4 Activity-based costing (ABC)

It became apparent that simplistic overhead allocations using limited number of volume bases such as direct labour could not be justified, particularly as information processing costs were no longer a barrier to introducing more sophisticated cost systems. Furthermore, in response to the intense worldwide competition of the 1980s the decision errors due to poor cost information are 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).

The above developments resulted in the emergence of ABC. However, the underlying principles of ABC are not new. Over fifty years ago Goetz (1949) advocated ABC principles. However, it was not until the early 1980's that costing systems resembling ABC type systems were first observed in a few firms in the USA. In a series of articles in the late 1980's based on observations of innovative costing systems Robert Kaplan and Robin Cooper, two prominent pioneers in the development of ABC,

conceptualised the ideas underpinning these systems and coined the term ABC.

2.4.1 Definition of ABC systems

ABC is an alternative to traditional costing systems, developed on the premise that resources are consumed by activities, and products incur costs by the activities that they require. Therefore, costs should be allocated to products according to the activities those products require. Traditional cost systems allocate virtually all indirect costs on the basis of one or a few volume-based variables, such as direct labour hours or machine hours. Some activities do indeed vary directly with volume, and their costs can be allocated using traditional volume-based measures. Other activities are not related to product volume. For these non-volume-related activities, ABC recommends identification of the cost drivers that cause costs to be incurred. Costs can then be allocated to products based on their consumption of these cost drivers. Thus, ABC's two-stage method of cost allocation first traces costs to activity centre cost pools, then from cost pools to products using cost drivers. These cost drivers are volume-related in some cases, and non-volume-related, in others.

Atkinson et al. (1997, p.263) define activity-based costing systems as:

Product costing systems that assign support costs to products in the proportion of the demand each product places on various activities.

Hornigren et al. (2002, p.336) define ABC as:

An approach for refining a costing system by focusing on individual activities as the fundamental cost objects. ABC systems calculate the costs of individual activities and assign costs to cost objects such as products and services on the basis of the activities undertaken to produce each product or service.

The term ABC varies through the literature and among organisations but most of definitions in the literature relate to the two-stage allocation process described in section 2.3.2.1 with costs being assigned to activities in the first stage and then activity costs to cost objects in the second stage. Although not explicitly stated, definitions imply cause and effect connections between the various activities and costs (or consumption of resources).

2.4.2 Implementing 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 organisation;
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.

2.4.2.1 Identifying activities

Hornigren et al. (2000) define an activity as an event, task, or unit of work with a special purpose. 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. To define activities a cross functional team from several departments such as manufacturing, distribution etc. is assigned to identify key activities using a flowchart of all the steps and processes needed to design, manufacture, and distribute products.

The number of activities performed in a typical facility is so great that it is not economically feasible to define activities at the individual task level; doing so would result in hundreds of separate activity cost centres being established. Instead, many activities have to be aggregated and a single driver is used to trace the costs of the activities to products. Recent studies (e.g. Kaplan and Cooper, 1998) 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.

Drury (2000, p. 343) states:

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 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.

2.4.2.2 Assigning costs to activity cost centres

The next task is to identify the cost of performing each activity. Many resources can be traced directly to activity centres, 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. When no meaningful way exists to estimate the resources used by an activity, some designers resort to arbitrary allocations. The greater the amount of costs traced to activity centres by cost apportionments at this stage the more arbitrary and less reliable will be the product cost information generated by ABC systems. Therefore, arbitrary allocations should be minimised whenever possible.

2.4.2.3 Determining the cost driver for each major activity

Cost drivers at this stage are called activity cost drivers. Kaplan and Atkinson (1998) define an activity cost driver as a quantitative measure of the output of an activity. The objective at this stage is to select cost drivers that link the performance of activities to demands made by individual products (For example set up hours as a measure of set up activity). Structuring activity-cost pools with activity-specific cost drivers leads to more accurate costing of activities. Because of the large number of potential activity-to-product linkages, designers attempt to economise on the number of different activity cost drivers. Drury (2000) suggests that several factors must be considered when choosing a suitable cost driver. First, the cost in each cost pool should have a cause-and-effect relationship with the cost driver. 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 as the selection of an activity cost driver should reflect a subjective trade off between accuracy and the cost of measurement.

Kaplan and Cooper (1998) identify three types of activity cost drivers:

- Transaction drivers
- Duration drivers
- 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 drivers but they are also likely to be the least accurate because they assume all outputs make essentially the same demands on the activity (i.e. the same quantity of resources is required every time an activity is performed). Where there is a limited variation in the amount of resources required by individual cost objects, transaction drivers are likely to provide a reasonably accurate measurement of activity resources consumed. If the consumption of resources varies considerably, 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. However, using set-ups hours as a cost driver assumes that all setup hours on the machine are equally costly, but extra costs may be required on some setups but not on others resulting in costs per set-up hour being different. In this case, intensity drivers should be used which 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 because they require keeping track of all the resources used each time an activity is performed. Hence, they should only be used when the resources associated with performing an activity are both expensive and variable each time an activity is performed.

2.4.2.4 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.

2.4.3 Issues to be considered when designing ABC systems

Cooper (1988 a) argues that the difficulty of designing good system can be viewed by making two separate but interrelated decisions: how many cost drivers to use and which cost drivers to use. Therefore, the number of different cost drivers to be used according to Cooper depends on:

- *Desired accuracy level of reported product costs.* The desired level of accuracy plays an important role. As the number of cost drivers increases, the accuracy of reported costs generally rises. Consequently, the greater the desired level of accuracy, the larger the number of drivers required to achieve that accuracy.
- *Product and volume diversity.* Products are said to be diverse when they consume activities in different proportions. The degree of product diversity between any two products with respect to two activities can be measured according to Cooper by calculating the ratio of the two activities consumed by each product, or by dividing the higher ratio by the lower. The greater the diversity between two products, the greater the distortion that will be introduced. Volume diversity occurs when products are manufactured in batches of different sizes. Section 2.3.2.2 emphasised the need for an accurate costing system when there is product or volume diversity. The costing system should therefore use cost drivers that adjust for the effect of different production volumes. Cooper suggests that by isolating the highly diverse products the designer would be able then to identify which of the major inputs can be aggregated without introducing excessive distortion into reported costs.
- *Relative cost of different activities.* According to Cooper the relative cost of the activities is a measure of how much each activity costs as a percentage of the total cost of the production process. He emphasises that the relative cost of the activities being aggregated is important because the higher the relative cost of an activity the larger the distortion that will be introduced by inaccurately tracing its consumption to the products. The higher the relative cost of the activities that are not volume related, the greater the distortion introduced by using a volume-based driver to trace their costs to products. Therefore, Cooper notes that the greater the number of

non-volume-related activities that represent a significant proportion of the total cost of the products, the more cost drivers are required to avoid cost distortion.

Cooper (1988 a) also affirms that the selection of the appropriate cost drivers depends on the following factors:

- *Cost of measurement.* When selecting a cost driver, the lower the cost of measuring the cost driver, the more likely the cost driver will be selected. Increasing the number of cost drivers may increase the cost of measurement. However, using drivers whose quantities are relatively easy to obtain may lead to reduced measurement costs. This is done by partly substituting duration drivers with transaction drivers. The data required for these cost drivers is relatively easily available because a transaction is generated every time the activity is performed. Also, the measurement cost associated with a cost driver depends on whether the data required by that driver is already available or has to be specially determined. In recent years, computer technology has dramatically reduced the cost of measurement of many cost drivers by recording events, activities, and costs in the firm's existing information systems in enough detail so they are already available in multiple ways as the need arises.
- *Correlation of the selected cost driver to the actual consumption of the activity.* The use of cost drivers that only indirectly capture the consumption of activities by products involves a risk that the cost drivers will introduce distortions into reported product costs because they do not highly correlate with the actual consumption of the activities. The higher the correlation of selected cost driver to the actual consumption of the activity, the more likely the cost driver should be used. Cooper illustrates that the selection of imperfectly correlated cost can thus result in the reporting of inaccurate product costs. Therefore, low correlation of the cost driver with the actual consumption of the activity results in the need of more cost drivers. Increasing the number of cost drivers will increase the level of accuracy of the reported product cost.
- *Behaviour induced by use of the cost driver.* In selecting cost drivers, the effect of the use of a particular cost driver will have on the behaviour of individuals in the firm has to be considered. A cost driver affects behaviour if individuals feel that their performance will in some way be evaluated based on the cost per unit of that

cost driver or the quantity of that driver consumed. For example, when the designers are rewarded based on their ability to design low-cost products, they can be induced to design products that contain fewer parts by using the number of parts as the cost driver to assign costs to activities. The more desirable the behaviour induced by using the driver, the more likely the driver is to be selected. Care however, has to be taken if cost drivers are used to modify behaviour, because if too many costs are traced via the cost driver, too much beneficial behaviour may result. For example, if reducing the number of parts causes the designers to sacrifice some functions required by the market (just for the sake of reducing the number of parts), the induced behaviour will be harmful.

2.4.4 Theoretical developments of activity based costing

Early ABC systems were subject to a number of criticisms, particularly relating to theoretical aspects. As a response to these criticisms a number of theoretical developments emerged during the 1990s.

2.4.4.1 Activity hierarchies

The first theoretical development was reported by Cooper (1990 b) who suggested that the overhead of a company is driven by four types of activities. He classified the factory operating activities as:

- Unit-level activities
- Batch-level activities
- Product-sustaining activities
- Facility -sustaining activities

Unit-level activities (also known as volume-related activities) are activities to support the production of a unit of output. Examples of expenses in this category include direct labour, direct material, and energy costs. Unit-level activities' cost increase with the number of units of output or services performed. Typical cost drivers for unit level activities include labour hours, machine hours, and the quantity of materials processed. These cost drivers are volume-based drivers which are also used by traditional costing systems. Traditional systems are therefore also appropriate for assigning the costs of unit-level activities to cost objects.

Batch-related activities such as setting up a machine or processing a purchase order

are activities to support the production of a batch of outputs. The cost of batch-related activities increases with the number of batches produced, but not the number of units in each batch. Therefore, traditional costing systems consider batch-related expenses as fixed costs. However, the more the batch related activities are required the more the organisation must eventually spend to supply resources to perform these activities. Thus, ABC systems assume that batch-related expenses vary with the number of batches processed, and provide a mechanism for assigning some of the costs of complexity to the products or services that cause the activity.

Product-sustaining activities or service-sustaining activities are activities undertaken to enable specific products to be produced. 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. The costs of product-sustaining activities cannot be linked in any cause-and-effect way to *individual* units of products or to individual batches of products and their expenses will tend to increase as the number of products manufactured is increased. 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 relate to plant management and maintenance of facilities. They are incurred to support the organisation as a whole and are common and joint to all products manufactured in the plant. It is usually impossible to establish cause-and-effect relationships between these costs and a cost allocation base. This lack of cause-and-effect relationship causes some companies to treat these costs as common costs to all products made and deducted as a lump sum from the total of the operating margins from all products. Other companies may choose to allocate facility sustaining costs to products on some basis (such as direct manufacturing labour hours if traditional cost accounting system is used) because management believes all costs should be allocated to products especially when selling prices are set on the basis of a cost number that includes all costs (Horngren et al., 2000). According to Drury (2004) 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. Such events are unlikely to occur in most organisations. Therefore, the ABC literature advocates that these costs should not be assigned to products since they are unavoidable for most

decisions.

2.4.4.2 Activity-based costing profitability analysis

The second theoretical development was first highlighted by Kaplan (1990) and Cooper and Kaplan (1991). Cooper and Kaplan demonstrated how ABC analysis exposed the relationships between activities and resource consumption and profits. Their paper emphasised that ABC analysis highlighted profit improvement possibilities to the managers. Therefore, they applied the ABC hierarchical activity analysis to profitability analysis. In addition, they stressed that the reported ABC product costs do not provide information that can be used directly for decision-making. Instead they report attention-directing information by highlighting those potentially unprofitable products or services that require more detailed special studies. According to Cooper (1997) a major role of ABC is to develop profitability maps that are used to focus managerial attention and identify a realistic number of decisions that should be made after conducting more detailed special studies. Cooper suggests that special studies should be conducted to explore the potential cash flow implications of each potential decision. The purpose of a special study is to convert the profitability analysis that reflects a resource usage model to a cash flow model that reflects more precisely the changes in resource supply. Cooper argues that because the cost of special studies is high the number performed has to be carefully controlled; hence the need for good profitability analysis attention-directing information. ¹

2.4.4.3 Resource consumption models

The most important theoretical advance in ABC systems was reported by Cooper and Kaplan (1992) in a paper which provided a conceptual basis for the design and use of ABC systems. They argued that the activities performed by many resources were not demanded in proportion to the total volume of units produced (or sold). The paper examined major activities performed and costs incurred by the organisation and formalised these relationships as:

Cost of resources supplied = cost of resources used+ cost of unused capacity

According to this equation, managers should manage separately the cost of resources used and the cost of unused capacity. Cooper and Kaplan (1992) 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 activity-based systems model show how activity usage varies with the demands made for these activities. ABC systems estimate the cost of resources used to perform activities for various outputs, but not the cost of supplying resources. The difference between the cost of activity resources supplied and the cost of resources used represents the cost of unused capacity. Cooper and Kaplan emphasised that managers to obtain higher profits, must take conscious actions either to use the available capacity to support a higher volume of business or to reduce spending on resources by elimination the unused capacity.

Cooper (1990 c) concluded that ABC is a model of resource consumption that looks at the demand for activities, not a model of spending that looks at the capacity provided to perform these activities. In other words, ABC systems measure changes in the level of consumption of resources not the changes in the level of spending on resources. The difference between both levels (consumption and spending) according to Cooper varies depending on the type of the resource. For some resources, the level of spending cannot be immediately adjusted in the short run to reflect exactly the changes in the level of consumption, so that the supply of these resources have to be acquired in discrete amounts in advance of usage. Therefore, unused capacity may arise. Examples include direct labour and most indirect production costs. Kaplan and Cooper (1998) describe such resources as committed resources. In contrast, for other resources, changes in the level of consumption are almost immediately reflected in the level of spending. Hence, the cost of supplying these resources will generally equal the cost of resources used and the resources will have no unused capacity. Examples include direct materials and the power required to run the production machines. Kaplan and Cooper (1998) describe such resources as flexible resources. The ABC system distinguishes between spending on resources that are currently being used productively and spending on resources that are currently in excess supply (Cooper, 1990 c).

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:

¹ Given the importance of activity-based profitability analysis for meeting the objectives of this research it will be considered in more detail in the next chapter.

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 expenses represents 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 \$5,000 difference represents the cost of unused capacity. The cost of unused capacity should be measured for each organisational activity, defined by the ABC system. Cooper and Kaplan (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 (2004) 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. If such decisions result in a decline in the demand for activity resources the cost of resources used will decline, but the cost of unused capacity will increase to offset exactly the lower resource usage cost. To convert the benefits of reduced activity demands into cash flow savings management must remove the unused capacity by reducing spending on the supply of the resources. Thus, to make a resource variable in the downward direction requires management to first 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 cause demands for activity resources to increase. 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 to be of such vital importance by Kaplan and Cooper (1998) that they conclude that managing used and unused capacity is 'the central focus of ABC'.

2.4.5 ABC in service companies

Most of the ABC literature originated in manufacturing settings. Horngren et al. (2000) stated that ABC systems are likely to yield the most benefit when indirect costs are large or products and services make diverse demands on indirect resources. Therefore, service organisations have a greater need to allocate their higher proportion of indirect costs accurately to avoid any service cost distortion. Hence, as stated by Kaplan and Cooper (1998) service companies are ideal candidates for ABC, even more than manufacturing companies, because most costs in service organisations are indirect and unlikely to be accurately assigned using traditional costing systems. 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, the indirect cost proportion of total costs in manufacturing organisations is much lower as compared to service organisations. Drury (2004) adds that service organisations must also supply most of their resources in advance and fluctuations in the usage of activity resources by individual services and customers does not influence short-term spending to supply the resources. Such costs are treated by traditional costing system as fixed and irrelevant for most decisions. This resulted in a situation where profitability analysis was not considered helpful for decision-making.

The difficulty in service cost measurement did not pose a problem in the past as most of these service organisations were government owned monopolies or operated in a highly regulated, protected and non-competitive environment. Drury (2004) continues saying that these organisations were not subject to any great pressures to improve profitability by identifying and eliminating non-profit making activities. Cost increases could also 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 organisations to be aware of their service costs to be able to make proper decisions. Drury (2004, p. 390) states that:

Privatization of government owned monopolies, deregulation, intensive competition and an expanding product range created the need for service organizations to develop management accounting systems that enabled them to understand their cost base and determine the sources of profitability for their products/services, customers and markets.

2.4.6 Distinguishing ABC systems

The collection of cost accounting techniques that became ABC in the late 1980s was not new or revolutionary. Activity-based costing largely consists of common sense techniques developed by many financial managers to respond to the particular needs of their own companies. Allocating costs in an ABC system is therefore, no different, in principle, than any traditional system allocation process. In the first-stage of the two-stage allocation process with a traditional costing system indirect costs are assigned to cost centres (normally departments), whereas ABC systems assign costs to each major activity centre rather than department. This procedure may be very similar for many organisations where many departments are often established on the basis of the activities undertaken. In other words, many of the departments within an organisation may be identical to activities. The only difference might be that ABC systems assign costs to a greater number of first stage cost centres (i.e. activity centres, or cost pools).

In the second stage the method of assigning expenses from cost centres to products does not also differ much in principle from activity-based cost systems. Traditional costing systems use simple drivers such as direct labour hours, machine hours, units produced or materials processed for allocating production cost centre costs to products. ABC systems involve more careful tracing of overhead to products, using 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 respectively allocating the costs of production scheduling and purchasing to cost objects. These activity cost drivers link the performance of activities to demands made by individual products (i.e. there is a cause and effect relationship between the cost drivers and cost objects). However, some cost system designers may claim that there may be a reasonably strong correlation between overhead costs and production volume measures, and allocation in non-ABC systems is usually made with bases that have the same trend in usage. In this case these measures can thus serve as a reasonably accurate proxy for activity cost drivers. Although such a costing system is a traditional costing system it could be argued that

it broadly fits the requirements of the above definitions of ABC. It can be concluded that classifying some cost systems as activity-based can sometimes be problematic. Malmi (1999) states that academics do not share a common view of what makes an accounting system an ABC system.

It is also evident from previous studies that difficulties have been experienced in distinguishing between ABC and non-ABC systems and some researchers have questioned whether systems described by survey respondents as ABC are really ABC systems². For example, Dugdale and Jones (1997) conducted a telephone survey of 12 companies that had responded to Innes and Mitchell's (1995) questionnaire survey. The respondents had indicated that they used ABC for stock valuation. Dugdale and Jones concluded that four did not use ABC for this purpose; five could only be identified as using ABC if a weak definition was applied and only three actually used ABC if a strong definition was applied. 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 and 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. Further support that respondents may mistakenly claim that their traditional costing systems are ABC systems is provided by Abernathy et al. (2001). The management at one of the research sites considered their system to be an ABC system even though the researchers' description clearly indicated that it should be classified as a sophisticated traditional system.

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 been rarely 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. Lukka and Granlund (2002) also suggest that practising managers seem far too eager to argue that the firm they represent applies ABC and draw attention to the widely held belief that, for the 1990's, the figures for

² Empirical studies on ABC systems are discussed in Chapter 4.

ABC adoption were upwardly biased.³ They conclude that ABC is part of the firms' image-building projects, and the claimed application of ABC is believed to offer a positive signal of the firm being perceived as managerially up-to-date.

2.5 Cost accounting systems continuum

Because of the above classification difficulties and the narrow focus in attempting to identify the characteristics of product costing systems by two dichotomous variables (traditional and ABC systems), this research attempts to adopt more robust measures of elements of product costing systems. The study adopts the approach used by Abernathy et al. (2001) and Drury and Tayles (2005) by viewing costing system design choices as varying along a continuum according to their level of sophistication.⁴ A firm's costing system's level of sophistication is based on where it is located on the continuum. Both studies argued that in practice management accounting systems can be located on a continuum ranging from simplistic to sophisticated. Figure 2.2 illustrates the continuum. At one end of the continuum the lowest level of sophistication is represented by a single cost pool and a single arbitrary allocation base. Higher levels of sophistication are assumed to be associated with increasing the number of cost pools in the first stage of the two-stage overhead allocation process and/or the number of different types of second stage cost drivers.

Drury and Tayles (2005) argue that when products or services require a different number and type of processes and consume different proportions of resources in each process, a management accounting system that incorporates multiple cost pools, with each cost pool representing a separate process better captures the variability in resource consumption. Also, when each process can be disaggregated further into different activities, with products/services consuming different proportions of resources within each activity, creating separate cost pools for each activity will further enhance the ability of the costing system to capture the variability in resource consumption. Thus, creating a greater number of cost pools allows the costing system to better capture the variability of resource consumption.

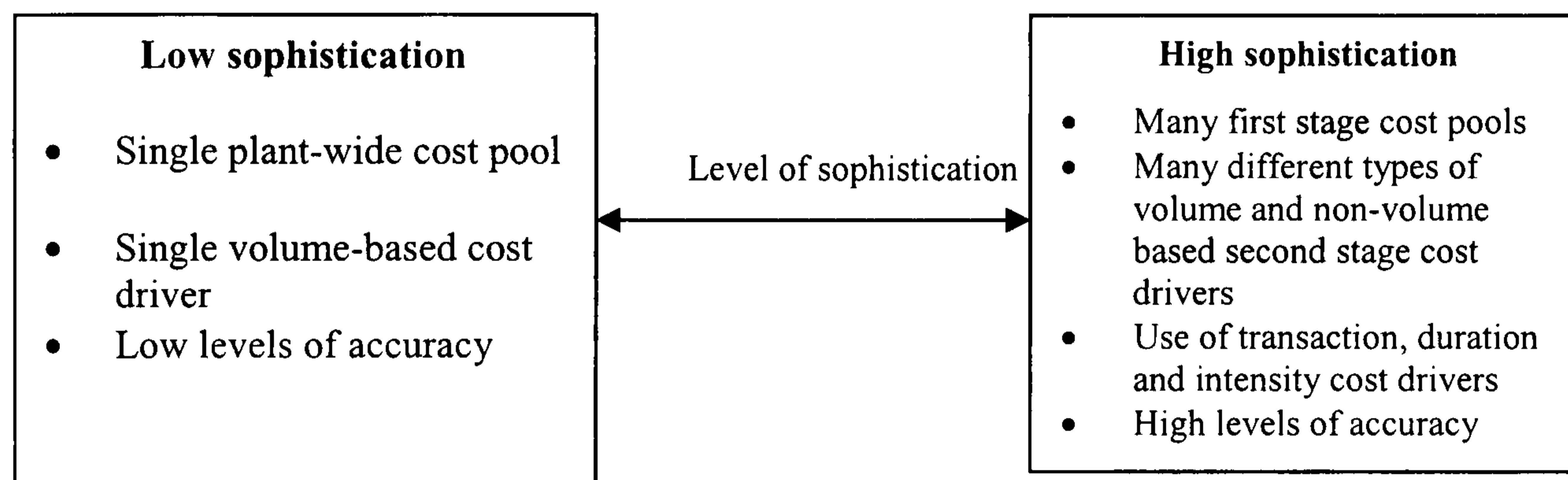
Cooper (1988 a) has stated that to capture product/service costs more accurately it is necessary to establish many different cost pools and employ many different types of

³ Granlund and Lukka cite as an example a UK study by Bright et al. (1992) which reported an incredibly high ABC adoption rates of 32%.

⁴ Both studies are discussed in detail in Chapter 4.

second stage cost drivers. Having many cost pools and different cost drivers for each activity may be expensive and therefore cost system designers may pool homogeneous activities and identify a single cost driver for this pool of activity. This would be a cost saving measure. The pooling of similar activities may be acceptable if an appropriate cost driver can be identified to capture the consumption of resources by this pool of activities. Nevertheless, it should be noted that if cost accuracy is paramount, then more cost pools and cost drivers should be deployed. Atkinson et al. (1997) note that the increase in measurement costs required by a more detailed cost system must be traded off against the benefit of increased accuracy in estimating product costs. Increasing the number of cost pools will result in movements from left to right on the sophistication continuum scale in Figure 2.2.

Figure 2.2: Dimensions determining varying levels of cost system sophistication



Adapted from Drury (2004)

A second factor influencing the level of sophistication according to Drury and Tayles relates to the number of different types of second stage cost drivers that are used. The aim of the second stage of the indirect cost allocation process is to use cost drivers that are significant determinants of the costs assigned to each cost pool (i.e. cause-and-effect cost drivers). The illustration in section 2.3.2 reveals the inaccuracy of arbitrary cost allocation. The fallacy in arbitrary cost allocations is that costs are being assigned based on factors that have no connection to the actual incurrence of those cost. Kaplan and Cooper (1998, p263) summarise the critical issue by stating that:

When arbitrary allocations are used, no cause and effect relationship can be established between the cost object to which the cost has been assigned and the resources whose cost has been assigned. In an ABC system every cost assignment to an activity, or a product, service, or customer, should be transparent and traceable, via cause-and-effect relationships, to the demand for the resources by the cost object.

Therefore a major attribute of sophisticated costing systems (based on the assumption that ABC systems are the most sophisticated systems) is to rely on cause-and effect

rather than arbitrary second stage cost drivers. Costs are allocated from the cost pools to products on the basis of cost driver usage. Cost drivers thus represent measures of quantities of resources consumed by products. Cause-and-effect cost drivers are more likely to be established by using many different types of cost drivers. Thus, increasing the number of different types of cost drivers and therefore, the usage of cause-and-effect cost drivers will increase the level of accuracy of the reported product costs and therefore will also result in movements from left to right along the continuum scale in Figure 2.2.

The level of cost system sophistication is also influenced by whether transaction, duration or intensity drivers are used (Kaplan and Cooper, 1998). Transaction drivers are the least sophisticated. Duration drivers represent an increase in the level of sophistication since they represent measures based on the amount of time required to perform an activity. Intensity drivers are the most sophisticated drivers since they are based on directly charging for the resources used each time an activity is performed. Therefore, the choice of the type of cost driver to be used depends on the benefits of increased accuracy against the costs of increased measurement.

The above discussion suggests that three factors influence the level of cost system sophistication – the number of cost pools, the number of different types of cost drivers and the nature of the cost drivers (transaction, duration or intensity). In addition, during the first stage of the two-stage allocation process, sophisticated cost systems should rely extensively on either directly assigning costs to each cost pool or using cause-and-effect first stage cost drivers (i.e. resource cost drivers). This is less of an issue with unsophisticated costing systems consisting of a single cost pool or a few cost pools since, under such circumstances, there is likely to be greater probability that costs will be directly attributable to a cost pool.⁵ Based on the above discussion and according to Drury and Tayles (2005) cost systems located at the extreme right of the continuum would have the following features:

- many first stage cost pools;
- costs are assigned in the first stage to cost pools based on either direct charging or cause-and-effect resource cost drivers
- many different types of second stage cost drivers

- An extensive reliance on second stage duration or intensity drivers, and
- A reasonable to high level of accuracy of cost information provided by the costing system

In other words, sophisticated ABC systems would be located at the extreme right. As described earlier, cost systems with a single cost pool and a single volume-based cost driver would be located at the other end of the continuum. Traditional sophisticated costing systems with many cost pools using only one or two types of second stage drivers would be located towards the mid-point along the continuum. However, it is possible that in some situations unsophisticated costing systems will report accurate product costs, such as where all products consume costs of different activities in similar proportions and the magnitude and proportion of overhead costs is relatively small. Abernathy et al. (2001) attribute the satisfaction of the cost information provided by the costing systems being sufficiently accurate for decision making to the fit between the level of cost system sophistication and contextual factors. The contingency approach adopted in this thesis does, however, seek to identify the circumstances (i.e. the contextual variables) under which sophisticated costing systems may result in the more accurate measurement of resources consumed by cost objects.

The above discussion and Figure 2.2 represents the model that is developed for determining how costing systems can be classified according to their level of sophistication. The proxy measures and the measurement scale that is used to capture attributes of this model are explained in Chapter 6.

2.6 How much/what kind of cost assignment is necessary

Different cost information and different accuracy levels are required for the different purposes for which cost information is required. For example, external financial regulations require that only manufacturing costs be assigned to products/services. Therefore, for stock valuation purposes costs must be assigned to products using arbitrary allocations even when it is not possible to identify specific cause-and-effect allocation bases (e.g. manufacturing facility-sustaining costs). These costs may not be relevant for decision-making. Furthermore, for stock valuation purposes, Kaplan &

⁵ For example, with a single cost pool all of the costs that represent indirect product costs will be directly attributable to the cost pool.

Atkinson (1989) have stated that it may not be necessary to measure individual product costs accurately, as they are required only for measuring the cost of goods sold and valuing inventories at the aggregate level. They suggest that the accuracy of product costs (i.e. the level of sophistication of the costing system) should be dependent upon the purposes for which the cost information is required. On the other hand, for decision-making purposes, incremental non-manufacturing costs may be necessary to be assigned to products. Also, for decision making purposes it is necessary for the cost system to capture accurately the consumption of resources by products/services to avoid computing distorted product/service costs. It has been claimed that more detailed and accurate cost information about individual products has become the driving force for effective managerial planning, controlling and decision making (Kaplan and Cooper, 1998; Turney, 1991). Thus, the purposes for which the product cost information is used may have an influence on the different costs information required and the accuracy level of the product/service cost information.

Choosing the best method of cost computation is a topic which has been dealt with many times in management accounting textbooks by advocates of different methods which can be used to gauge margins and profits. The extent to which different cost information is used for different purposes (specifically cost-plus pricing and profitability analysis) represents one of the objectives of this study. The costs under consideration that may be extracted from the cost system for decision making are as follows:

2.6.1 Direct costs

Many accounting academics focus on the dysfunctional aspects of cost allocations, and recommend direct costing approach for decision making. This approach only assigns attributable direct costs to cost objects for decision making. The costs of joint resources that fluctuate in the long term according to their demand are excluded. They are appropriate for decision making where the cost of those joint resources that fluctuate according to the demand for them is insignificant. In direct costing, the direct costing margin will accumulate to build up the necessary contribution to pay indirect costs before taking a net profit. In profitability analysis the difference between sales revenues and direct costs represents the contribution to indirect costs and profit. A positive direct cost contribution by a product does not ensure a final

profit but a negative direct cost contribution unavoidably means that if there are no product inter-dependencies, or important marketing factors to be considered, a product is making a loss and should be discontinued. Thus, direct costing can be used for highlighting those products/services that have negative or low contributions to indirect costs for undertaking special studies. At this stage an estimate can be made of the potential savings arising from the reduced consumption of 'joint resources' if the product, or combination of products, were discontinued. Adopting this approach, and assuming that there are no other relevant factors, products should be discontinued if the resulting savings in the joint costs exceeds the lost contributions.

This approach may also be used for pricing by companies that may wish not to allocate indirect costs for pricing purposes because they operate in many markets with multiple products, produced by various processes, making cause-and-effect allocations of indirect costs difficult in the absence of a good deal of highly subjective judgment. Also, in a competitive market prices based on direct costs can provide better protection than those prices based on full costs, as they will tend to be lower and more competitive. However, experiences of companies using direct costing without proper guidelines and control show that the use of direct cost information can be a disaster because fixed costs may be ignored thus resulting in insufficient product contributions to cover the avoidable fixed costs.

Organisations have therefore a choice between the use of adding large percentage profit margins to direct costs in order to make contributions to the avoidable fixed costs or adding small percentage margins to full costs. The key problem in making the choice is the way indirect costs have been allocated and added to direct costs to come up with full costs. Sophisticated costing systems aim to more accurately assign indirect costs where cause-and-effect allocations can be established. Thus, organisations that have implemented sophisticated costing systems may focus to a greater extent on adding small percentages to full costs for pricing. Hence, they avoid the risk of over-pricing and poor sales. Unsophisticated costing systems are likely to rely more heavily on using arbitrary allocations for indirect costs and therefore result in inaccurate indirect cost assignment to products. In this case, (where an unsophisticated costing system is implemented) direct costs are likely to provide more meaningful information for pricing.

2.6.2 Direct costing plus the assignment of indirect costs using only cause-and-effect allocations

Cooper and Kaplan (1991) recommend the use of average long-run product costs in a situation where numerous product combinations and interdependency of product decisions exist. They stress the need to assign to products a share of the cost of those joint resources (support costs and not facility-sustaining costs) which fluctuate in the long-term according to the demand for them, but which are not uniquely attributable to specific products.

This approach is appropriate for inclusion in profitability analysis where interdependencies exist among a series of decisions. For example, as Cooper (1990 a) has illustrated, the sum of the decision to drop individual products is not equal to the sum of the realisable savings from dropping many products. This is because considering dropping an individual product in isolation will not affect the fixed overhead spending whereas considering dropping many products over a period of time may allow considerable savings in the fixed overhead spending.

Cooper and Kaplan (1991) have suggested that the indirect costs should be allocated using the cause-and-effect relationship between the activity needed to produce or provide the product/service and the consumption of the joint resource by this activity. As for profitability analysis purposes more accurate product costs are required. Arbitrary indirect cost allocations are to be excluded as this may distort product/service cost information. If the product/service cost information is distorted, then there is a risk that profitable products/services may be dropped and unprofitable products/services may be continued. The facility-sustaining costs, where it is not possible to identify cause-and effect relationships, are likely to be unavoidable and irrelevant to most decisions. Hence, they should not be assigned to products.

2.6.3 Direct costs plus the assignment of all indirect costs including those that do not rely on cause-and-effect relationships

As Drury and Tayles (2000) have stated, the facility sustaining costs are common and joint costs which tend to remain unchanged unless there is a dramatic change in the scale or scope of activities. Examples of such costs are depreciation, property taxes and general administrative costs. The assignment of such costs for product introduction/abandonment decisions are likely to be inappropriate since their total

amount are likely to remain unchanged. However, for cost-plus pricing decisions full cost information may be needed to ensure that products recover the cost of resources consumed, plus a fair share of the facility–sustaining costs. As it may not be possible to identify a cause and effect relationship for these costs, arbitrary methods of assignments are normally used.⁶

2.7 Cost-benefit issues

Based on the discussion in section 2.3.2.2 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, more detailed systems are likely to minimise the cost of errors but they are significantly more expensive to operate than simplistic costing systems. The ideal relationship for cost allocation bases is causal, However, bases that are too complicated run the risk of costing more to implement than the value of the improved decision making that they provide. Therefore, the optimal management accounting system should be different for different organisations depending upon various contextual factors that have been identified in the literature (examples include Bjornenak, 1997; Krumweide, 1998; Malmi, 1999). For example, for an organisation whose indirect costs are a low percentage of total costs and which also has a fairly standardised product range, all consuming organisational resources in broadly similar proportions, simplistic costing systems, are likely to be sufficiently accurate for managerial decisions. Consequently the benefits from using a carefully designed cost allocation systems being able to make better informed pricing decisions or product emphasis decisions would be relatively small. In this situation the optimal costing system will be located towards the extreme left in Figure 2.2. In contrast, more detailed cost allocation systems located towards the extreme right providing a reasonably accurate cost information may be optimal for an organisation 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. In this case more sophisticated cost analysis is needed to analyse cost data across diverse objects, as a means of improving competitiveness through more informed pricing and product mix decisions (Kaplan, 1994; Cooper, 1988 b).

⁶ The use of different cost information for both profitability analysis and cost-plus purposes is discussed in more detail in Chapter 3.

2.8 Summary

This chapter has identified the alternate product costing systems in the form of the direct costing, traditional absorption costing and the ABC systems. Based on the limitations of this classification of these alternate costing systems, specifically the difficulties in distinguishing between traditional costing and ABC systems, this chapter has provided justification for the adoption of a wider perspective to capture aspects of the product costing systems by classifying costing systems based on the level of sophistication in assigning indirect costs. In particular, potential proxies that could be used to measure the level of sophistication were identified. They include the number of cost pools and the number and nature of cost drivers (cause-and-effect/arbitrary) deployed in the cost system and level of accuracy of cost information produced by the costing system.

It was also highlighted in this chapter that different cost information may be extracted for different purposes. The costs that may be included for decision making were classified into the following three categories: direct costs excluding all overheads; direct costs plus the assignment of only those indirect costs where cause-and-effect allocation bases can be established; and direct costs plus the assignment of indirect costs using both cause-and-effect and arbitrary allocation bases.

Having discussed in this chapter, the alternative cost assignment systems together with the possible cost categories that can be extracted from cost databases for different purposes, the role of product cost information in pricing decisions and profitability analysis for internal attention-directing purposes will be discussed in the next chapter.

Chapter 3

Importance of cost information for pricing decisions

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3.5 Summary

3.1 Introduction

The pricing decision is vital to a company (Monroe, 1990). Peter (1992) calls it one of the most important and complex decisions a firm has to make. Given the importance of the pricing decision, understanding how these decisions are made is critical to academics and practitioners alike. This chapter provides an overview of the contributions from the economics, marketing, and accounting literature for determining how prices should be set and the factors influencing pricing decisions. Because of the role price plays in a firm's welfare, the study of pricing has been extensive in recent years (Diamantopoulos and Mathews, 1994). In fact, there have been literally thousands of articles, chapters, and entire books published on the subject of pricing written by authors from economics, marketing, and accounting. A vast amount of the normative literature has been published in regards to the three perspectives, and to adequately describe it would require several chapters. Because of this the focus is on providing a general overview rather than a detailed description of the normative pricing literature. The empirical literature will be presented in the next chapter.

Knowledge of economic theory provides a suitable framework for establishing a normative theory of how prices are determined and also provides an insight into the cost information that is appropriate for pricing decisions. This chapter, therefore, will briefly examine traditional pricing theory in its section 3.2. This section also identifies the limitations of applying economic theory in practice. Section 3.3 describes the marketing literature relating to pricing decisions. In particular, it identifies the marketing factors to be considered in making the pricing decision. Accounting has for many years advocated the use of cost-based framework to pricing. Thus, section 3.4 focuses on the role the accounting information plays in determining the selling price by a price setting firm. Furthermore, where the prices are set by the market the role of cost information is described. In these circumstances cost information is required for product mix decisions. Therefore, this aspect will be also examined. In particular, the focus is on profitability analysis. Therefore, the chapter continues with a presentation of the categories of costs that can be used for profitability analysis/pricing decisions.

3.2 Pricing from the standpoint of economic theory

According to economic theory the price of a good or service is influenced by market conditions. Market conditions are generally described as perfect competition, monopoly, and oligopoly.

3.2.1 Perfect competition

In perfect competition, which assumes perfect knowledge, price will be determined by the forces of demand and supply.

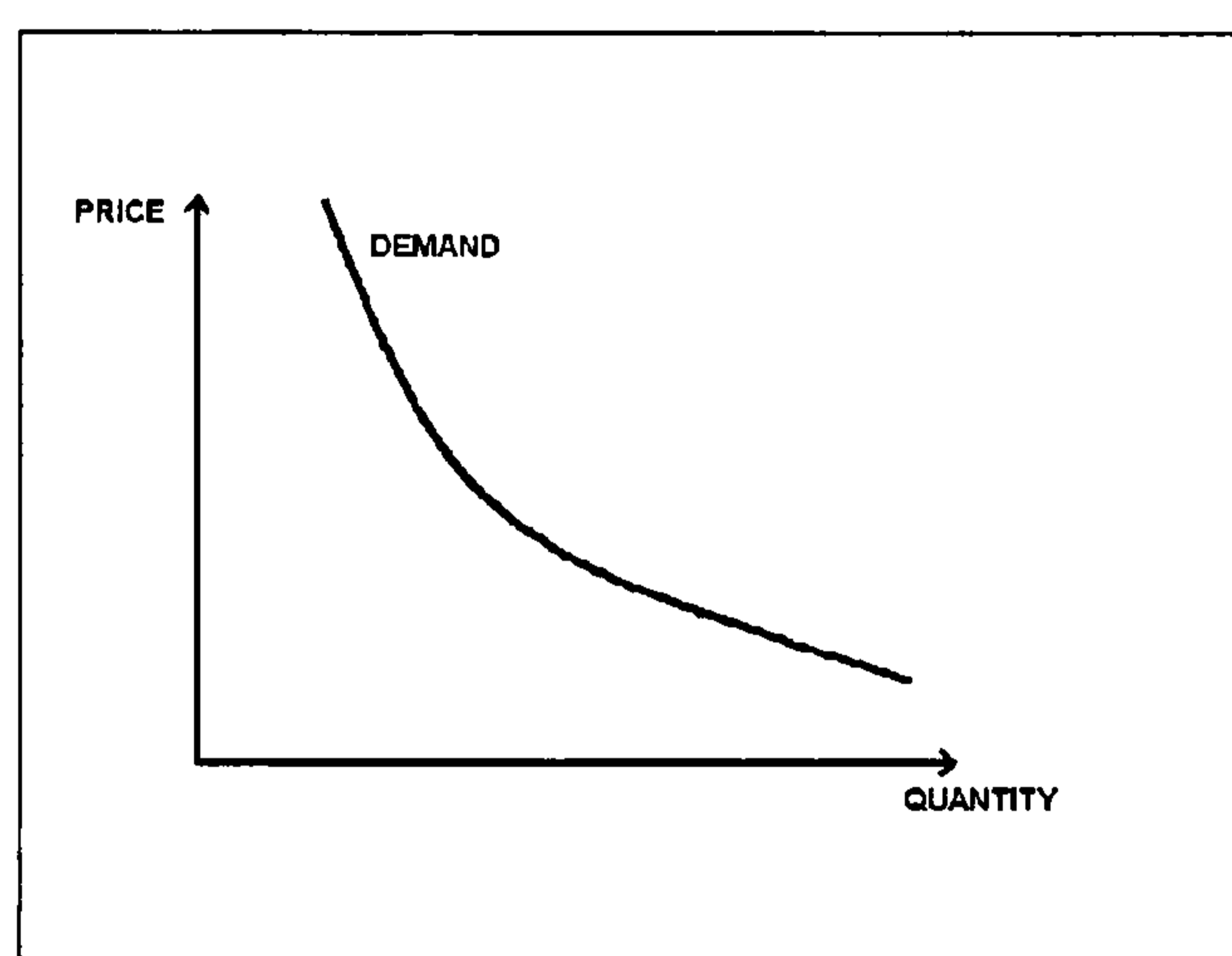
3.2.1.1 The concept of demand

Demand, as expressed in economic terms, is the measurement of a buyer's desire for a product. This measurement is expressed graphically in terms of a demand curve. The market demand curve expresses the relationship between quantities demanded and price changes, holding other factors constant. The demand curve is shown in Figure 3.1. For normal goods a high quantity will be demanded at low price levels and a low quantity at high prices. As the price of the good increases the quantity demanded by consumers fall and vice versa. That is, the quantity demanded increases with a decrease in price and conversely decreases with an increase in price. This statement is known as the law of demand.

There are many circumstances in which it is desirable to have information about the steepness of a particular demand curve. The economist describes the sensitivity of demand to changes in price as the price elasticity of demand. If a small change in price makes a large change in buyers' demand, demand is said to be elastic. Demand is elastic when there are substitutes for a product, or when customers do not value the product very highly, the result is that a small increase/decrease in price causes a large decrease/increase in the quantity demanded. Alternatively, demand is inelastic if price increases have little effect on demand. The demand is inelastic when customers place a very high perceived value on owning the product, and need to have the product regardless of its cost or when no close substitutes exist; the result is that a small increase/decrease in price causes only a small decrease/increase in the quantity demanded (Drury, 2004).

The economists are apt to assert that the profitability in making a pricing decision to lower or raise prices is influenced by the degree of elasticity. When demand is elastic, the rational decision may be to lower the price, because this results in more units being sold and an increase in total revenue. Price increases may be unwise, because in the short run both units sold and total revenue are likely to drop. In situations where demand is inelastic and buyers are not as sensitive to price changes, an increase in price is likely to produce greater total revenue, even though fewer units will be sold.

Figure 3.1: Typical Demand curve



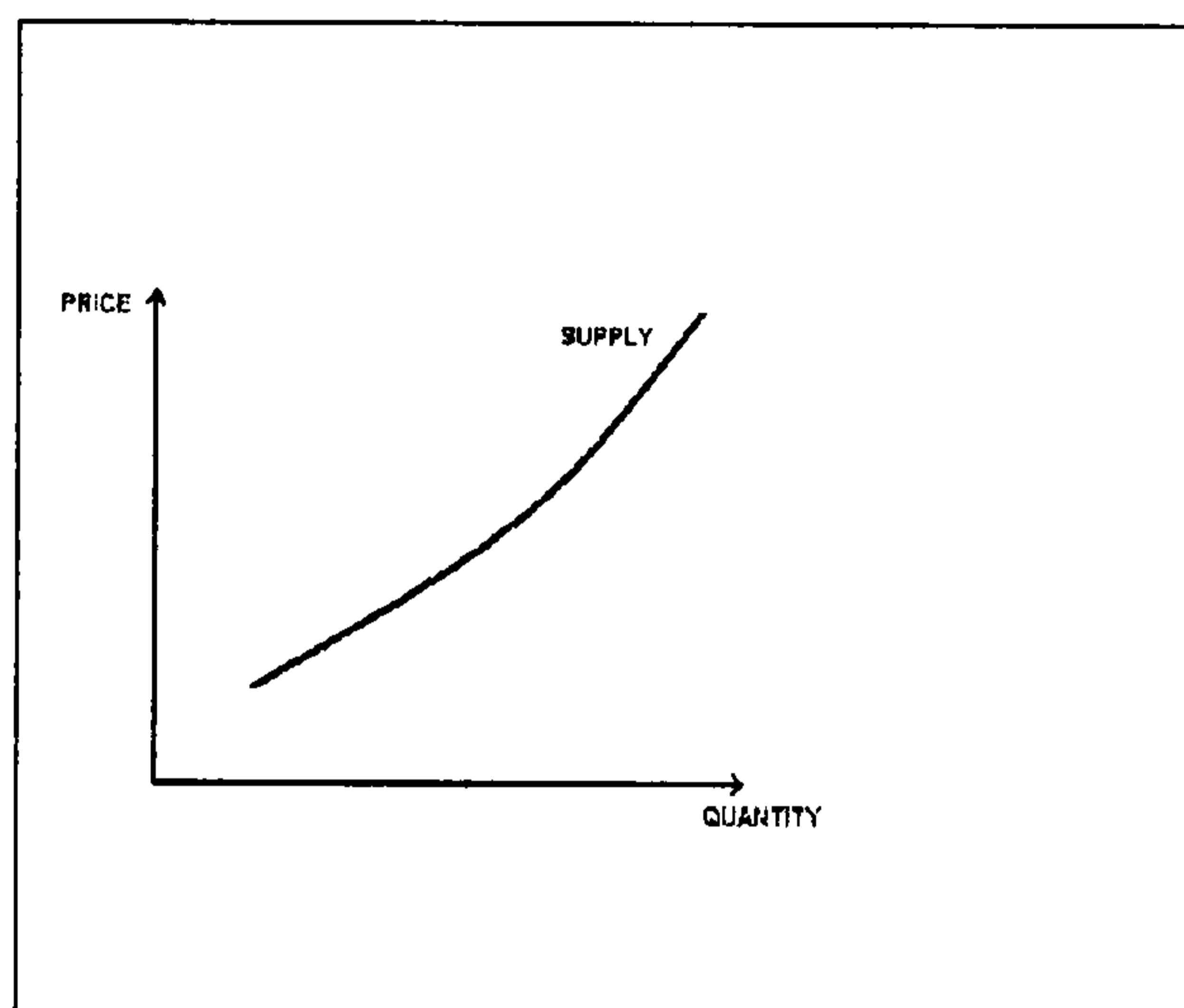
3.2.1.2 Supply

Supply is analogous to demand. Supply, as expressed in economic terms, is the measurement of the amount of goods that suppliers are willing to offer for sale at various prices during a particular time period assuming no changes in other elements of the marketing mix. The higher the market price is for a product, the greater is the profit motive to offer larger quantities for sale. Suppliers will offer more goods for sale at a high price than they will at a low price. As price levels fall the quantity supplied decreases because less efficient producers are unable to produce at low prices.

The law of supply states that when the price goes up, the quantity supplied goes up. This measurement is expressed graphically in terms of supply curve shown in Figure 3.2. A shift in the supply curve whereby more or less of the product is offered at a particular price occurs as a result of changing costs or manufacturing technology. A shift to the left

means less of the product is offered at each designated price level as a result of cost increases.

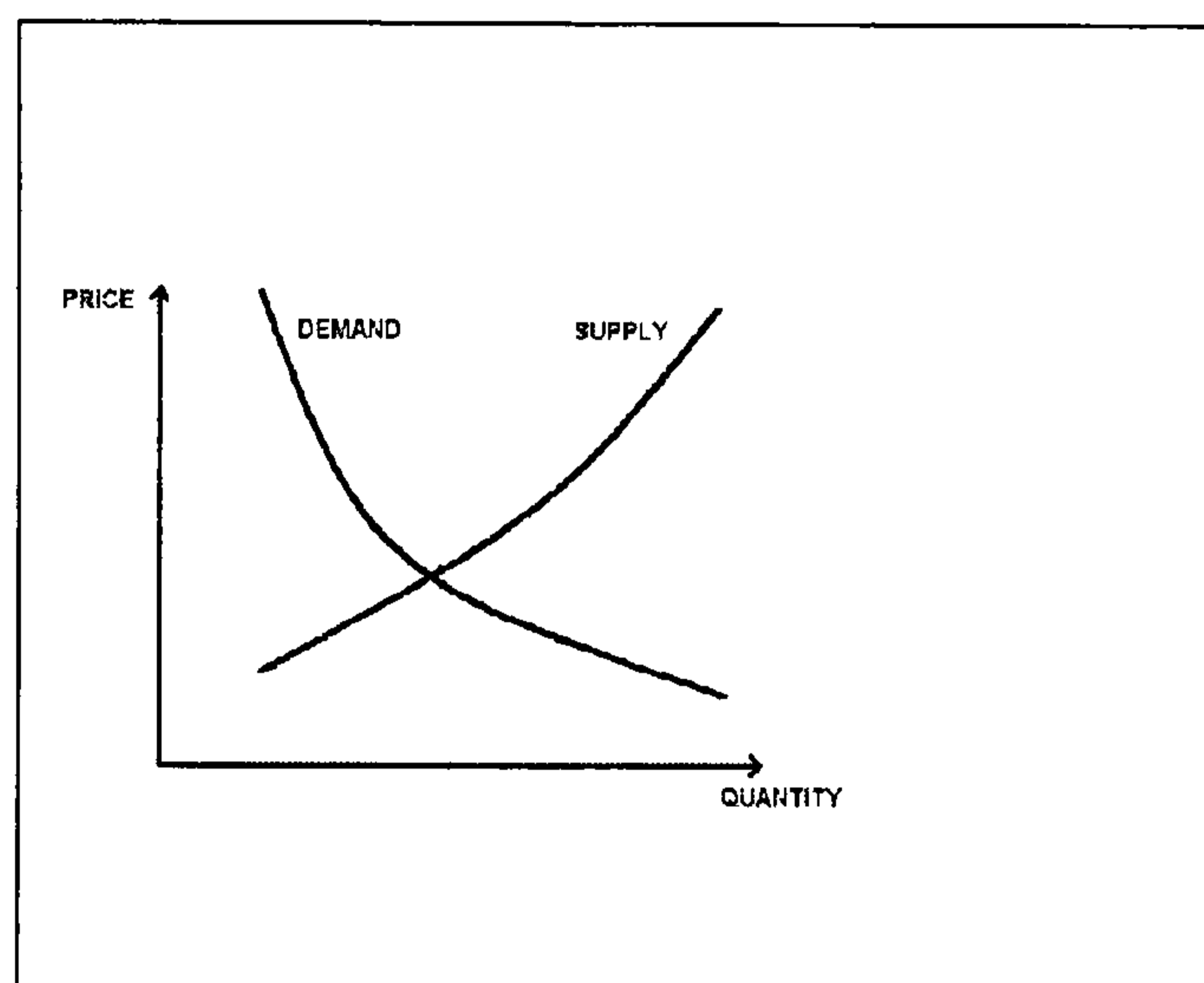
Figure 3.2: Typical Supply curve



3.2.1.3 Supply, demand, and market equilibrium

Assuming competitive conditions (i.e. there are many demanders and suppliers in the market resulting in no single demander or supplier being able to influence the market price) the price of a given product as well as the quantity that will be bought and sold in the marketplace is determined by considering supply and demand simultaneously. In a stable market, the point where the supply curve and the demand curve cross should reflect the market price. The corresponding point on the graph is called the equilibrium point. The price at this point is called market price. Therefore, it is reasonable to expect that this will be the price prevailing in the market. Although there are many prices that could exist in this market, there is only one at which the quantity demanded is equal to the quantity supplied, and that price is expected to persist in the marketplace. Figure 3.3 shows the equilibrium price or the price at which quantity supplied and quantity demanded is the same. At any other price there will be either a surplus or a shortage of the product. Because the point of equilibrium is determined by the supply and demand curves, it can change only if either the supply and demand curves changes.

Figure 3.3: Supply and demand



A state of pure (perfect) competition, however, rests on the following assumptions (1) consumers can get the product from more than one seller, if there was only one seller for a product, there would be no competition and thus the buyers must pay the price specified by the seller, (2) Products are equivalent (i.e. the customers perceive several competing products as identical). In this case sellers who price even slightly above the market price may experience a drop in sales, therefore all sellers competing in the same market offer products at exactly the same price, and (3) products are available at the same time and place. It should be obvious that these three conditions rarely exist simultaneously. Only few markets offer identical products (commodities) such as agricultural products, building materials, and chemicals. Effective competition may exist for such markets. In most markets, however, sellers might sell products that are similar, but are not the same. Some products may be differentiated from each other. Therefore, products are often sold at a variety of prices that minimise price competition. Gabor (1988) noted that few, if any, firms would accept these assumptions as being sufficiently realistic to be of practical use.

The term monopoly is used to refer a market where there is only one seller. An oligopoly is a market served by only few sellers who each hold a large market share. Both types of markets are discussed in the following sub-sections.

3.2.2 Monopoly

A pure monopolist is the antithesis of a competitive firm. A competitive firm has no control over price and that is why it is called a price taker. On the other hand, a monopolist is the only supplier of the product so it is a price maker. While a monopolist's price is not constrained by competition, it is constrained by the law of demand. Because it is the sole seller, the monopolist faces a downward-sloping demand curve, the market demand curve. The downward-sloping demand curve means that a monopolist can sell more units only by lowering price (assuming that price discrimination is not possible i.e. that the firm can charge only one price)¹. Because the monopolist must lower price to sell more, the extra or marginal revenue it gets from selling another unit is less than the price it charges. Thus, its marginal revenue curve lies everywhere below its demand curve. In contrast, for a seller who is a price taker, demand is identical with marginal revenue (Pashigian, 1998).

The pure monopoly model assumes barriers to entry, there are no immediate rivals, and price as well as quantity is determined without fear of attracting other firms to industry. The model also assumes that products of other firms are not close substitutes, and therefore pure monopolists do not have to consider the price response of other firms (Pashigian, 1998).

Pure monopoly rarely occurs because few industries satisfy these assumptions completely. Nevertheless, the theory of pure monopoly is useful as a standard or point of reference. The theory indicates what price a monopolist would charge, what quantity it would produce, and the profits it would earn. Many economists believe that conditions approaching a monopoly can emerge when one firm has a large cost advantage over

¹The act of charging different prices for identical items is known as price discrimination. Any monopolist faces the temptation to price discriminate, because he produces where marginal value exceeds marginal cost. Consequently, he can always sell additional items at a price higher than the marginal cost of producing them. A competitive producer, by contrast, faces no temptation to price discriminate. This is because he can sell any quantity he wants to at the going market price, so there is never any reason for him to sell for less. Sometimes a monopolist can increase its profits by charging different prices for identical items. This practice is known as price discrimination.

others, so that it can set a profit-maximising price without attracting other firms to the industry.

In some markets there is neither monopoly nor competition. In these markets with just a few firms each has a certain degree of monopoly power the strategic interaction among firms is the key to understanding how prices are determined. Economists describe these markets that are intermediate between monopoly and competition with the term oligopoly.

3.2.3 Oligopoly

An oligopoly is an industry in which the number of firms is sufficiently small that any one firm's actions can affect market conditions; it is where many price-taking firms escape the discipline of competition by cooperating rather than competing by forming a cartel. A cartel is an arrangement among price taking firms that reduces each firm's output and increases the market price. The reason for this alleged rigidity according to Gabor (1988) is the belief that a price cut would immediately be followed by the main competitors, and the market as a whole would not expand sufficiently to make the lower prices worthwhile. Each firm in this situation is also supposed to fear that if it should increase its price, the others would not follow suit and that hence it would lose a high proportion of its customers. In such a setting the firms may collude to raise prices and restrict production in the same way as a monopoly. However, there are legal restrictions on such collusion in most countries. There does not have to be a formal agreement for collusion to take place (although for the act to be illegal there must be a real communication between companies). For example, in some industries, there may be an acknowledged market leader which informally set prices to which other producers respond, known as price leadership. In these markets economists have developed different models. The results of these models differ, and unambiguous answers are not presently available.

3.2.4 Difficulties with applying economic theory

Pricing in practice departs significantly from traditional normative economic pricing theory. Traditional economic theory has concentrated on the price and outputs of companies under various market structures, such as competitive, monopoly and

oligopoly, concentrating on demand, supply and cost functions. The key assumptions underlying rational price decision making have been profit maximisation and marginalism whereby engaging in any activity up to the point where marginal cost equals marginal revenue. When the firm sells goods in the marketplace, it chooses the profit-maximising quantity. In accordance with the equimarginal principle (i.e. the quantity at which marginal cost equals marginal revenue) the firm sells this quantity at a price determined by the demand curve for its products. A change in the firm's fixed costs, because it affects nothing marginal, will not affect the quantity or price of the firm's output. There is one exception: a sufficiently large increase in fixed costs will cause the firm to shut down or leave the industry entirely. A change in marginal costs can lead to a change in the firm's behaviour. So can a change in marginal revenue. Any change in the demand curve facing the firm can lead to a change in marginal revenue. For example, a change in the availability of competing firms can affect demand and, consequently, marginal revenue and, consequently, the behaviour of the firm.

While marginalism may be a useful way of analysing the decision-maker's thoughts about pricing, it suffers from a number of severe limitations when it comes to the analysis of individual firm behaviour. These limitations according to Drury (2004) can be grouped in the following three groups:

1. Traditional economic theory assumes that demand and cost functions are known. In practice, it is very often difficult to estimate such information. A multi-product company may have hundreds of different products and varieties, the price set for one product may affect the demand of other products, taking into account competitive reactions it will be extremely difficult task to make price/demand estimate or, if it can be estimated it is only in the vaguest form. Also the marginal cost curve for each individual product can only be determined after considerable analysis and the final result may only represent an approximation of the true marginal cost function particularly where significant joint product costs exist.
2. The economic theory is based on the assumption that the decision-maker is a rational profit maximiser. However, many firms are not seeking to maximise profits, particularly in the short run, as they can be motivated by other non-profit objectives.

3. No consideration is given to non-price variables. In practice advertising strategies, distribution policies, and other marketing- mix characteristics have an important influence on price. If one of these is changed, a whole new demand curve may have to be estimated, and a new pricing decision has to be made.

3.3 Pricing from the standpoint of the marketing literature

While economics has demonstrated the importance of demand, supply, and structure of the market considerations marketing have developed their contribution into considering the practicalities of making a pricing decision when a company decides upon a price for a product. A good example is provided by Kotler (1986) who regards pricing decisions as being influenced by a number of internal company and external environmental considerations. Diamantopolous (1991) refers to the influence of the environmental forces collectively as the “pricing environment” describing them as the elements that constitute the setting within which price decision-making taking place. These factors are presented below categorised as external and internal factors.

3.3.1 External factors affecting pricing decisions

External factors that affect pricing decisions include competition, economic conditions, as well as the nature of the market and demand discussed in Section 3.2.

3.3.1.1 Competition

In determining prices, the competitive environment should explicitly be accounted for. According to Kotler (1986) careful consideration should be given to the price and value of a given product or service against those of a comparable product or service. Also, the company’s pricing strategy may affect the nature of the competition it faces. A high-price, high margin strategy may attract competition, a low-price, low-margin strategy, however, may stop competitors or drive them out of the market. Therefore, consideration should be given to both current competitive and future competitive reactions. Competitive price reactions to price changes vary from passive (no reaction), through matching price changes to retaliatory (cutting prices below competitive levels) (Blois et al., 2000).

Blois et al. (2000) continue by arguing that competitive reactions depend on the nature of the competitive environment: the market structure, the level of market concentration and the existence of competitive advantages. Market structure is portrayed by the number of buyers, the number of sellers and the degree of product differentiation. Fewer buyers, more sellers and less product differentiation where brands begin to lose their identity and choice by buyers is largely based on price, leads to aggressive forms of competition. In particular, it leads to price competition and to a higher probability of competitive reactions to own prices and competitor price changes. Furthermore, the distribution of market shares across competitors affects competitive reactions. Competitors with larger market shares often react more strongly to price changes. Finally, the presence and nature of competitive advantages influence the extent to which a company can maintain prices below or above competitive levels, also the type and outcome of competitive reactions.

Porter (1985) recognises that a business can develop a sustainable competitive advantage by implementing one of the following strategies: cost leadership strategy; or differentiation strategy (these strategies are further explained in section 5.4.1.5 Chapter 5). Cost advantages occur when the product can be produced or distributed at a lower unit cost than competitive products. The source of this competitive advantage may arise from factors such as economies of scale and a product mix comprising of standardised products. A differentiation strategy is associated with companies that have unique product value advantages arising from marketing products that have characteristics that differentiate them from those of competitors. The source of this competitive advantage may arise from factors such as superior quality, product flexibility, delivery and product design (Porter, 1985). The differentiation may be between specific physical features of the products, or it may involve more technical aspects such as service availability, engineering capability to modify products to meet specific requirements of customers, and so on. If the competitive advantage is based on differentiation, prices above competition can be justified because the customer is willing to pay for the differences a firm offers. However, if it is based on a low cost strategy, maintaining a low price is crucial. Blois et al. (2000) argue that companies relying on differentiation based advantages typically show little price reaction and are less likely to engage in price wars. Companies whose competitive strength is based on low cost are bound to react with a

price move and may engage in a price war, but they are more likely to survive it. Basically, as indicated by Kotler (1986), the firm will use price to position its offer relative to competitors.

3.3.1.2 Economic conditions and other external factors

When setting prices, the company must also consider other factors in its external environment. Economic conditions like inflation, interest rates and recession influence price decisions by affecting both the cost of producing a product and consumer perceptions of the product's price and value. Companies must also consider the effects their price will have on other parties in the economy and the reaction of the resellers to various prices. The company should set prices that give resellers a fair profit, and help them to sell the product effectively. The government is another important external influence on pricing decisions. Direct price setting, public utility regulation, limitations on competition and laws restricting supply are the major ways in which government can influence pricing decisions. Thus, pricing decisions must also take into account any government legislation to determine if the price set is within legal bounds. Marketers need to know the laws affecting price and make sure their pricing policies are legal.

3.3.2 Internal factors affecting pricing decisions

Internal factors include marketing-mix strategy, costs, and the company's marketing objectives.

3.3.2.1 Marketing-mix strategy

Price is only one of the marketing mix tools that the company uses to achieve its marketing objectives. Decisions made for other marketing mix variables according to Kotler (1986) may affect pricing decisions. Price decisions must be coordinated with decisions on the other marketing mix to form an efficient and effective marketing program. According to Nagle and Holden (1995), managers should be aware of marketing mix interactions and exploit them through integrated decisions on product design, distribution, promotion, and price. The failure to do so is one of the reasons of ineffective pricing. Kotler (1986) noted that the company often makes its pricing decisions first and then bases other marketing-mix decisions on the prices they want to

charge. Here, price is a crucial product positioning factor that defines the product's market, competition, and design. Other companies de-emphasise price and use other marketing mix tools to create non price positions. Thus, the marketer must consider the total marketing mix when setting prices. If the product is positioned on non price factors then decisions about quality, promotion, and distribution will strongly affect decisions on the other marketing-mix elements. In most cases, the company will consider all the marketing-mix decisions together when developing the marketing program.

3.3.2.2 Costs

Cost is considered by Kotler (1986) to be important for setting a price floor or lower boundary on prices. The company aims to charge a price that covers all its costs for producing, distributing, and selling the product, plus a fair rate of profit return. According to Kotler (1986), management should charge a price that will at least cover the total production costs at a given level of production and should monitor its costs carefully because if the costs of products are more than competitors' costs, the company will have to charge more or make less profit putting it at a competitive disadvantage. Blois et al. (2000) agree that the knowledge of costs is a crucial input to pricing. They illustrate that costs can be classified along several dimensions and that the quantification of all relevant costs may be problematic.

3.3.2.3 Marketing objectives

The setting of marketing objectives requires the company to decide what it wants to accomplish with a particular product. If a firm is clear about its objectives, pricing according to Kotler (1986) will be fairly straightforward. Pricing objectives play a very important role in pricing decisions. If the company's objectives are to be met, pricing decisions must be made in light of those objectives. Understanding what objectives managers are trying to achieve is an obvious and necessary step in being able to help them achieve those objectives.

A company may choose among a wide range of pricing objectives. Common objectives include survival, current profit maximisation, market share leadership and product quality leadership.

Survival: Companies set survival as their major objective if they are troubled with too much capacity, heavy competition, or changing consumer demands. To keep the plant going companies must set a low price, hoping this will increase demand. In this case profits are less important than survival. As long as its prices cover variable costs and some fixed costs, a company can stay in business for a while. However, survival is only a short term objective. In the long run, the firm must learn how to add value or face extinction.

Current profit maximisation: Many companies aim to set profit that will maximise current profit. This goal requires an estimate of demand and costs at different prices, then the price that will produce the maximum current profit, cash flow, or return on investment will be chosen. In all cases, with this objective the company concentrates on current financial outcomes rather than long-run performance.

Market share leadership: Other companies seek to obtain market share leadership. To become the market share leaders, prices are set as low as possible. They believe that the company with the largest market share will enjoy the lowest costs and highest long-run profit. A variation of this objective is to pursue a specific market-share gain. For example, if the company wants to increase its market share to 20%; it will search for the price and marketing program that will achieve this increase.

Product quality leadership: achieving product quality leadership would normally call for charging a high price to cover higher performance quality and the high cost of R&D.

Other objectives: companies might also use price to attain other more specific objectives. Prices can be set low to prevent competition from entering the market or set at competitors' levels to stabilise the market. Prices can be set to keep the loyalty and support of resellers or to avoid government intervention. Prices can be reduced temporarily to create excitement for a product or to draw more customers into a retail store. Some products may be priced to help the sales of other products in the company's line. Thus, pricing may play an important role in helping to accomplish the company's objectives at many levels.

Most of the empirical research on how prices are set has focused on determining the pricing objectives used by managers, and to lesser extent, the factors which influence

their choice of objectives (Diamantopoulos, 1994)². The role of objectives in determining specific prices, however, is not simple. The problem is pricing objectives are usually very vague, a knowledge of the objectives a firm is likely to use will not necessarily tell much about the relative price level to expect from the firm in some future period. Noble and Gruca (1999) argues that studying pricing objectives can provide information on what the firm is trying to accomplish, however, objectives do not tell much about how the firm will accomplish these objectives (i.e. what pricing strategies will be used to accomplish the goals of the firm).

3.3.3 Pricing strategies

Marketing texts note that in principle, companies will set prices with reference to one or more of three considerations (product costs, competitors' prices, consumers' perceptions). Each of these considerations corresponds with one of the following general pricing approaches.

Table 3.1: Pricing approaches

Considerations in setting prices:	Product costs	Competitors' prices	Consumers' perceptions
Method of pricing:	Cost –based	Competition-based	Buyer-based

Adopted from Mills and Sweeting (1988)

The following sections describe the primary attributes of each category.

3.3.3.1 Demand-based pricing

Demand-based models to pricing have been developed since the mid 1970s. The company using this approach to pricing must find out the value in the buyers' minds for different competitive offers. If the seller charges more than buyers' perceived value, the company's sales will suffer. Many companies may overprice their products and their products sell poorly. Other companies may underprice their products thus increasing sales

² The empirical research investigating how managers set prices will be discussed in Chapter 4.

volumes but producing less revenue than they would if price was raised to the perceived value level.

A demand schedule (i.e. an analysis of customer demand with estimates of how many units the company will sell at different prices) for the product in question is needed for this type of pricing. The demand schedule becomes in turn the basis for determining which level of production and sales would be most profitable for the firm. Price is set to match the most profitable level, or the one which attains the firm's desired objective which is ascertained by interjecting manufacturing and marketing cost projections at various sales levels with the previously determined demand schedule (Hanna and Dodge, 1995).

Several methods of determining demand have been set forth in the literature (both the marketing and economic literatures). The specific conditions in a particular case may require using a different technique, or may favour one over another. Each one of these methods has its advantages and limitations. Among these are expert estimates, analysis of historical data, surveys of buyers, and price experiments.

Expert estimates: Experts will often consist of, among others, executives of the company, market researchers, and consultants. Experts might also include loyal customers or distributors who resell the company's product. There are a number of limitations in using expert estimates (Hanna and Dodge, 1995). First, these people may not make a conscientious effort to reach the desired estimates. A second problem results from intended or unintended bias by either optimistically or pessimistically stating the likely estimates occurring under each of the given price possibilities. A panel of experts from different levels of the organisation may improve the quality of the data by introducing people with different paradigms and biases into the process. However, inside experts may not be all in touch with the market and will base their decisions on the same flawed source, perhaps from an earlier feasibility study or the opinion of an executive. Also the closer a new product resembles the look, features, and function of an existing product, the more reliable expert judgment is likely to be. However, it is often difficult to evaluate the value of a new product or of a new product feature to a customer and experts may often grossly underestimate the value of products and product features that are truly innovative.

Analysis of historical data: The historical data that a firm might have can be of value in revealing a schedule of the prices and corresponding quantities that occurred in previous years. Demand estimates using historical data is based on the assumption that relationship between quantities sold and price in past periods can be used to predict sales at given prices in future periods. This prediction involves using simple regression models in which changes in sales are assumed to be caused by changes in price only. This can only be useful according to Hanna and Dodge (1995), if the assumption is made that minor variations have occurred in the product, competitors, and targeted customers. Multiple regression is advised by Hanna and Dodge (1995) which can take account of other causal variables that are believed to have an influence on sales. Furthermore, historical data have the advantage that they are already available and can usually be inexpensively analysed.

This data, however, would be useful for estimating customer price elasticity only if the company has a history of having sold its product at different prices from time to time. If the price has not been changed there would be no meaningful data to analyse (Daly, 2001).

Surveys of customers: Demand estimation is essentially the practice of anticipating what actual and potential customers are likely to do when different prices for the product prevail. This suggests asking them directly about the probabilities of purchasing the particular product at various price levels. Doing so should provide more accurate data than any other demand estimation method. However, the value of a buyer survey in estimating demand at various possible prices according to Hanna and Dodge (1995) rests on two assumptions. One is the assumption that potential customers can be identified and persuaded to participate, which Daly (2001) argues might be a difficult task since personnel who perform surveys are usually unskilled and have little familiarity with the product or its potential customers. Getting data from these customers Daly goes on to state that surveys can also be difficult to undertake as people have limited patience for completing survey forms or even for telephone surveys. The second assumption hinges on the reliability of customers responses. The quality of information may not necessarily reveal their future intentions or reflect their actual purchase behaviour.

Price experiments: A demand schedule for the product may be obtained by using price experiments in which price is manipulated in a broad or localised setting to observe the effect on quantity demanded. The basic technique for price experimentation is that the company sells the product at one price for a period of time, then observes how much the product sells and then changes the price again. In other words, the company offers the product at different prices, noting the effect of price on volume each time. In theory, the company should be able to determine the price-volume relationship, drawing the customer demand curve from the data.

One advantage of price experiment is the attainments of the desirable results quickly and relatively inexpensively. However, the cost of price tests is dependent on the test duration (i.e. the normal period of time that it takes the buyer to consume the product before restocking). For some products it may be a matter of days such as for soft drinks, while for others it may be weeks. A negative aspect of price experiments is that it requires an existing product. A new product may have a natural trend of constantly increasing volume that is independent of price. Also, because the company invests time and money in product development, product launch and product promotion before running a price test other methods of determining customer demand are advised for a new product. Another disadvantage is that seasonal buying trends may increase or decrease sales in ways that have nothing to do with price and differences in advertising or promotional efforts may disguise the real effects of price on customer demand (Hanna and Dodge, 1995; Daly, 2001).

To conclude, there are many ways through which a firm can estimate the demand for its products. The techniques range from very sophisticated studies to simple guesses. For most the difficulty surrounding such a task of demand estimation is quite obvious (this apparent difficulty in estimating demand was noted as a major limitation to applying economic theory described in the first section of the chapter).

3.3.3.2 Competition-based pricing

Under competition-oriented pricing the price of a product is relative to the price of one or more competitors. This could be the actual or predicted price, or the price the firm hopes the competitor will move to. The firm first determines who the competitors are at the

present time. This step is followed by a competitive evaluation of its own product. Taking this knowledge into consideration, the price set for the firm's product can be raised or lowered from the prevailing 'market' price, taking into consideration the unique characteristics of its own brand, the relative strengths or weaknesses of its competitive position and more importantly how the competitors will respond to its own price changes. The most common competition strategies include leader pricing, and parity pricing.

The price leader will usually have one of the highest shares of market of all competitors and usually enjoys a higher efficiency of operations, either through economics of scale or experience (Greer, 1984). The price leader initiates a price increase and expects the other firms to follow with equal price increases. Price leader strategy is used in markets where changes by competitors are easily detected, and most competitors are running close to capacity in their factories (Nagle, 1987).

Firms following parity pricing will usually have a smaller share of the market than the price leader (Greer, 1984). When the price leader attempts to change prices, most competitors follow parity pricing and match the price change. If there is no price leader, but a market price exists, the firm following parity pricing matches the market price. Some firms may charge a bit more or less, but they hold the amount of difference constant. This method of pricing (parity pricing) is quite popular. Where demand elasticity is hard to measure, firms feel that the going price represents the collective wisdom of the industry concerning the price that will yield a fair return. They also feel that holding to the going price will avoid harmful price wars.

Kotler (1986) noted that competition-based pricing is also used when firms bid for jobs. Using sealed-bid pricing, a firm bases its price on how it thinks competitors will price rather than on its own costs or on the demand used when a company bids for jobs. Winning the contract requires pricing less than other firms. Yet the firm cannot set its price below its costs. In contrast, the higher the company sets its price above its costs, the lower its chance of getting the contract.

3.3.3.3 Cost-based pricing

The pricing literature in marketing considers competition-based and demand-based approaches to pricing to be externally focused in nature and the cost-oriented method an

internally focused exercise in pricing. Price under competition-based and demand-based pricing is the starting point in the calculation process. This price is obviously only an indication of the appropriate price to charge in view of the competition in the market place; however, has no necessarily relationship to cost. Therefore, management works from this given price to see if the designated price is sufficient to cover costs and to achieve desired profitability. In contrast, under the cost oriented pricing approach, prices are determined by converting the internal costs to a per unit cost for the product and then adding a predetermined percentage of these costs as a profit margin to determine prices. According to Hanna and Dodge (1995) although competitive environments, business organisational structures and marketing response have changed dramatically making pricing decisions a complex matter, costs remain a major determinant. They state:

When the price does not cover costs plus the firm's profit objectives, management will have to decide whether to bear the losses or reduced returns for a period of time until the product is strong enough to be profitable, or to adjust the choice of materials, equipment, and manpower to produce the product at a lower cost sufficient to make it profitable; or as a last resort, to drop the proposed product entirely (p. 39).

Furthermore, they argued that no longer is it sufficient to know that prices will cover costs and yield a profit; the more important consideration is that cost advantages need to be reflected in pricing variations to gain competitive advantage.

The marketing literature emphasises the distinction between cost-based pricing and the other pricing strategies. Cost-based pricing is a purely supply-oriented strategy and is internally focused. The others are all demand-oriented. Monroe (1990) points out that cost-based pricing ignores demand factors and ignores the consideration of price-volume-cost relationships. Nagle (1987) says that cost-based pricing methods can be seriously misleading and should only be used as a starting point, deviating from them as necessary to reflect market reality. Although the marketing literature (for example, Kotler (1986)) is not in favour of cost-plus pricing saying that any pricing method that ignores current demand and competition is not likely to lead to the best price, it states that cost-based pricing still remains very popular. A more detailed discussion of cost-plus pricing including the different types of cost that can be included in the cost base is provided in section 3.4.2.2.

3.3.3.4 New product strategies

New product strategies share the common attribute of being strategies that are applied early in the product life cycle. For many products in this stage it is the time at which the amount of product differentiation is at its peak. This means that the product offers unique features that others do not yet have. If these features have significant utility for groups of users, these users often will be less price sensitive than would otherwise be the case. Many new products will have the potential of future cost reductions based on the experience curve, economics of scale, etc., reductions which have not yet been realised but which can be predicted. Included in the category of entry strategies are (1) price skimming, (2) penetration pricing, and (3) experience curve pricing. Each of the strategies will be defined and discussed in the following sub-sections.

3.3.3.4.1 Price skimming

Price skimming is a strategy that is frequently used when a company has a new, unique product. Price skimming is a practice whereby an abnormally high price of a product is set so companies can begin to recover development costs. Direct competition is limited (Oxenfeldt, 1975), only a limited threat of entry for competitors to undercut the high price exists (Nagle, 1987; Kotler, 1986) and there is considerable differentiation between the products throughout the market (Nagle, 1987; Clancy and Shulman, 1991; Kotler, 1986). Often the strategy will be used if the company's factory utilisation is high, since it would be more attractive to pursue high margins rather than high volume (Guiltinan and Paul, 1991), or if the potential for achieving economics of scale or economics of experience is limited (Nagle, 1987).

3.3.3.4.2 Penetration pricing

Market penetration is a strategy whereby price is initially set low with the objective of dominating the market when large segments of buyers appears to be highly price sensitive/ demand is elastic (Dean, 1950; Guiltinan and Paul, 1991; Oxenfeldt, 1975; Nagle, 1987), so that a low price produces more market growth. This allows increased production volumes resulting in falling costs. It will often be associated with building high plant capacity to produce a high volume such that money is lost in the first few years

but is made up later once a dominant position is held and unit costs are lowered (Kotler, 1996).

Usually competitive market entry is slow, allowing the firm with penetration strategy to establish substantial market share before competitors can react with comparable products (Monroe, 1990). Although product differentiation may be present, price is more important than product features to many segments and the firm's costs are usually lower than those of the competitors (Nagle, 1987). This is often because of economics of scale or experience gained through the initially high volume and market share (Guiltinan and Paul, 1991).

3.3.3.4.3 Experience curve pricing

In experience curve pricing the price is set low to build volume and reduce costs through accumulated experience. As costs come down, the price is reduced further. It is generally used in the early stages of the product life cycle when there is a high potential of cost reductions resulting from cumulative experience gained in the production and/or marketing of the product (Tellis, 1986; Monroe, 1990). The firm generally will have excess factory capacity available to accommodate the increased volume. Large segments of price sensitive buyers exist (Tellis, 1986). This price sensitivity allows a low priced firm to realise an increase in volume and gain the accumulated experience that will bring costs down.

3.4 Pricing from the standpoint of the accounting literature

The starting point for pricing decisions from accounting point view can be expressed from two different perspectives:

- 1) Market-based perspective
- 2) Cost-based perspective

Section 3.4.1 focuses on the market-based and section 3.4.2 on the cost-based perspectives.

3.4.1 The market-based perspective

Many cost accounting textbooks have suggested that in many industries prices are market driven. In these industries even though the market sets the price, cost data can help firms to decide the output level that maximises total profit. It has been argued that in very competitive markets the items provided by one company are very similar to those produced by others (i.e. the products are standardised and little chance exists to differentiate the products of one firm from those of another). Therefore, companies have no influence over the prices to charge and must accept the price determined by market forces. In other words, they face conditions similar to those described for all firms based on perfect competition described in section 3.2.1. Alternatively, if there are a few dominating firms their decisions influence the prices. In these industries small firms, or firms with negligible market shares in the industry behave as price-taker firms and they face conditions similar to those described for oligopoly in section 3.2.3. These firms match the market price for their products as given (i.e. in marketing terms the firm is following parity pricing) and then decide how many units of each product they should produce and sell. If an individual firm demands a higher price for any of its products, its customers might go to other competing firms in the industry unless it can successfully differentiate its products by offering special features or services. Also, significant price-cutting would lead to severe damage to the entire industry as this may lead to a retaliatory reduction in prices from its competitors. Lowering the price might result in a price war that would make the firm, and the entire industry, worse off with lower margins. Given industry prices, a price-taker firm's cost information will be used extensively to determine product profits in order to find the product mix which maximises total profits and identify loss-making products. (In marketing words, where competition-or demand based pricing strategy is used costs still are a major internal determinant see for example section 3.3.3.3).

Drury (2004) and Horngren et al. (2002) argue that the decision time horizon determines the cost information that is relevant for product pricing. Therefore, they advocate distinguishing between price taking firms facing short-run product mix decisions and price taking firms facing long-run product mix decisions.

3.4.1.1 Short-term product mix decisions by price taker firms

Price taking firms may be faced with opportunities of taking on short-term business at a market determined selling prices. Accepting short-term business where the incremental sales revenues are greater than incremental short-run costs will provide a contribution towards committed fixed costs which would not otherwise have been obtained and thus increases total profits (or reduces total losses) in the short-term. However, such business is acceptable only if the following conditions are met:

1. Surplus capacity is available that has no alternative uses for additional production of undertaking the business;
2. The company will not commit itself to repeat longer-term business that is priced to cover only short-term incremental costs; and
3. The company should commit its production capacity to fill that order for only a short period because a long-term capacity commitment to a marginally profitable order may prevent the firm from reducing its capacity or deploying its capacity for more profitable products or orders, and thus force the firm to add expensive new capacity to handle future sales increases.

In addition, Drury (2004, p. 425) noted that:

Besides considering new short-term opportunities organisations may, in certain situations, review their existing product-mix over a short-term time horizon. Consider a situation where a firm has excess capacity which is being retained for an expected upsurge in demand. If committed resources are to be maintained then the product profitability analysis of existing products should be based on a comparison of incremental revenues with short term-incremental costs. The same principal applies as that which applied for accepting new short-term business where spare capacity exists. That is, in the short term products should be retained if their incremental revenues exceed their incremental short-term costs.

3.4.1.2 Long-term product mix decisions by price taker firms

When prices are set by the market a firm has to decide which products to sell given their market prices. Costs indicate whether the product can be made and sold profitably at any price and serve to guide management in the selection of a profitable product mix and in the determination of how much cost can be incurred without sacrificing profit. In the longer-term a firm can adjust the supply of resources committed to a product. Therefore, the sales revenues from a service or product should exceed the full costs of products that

incorporate the cost of using various activity resources to produce and sustain the product. Comparing product costs with their market prices reveals which products are not profitable in the long term when firms can adjust activity resources capacities to match production requirements. Hence, in this situation, management accounting's role is to undertake periodic profitability analysis that serves to distinguish between profitable and unprofitable products in order to ensure that only profitable products are sold.

3.4.1.3 Profitability analysis

The writings of Cooper and Kaplan have stressed that periodic profitability analysis provides the foundation for managing the existing mix of activities and that it provides a strategic review of the costs and profitability of a firm's products, customers and sales outlets. For routine profitability analysis the accounting literature identifies different approaches to specify the categories of costs that are traced to costs objects.

3.4.1.3.1 Contribution accounting hierarchical approach

The contribution accounting hierarchical profitability analysis approach was advocated by several writers in the 1960's. Boer (1990) describes the approach that was presented in an article by Marple (1967) assuming that products are the cost object. At the lowest level of the hierarchy (i.e. a unit of a product) a variable contribution margin is computed by deducting from sales revenue the variable costs traceable to that revenue (see Figure 3.4). Total contribution for a period for each product is obtained by multiplying the unit contribution margin by total units sold in the period. Fixed costs directly traceable to the sales of each product (e.g. advertising) are deducted from the total of each product's contribution margin to derive the contribution for each product. Moving up the hierarchy fixed costs traceable to the product line but not identifiable with individual products are deducted to derive a total contribution for each product line. In Figure 3.4 the highest level of the hierarchy is the business unit. At this level the costs of sustaining the business unit that cannot be directly traced to lower levels within the hierarchy are deducted to compute a profit at the business unit level. Boer (1990) points out that this approach involves the creation of a hierarchy of contribution margins, with the contribution at each level being an accumulation of all the contributions at lower levels minus the traceable fixed costs at that level.

Figure 3.4: An illustration of the profitability analysis contribution hierarchical approach at the business unit level

Level within the hierarchy	Direct (traceable) costs	Indirect costs
Unit of the product	Variable with units of output	All other costs
Product within the line	Above plus fixed to the product	All other costs
Product line	Above plus fixed to the product line	All other costs
Business unit	Above plus fixed to the business unit	None

Adapted from Boer (1990)

More recently, Bromwich and Bhimani (1994) have also advocated the contribution approach to profit reporting. They suggest that overhead costs relating to joint costs should be treated as a fixed charge to the aggregate of the profits from *all* products that use the joint service. They state that this charge should be levied at the point in the product hierarchy at which the resource's uses, and therefore costs, become incremental.

The authors concluded:

many of the problems with overheads can be overcome by adopting a report that uses a contribution approach for each element of the organisation and product hierarchy.

3.4.1.3.2 Cause-and-effect hierarchical approach using ABC

Kaplan and Cooper (1998) advocate that profitability analysis should be structured by activity cost hierarchies for each cost object (e.g. unit-level, batch-level, product-level and facility level where products are the cost objects). They claim that cost hierarchies categorise costs according to the causes of their variability at different hierarchical levels. Hierarchies are defined as the lowest level to which cost can meaningfully be assigned without relying on arbitrary allocations. The objective of activity-based hierarchical profitability analysis reporting is therefore to rely only on cause-and-effect cost assignments and not to incorporate arbitrary allocations.

Drury (2004) recommends the use of activity-based profitability analysis to evaluate each product's long-run profitability. The diagram that is presented in Figure 3.5 illustrates the approach. Drury explains:

At the individual product level all of the resources required for undertaking the unit, batch and product-sustaining activities that are associated with a product would no longer be required if that product were discontinued. Thus, if the product's sales revenues do not exceed the cost of the resources of these activities it should be subject to a special study for a discontinuation decision.

If product groups are marketed as separate brands the next level within the profitability hierarchy is brand profitability. The sum of the individual product profit contributions (that is, sales revenues less the cost of the unit, batch and product-sustaining activities) within a brand must be sufficient to cover those brand-sustaining expenses that can be attributed to the brand but not the individual products within the brand. Thus it is possible for each individual product within the product brand to generate positive contributions but for the brand groupings to be unprofitable because the brand-sustaining expenses exceed the sum of individual product contributions. In these circumstances a special study is required to consider alternative courses of action that can be undertaken to make the brand profitable.

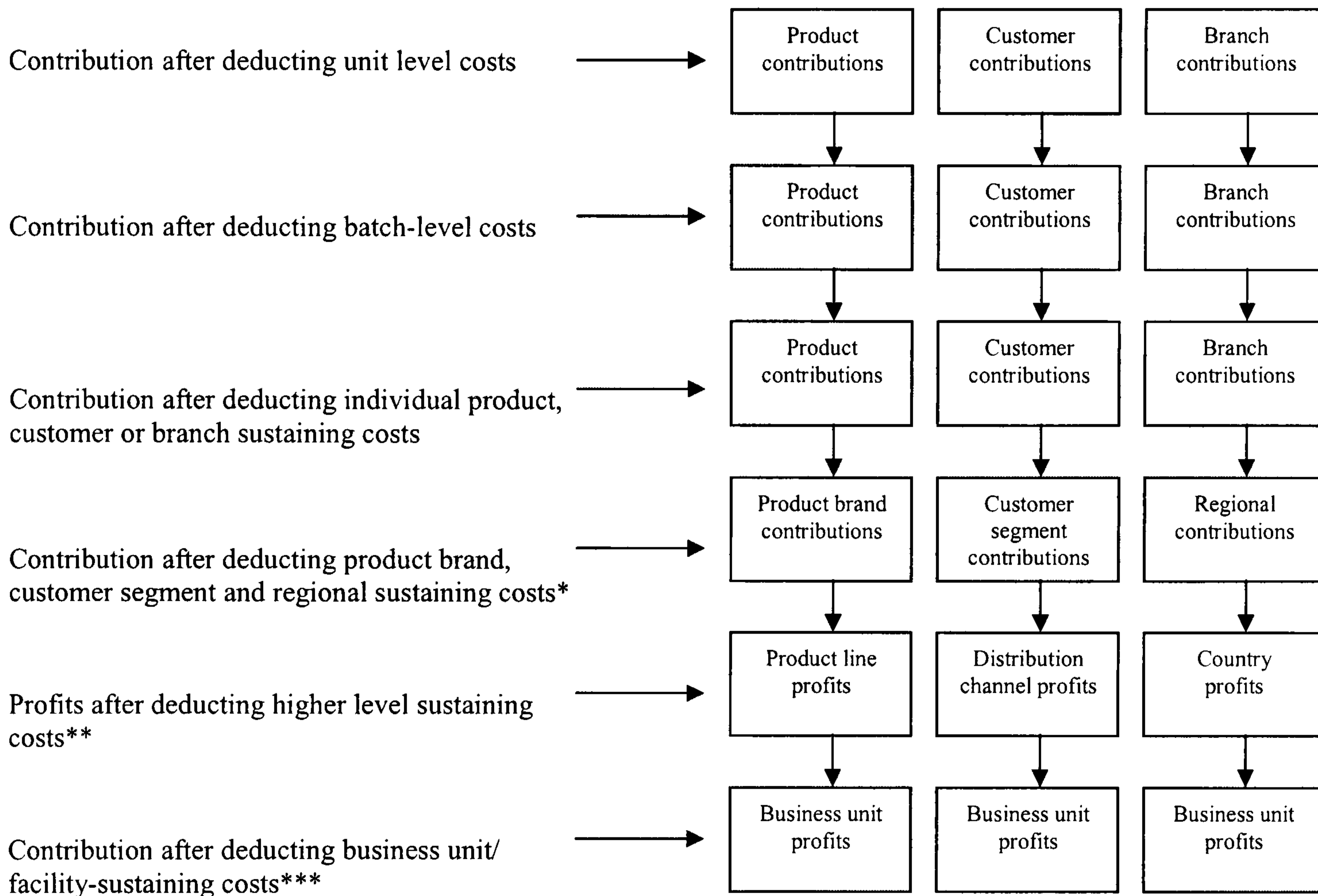
Product line profitability is the next level in the hierarchy. The same principle applies. That is, if the product line consists of a number of separate groupings of branded and non-branded products the sum of their contributions (that is, sales revenues less the cost of the unit, batch, product-sustaining and brand sustaining activities) should exceed those product-line sustaining expenses that are attributable to the product line as a whole but not the individual groupings of branded and non-branded products within the product line. Here a negative profit contribution would signal the need to undertake a major special study to investigate alternative courses of action relating to how the product line can be made profitable.

The final level in the profitability hierarchy relates to the profitability of the business unit as a whole. Here the profit for the business unit can be determined by deducting the facility or business-sustaining expenses that are attributable to the business unit as a whole, but not to lower levels within the hierarchy, from the sum of the product line contributions. Clearly a business must generate profits in the long term if it is to survive (p. 427).

Drury (2004) also argued that most of the decisions are likely to be made at the individual product level. However, while discontinuing a product appears to be an obvious option if it is unprofitable, other alternatives or considerations must be taken into account at the special study stage. In some situations it is important to maintain a full product line to make it possible for customers to be offered a wider choice, so they will not seek competitors. Where maintaining a full product line is not required managers should consider other options before dropping unprofitable products. They should consider re-engineering or redesigning unprofitable products to reduce or eliminate costly activities and bring their costs in line with market prices.

Dropping products based on ABC information will improve overall profitability only if managers either eliminate the activity resources that are no longer required to support the discontinued product, or redeploy the resources from the eliminated products to produce more of other profitable products that the firm continues to offer. If management does not eliminate or deploy the unused resources, the cost resulting from unused capacity will increase and the supply of resources will remain unchanged but sales revenues from the discontinued products will be lost.

Figure 3.5: An illustration of hierarchical profitability analysis



* 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.

** 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.

*** Consists of expenses dedicated to the business as a whole and not attributable to any lower items within the hierarchy.

Adopted from Drury (2004, p. 426)

In their writings, Kaplan and Cooper stress that one of the major benefits of ABC systems relates to the improved quality of profitability analysis. 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 profitable products will be found to be profitable, and unprofitable products will be found to be unprofitable.

3.4.1.3.3 Full cost approach using traditional costing systems

In contrast to the ABC profitability analysis (based on cause-and-effect allocations), Cooper and Kaplan argue that the use of full costs that incorporate arbitrary allocations often result in inaccurate profitability analysis resulting in special studies being at odds with the message sent by the cost system. Thus, managers will have little confidence and attach low importance to the information extracted from the costing system and periodic profitability analysis.

The above discussion indicates that both ABC and non-ABC literature based on the contribution approach described in section 3.4.1.3.1 advocate a hierarchical profitability analysis approach that does not involve arbitrary allocations. The distinguishing feature is that some of the direct fixed costs that are traceable at higher levels within the hierarchy with the contribution accounting approach are treated as long-run variable costs at lower levels within the hierarchy with the ABC approach. It is assumed that these costs vary in the longer-term with cost driver usage and their variability is captured by cause-and-effect cost allocations within the ABC profitability analysis. Thus, an ABC system assigns those joint resources that fluctuate in the longer term according to the demand for them (e.g. batch level activity and product-sustaining activity costs) to individual products using cause-and-effect allocations. In contrast, the contribution accounting approach incorporates them within a lump sum of fixed costs that are directly traced at higher hierarchical levels at either the product line or business unit level. The contribution accounting approach therefore does not involve the use of any cost allocations whereas the ABC profitability analysis approach aims to rely on the use of only cause-and-effect allocations.

3.4.1.4 Target costing for target pricing

An important form of market-based pricing is the use of target costing based on target pricing. This approach is mainly applicable to those firms that have some discretion in setting selling prices (i.e. price-making firms) but the approach can be refined to apply the target costing aspect relating to cost management to price-taking firms. Target costing was introduced in the 1960's and originates from the Japanese cost management. Since then, target costing has grown and its use has become much more widespread. Simply

explained, a target price is the estimated price for a product (or service) that potential customers will be willing to pay. This estimate is based on an understanding of customers' perceived value for product and competitors' responses based on the marketing factors and pricing strategies described in section 3.3. After the determination of the target selling price, a standard or desired profit margin is deducted to get a target cost. In cases where the target cost cannot be achieved value engineering is used to reduce costs. There are several methods of establishing target prices. Japanese companies use four key determinants when setting a product target price, namely, customer needs, which are related to the physical features of the product, the acceptable price level, product features as compared to competitors, and finally, setting a price that will capture the desired market share, or even more.

Setting a target price is based on managers' estimate of the highest price that future customers would be willing to pay for the product, its differentiation value relative to competing products and the price of competing products. The target profit margin depends on the planned return on investment for the organisation as a whole, and profit as a percentage of sales. The target margin is deducted from the target price of the product to determine the target cost (i.e. the maximum allowable cost for the product).

The second stage of the target costing method involves the process of comparing the target cost with the predicted actual cost. If the predicted actual cost is above the target cost, three core methods or tools can be used to close the gap. These methods include; value engineering, Kaizen costing (continuous improvement) and cost analysis and estimations (Ansari and Bell, 1997).

Because in the long run, a company's prices and revenues must recover all its costs, all costs both variable and fixed costs should be included in the target cost calculations. Drury (2004) recommended using target costing for setting prices for non-customised and high sales volume products. It is also according to Drury an important mechanism for managing the cost of future products.

3.4.2 Cost-based perspective

In less competitive markets where firms sell products or services which are highly customised or differentiated from each other by special features or who are market

leaders, managers have some discretion in setting prices and such firms can be classified as price-makers/setters. A price setter firm according to Kaplan and Atkinson (1998) is a firm that sets or bids the prices of its products; it enjoys a significant market share in its industry segment. The cost information that is accumulated and presented is therefore important for pricing decisions. This section consider the role that accounting information plays in determining the selling price by a price setter firm assuming that a cost-plus pricing approach is used as an input in making pricing decisions. Cost-plus pricing refers to a target profit margin being added to a cost base to determine selling prices. The following sections discuss the different cost bases that may be used when applying cost-plus pricing.

3.4.2.1 A price setting firm facing short-run pricing decisions

If a short-term perspective is adopted for setting product selling prices the price should be set using a decision-relevant approach by direct, marginal or variable costing pricing whereby fixed costs are assumed to be unaffected by output changes which result from a pricing decision. As a result, if sufficient capacity is available a price should be considered which results in a positive contribution to fixed costs (Drury et al., 1993). Kaplan (1990) believes that when there is idle capacity short-term incremental costs provide a reasonable basis for acting as a cost base for pricing special one-off non-standard orders. However, he suggests that if these orders continue then the demand for resources is likely to increase leading to increases in long-term fixed costs and as a result an inevitable increase in prices (see also Cooper and Kaplan, 1987). Therefore Kaplan argues that firms making short-term pricing decisions should always consider their long-term implications and that the short-tem perspective should only be adopted based on the conditions specified in section 3.4.1.1.

In most cases, incremental costs are likely to be confined to items within unit-level activities. Resources for batch, product and service-sustaining activities are likely to have already been acquired and in most cases no extra costs on the supply of activities are likely to be incurred. Typically, the incremental costs are likely to consist of:

- Extra materials that are required to fulfil the order.
- Any extra labour costs.

- Extra energy and maintenance costs for the machinery and equipments required to complete the order.

As indicated above any bid for one-time special order that is based on covering only short-term incremental costs should also meet the conditions in Section 3.4.1.1.

3.4.2.2 A price setting firm facing long-run pricing decisions

According to Drury (2004), in the long run firms can adjust the supply of virtually all their activity resources. Therefore, a product or service should be priced to cover all of the resources that are committed to it. If a firm is unable to generate sufficient revenues to cover the long-run costs of all its products, and its business sustaining costs, then it will make losses and may not be able to survive. Accurate cost information (i.e. a costing system that accurately measures resources consumed by each product) is essential for setting prices that cover all of the resources that are committed to each individual product or service. However, the allocation of costs for pricing is not a simple task. The complication is in the distortions resulting from using costing systems that distribute indirect costs based on antiquated bases such as direct labour. It was shown in Chapter 2 that distortion of costs may result in undercosting or overcosting. In the first situation there is a risk that prices may not cover the long run resources committed to a product. Conversely, with the second situation profitable business may be lost because overstated products costs have resulted in excessive prices being set that adversely affect sales volume, and revenues. The approach that is favoured where firms are price setters according to Drury is to allocate costs to activities using an activity-based costing system.

The terms full cost or long run cost are used to present the sum of the cost of all those resources that are committed to a product in the long-term. The term is not precisely defined and may include or exclude facility/ business sustaining costs. The treatment of facility-sustaining cost is not totally settled in the literature. They may be allocated to the products or treated as a period cost (Noreen, 1991).³

There is disagreement about whether product costs used as the cost base in cost-plus pricing decisions, should it be measured at full cost or variable cost (Cooper and Kaplan, 1987). Full product costs include the assignment of fixed manufacturing overhead cost, or

fixed manufacturing and non-manufacturing overhead costs. In contrast, variable product costs exclude fixed costs.

3.4.2.2.1 Variable cost-plus pricing

Using a variable costing approach the cost element within the cost base is calculated by considering only variable product costs excluding fixed costs. Alternatively, the approach may be to use direct costs rather than variable costs in calculating the price.⁴

The supporters of using variable cost pricing argued that the use of traditional absorption costing for pricing decisions has disadvantages, at least in the short run. They claim that marginal techniques can provide better data for pricing decisions that help to achieve capacity levels and optimise profits by selective selling after capacity is reached. Furthermore, it is argued that in a highly competitive industry where demand is elastic for an individual firm's products and the proportion of fixed to variable costs is high it is possible to use cost information to support a wide range of prices determined on the basis of marginal costs which are all economically possible, i.e. each price generates sufficient total sales revenue to cover variable costs and the margin provide some contribution to fixed costs. In addition, in a competitive market prices based on contribution margin costing can provide better protection than those prices based on full costs, as they will tend to be lower. Furthermore, the contribution approach requires no allocation of indirect costs to products. It is argued that most firms today operate in many markets with multiple products produced by various processes, making the accurate allocation of indirect costs almost impossible. This is a troublesome issue for firms that use production costs to establish prices. Therefore, it has been argued that firms may avoid the problem by only looking at directly attributable costs (Pavia, 1995; Banker 2002). The limitations of using variable costs as the cost base to determine cost-plus prices are discussed in section 3.4.2.2.3.

3.4.2.2.2 Full cost-plus pricing

Full (absorption) costing requires in theory that all costs are attributed to products or services in order to determine the cost base. Full product costs include the assignment of

³ This issue was explained in Chapter 2 (section 2.2.1).

⁴ The distinction between both types of costs was explained in Chapter 2 see pages 24-26

fixed manufacturing overhead costs, or fixed manufacturing and non-manufacturing overhead costs.

Johnson and Kaplan (1987) and Kaplan (1990) emphasised that most pricing and other decisions affect a firm's long-term capacity and as a consequence these decisions should be made based on prices covering long-term, not short-term, variable costs which vary with product complexity and diversity. In fact much recent research in management accounting has focused on the design of cost accounting systems that report more accurate product costs. Considering the possible negative consequences of inaccurate cost information on various decisions, such as product pricing, inaccurate cost accounting systems were blamed for many of the observed failures of companies in competing with their competitors (e.g. Cooper and Kaplan, 1988; Shank and Govindarajan, 1988). As a consequence many commentators have recommended that firms adopt activity-based costing (ABC) to provide more accurate product costs for decision making because as was explained in Chapter 2 activity-based costing attempts to identify and use cost drivers that more accurately measure the costs of resources consumed (Cooper and Kaplan 1987, 1988, 1991; Cooper, 1988 a, b; Brimson, 1991; Turney, 1991; Cooper et al., 1992; Kaplan and Cooper, 1998; Lere, 2000). Shim and Sudit (1994) explained the possible reasons for the continuing use of full-cost pricing. According to them, the increased implementation of ABC systems is likely to rationalise the allocation of fixed costs and make more seemingly fixed costs variable or semi-variable. In addition, ABC systems enhance ways of tracing fixed costs to a specific product and lead to better allocation of these costs. They concluded:

ABC systems provide more accurate product cost estimates that serve as a basis of determining full-cost price. The rapid implementation of ABC systems, therefore, tends to supply for the prevalent use of full cost pricing in practice (Shim and Sudit, 1994, p. 135).

Therefore, product costing system should report accurate product costs to make pricing decisions (Cooper and Kaplan, 1987; Johnson and Kaplan, 1987).

There has been a debate about the advantages and disadvantages of the two main accounting approaches for determining the cost base as an input for making pricing decisions. The argument of the use of either of these approaches in pricing is the subject of the following discussion.

3.4.2.2.3 Full cost pricing versus variable pricing

The question of which costing base is suitable as an input for pricing decision has received much attention in the management accounting literature. Management accounting texts (e.g. Drury, 2000; Atkinson et al., 1997; and Horngren et al., 2000) almost universally argue for the relevant costing approach whereby selling prices are determined after comparing incremental revenues with incremental costs. Unfortunately, there has been a tendency to interpret incremental costs as representing short-term variable costs rather than long-term variable costs. The optimal selling price is the price that maximises the contribution towards common/unavoidable fixed costs. Where the full costing approach is mentioned, it tends to appear as proposal to be criticised as irrelevant for the purpose of pricing decisions but this again may be a failure of texts to highlight that in the long-term fixed costs become variable. However, the assertion that most companies do base their selling prices on marginal costs has no basis in fact; surveys of pricing practices show that full cost pricing predominates. Lucas (2003) argued that although leading modern management accounting textbooks recommend the use of decision relevant cost approaches to pricing decisions they also refer to the empirical findings of accounting researchers which suggest the dominance of full cost-plus approach to pricing. Scapens (1991) refers to this situation of an apparent dichotomy as a “reality gap”. Lucas noted that several writers have attempted to explain this gap between theory and practice; however, this controversy remains unsolved.

Cooper and Kaplan (1987) observed that there were two main reasons for using full costs as the cost base in making pricing decisions. The first was that pricing had long-term implications and in the latter case full cost based prices provided some protection against underpricing. Second, managers felt variable costs did not reflect the demand that different products placed on different fixed resources. Cooper and Kaplan (1987) argue that this is likely to be true given the thousands of different products many firms produce and the varying demand that these products made on fixed resources. Cooper and Kaplan (1987) continue by suggesting that the use of variable costs in decision making is appropriate when they make up a relatively large proportion of the manufacturing cost and when a small range of products are produced which make similar demands on the firm’s resources. They argue that these conditions are not typical because as firms are

required to produce an increasing variety of products that make differing demands on resources, then overheads make up a larger proportion of the manufacturing cost.

Drury et al. (1993) also identified a number of reasons that justify the popularity of full-cost pricing in practice. First, the cost of measuring estimates of the demand for the firm's products using the decision-relevant approach may exceed the benefits. This was also supported by Shim and Sudit (1994) who argued that the difficulty in estimating marginal cost and marginal revenue for various products may prevent companies from using marginal-cost approach (i.e. the equimarginal principle discussed in section 3.2.4). According to the authors, manufacturing companies producing an average of 75 products, estimating marginal cost and marginal revenue may not be economical or feasible. Second, demand can be taken into consideration indirectly by adjusting the mark-up on the cost relative to the expected demand. Third, it is argued that prices should be based on long-term variable costs, rather than short-term variable costs and full costs provide an approximation for long-term variable costs.

Furthermore, it may be the case that the type of costing system used is dependent upon the type of products the firm sells. For unique-products situation there may be little to offer as an alternative to full costing because there has to be some means of achieving an approximate price in such markets. In these circumstances the role of full costing acts as a market-price mechanism (Drury, 2004). On the other hand, it would be expected that those companies fighting for a market share in highly competitive industries would be supporters of variable costing approaches. Dorward (1984) has related the appropriateness of using alternative cost related approaches to different market conditions. For example, in conditions approximating perfectly competitive markets (as in section 3.2.1) there is a generally accepted market price, where the company is a price taker, having no market power whatsoever in terms of price adjustments, and because there is little choice about what price to charge so contribution costing is the most suitable approach. This is because it allows for overheads to be allocated after the pricing decision has been made, and they are charged directly against either profits or losses. Also, supporters of variable costing argued that where management accountants practise methods of overhead allocation (such as simplistic absorption costing - and most

empirical work shows such practices to be commonly used)⁵ their overhead allocations are alleged to be arbitrary. Therefore, full cost is likely to include the assignment of fixed overhead costs to products which will be incurred regardless of whether or not the product is produced and the quantity of the product produced.

According to Drury (2000), a cost-plus price can be based on a number of different types of product cost. If the price is based upon the direct cost then the mark-up should be sufficient to cover fixed manufacturing and fixed non-manufacturing overhead and earn the expected profit. If it is based on the manufacturing cost (direct cost and fixed manufacturing overhead) then the mark-up should be sufficient to cover the fixed non-manufacturing overhead and earn the expected profit. Finally, if it is based on the total cost (manufacturing cost and fixed non-manufacturing overhead) the mark-up should be sufficient to earn the expected profit. In addition, the initial cost-plus price may be altered based on market-related factors. It can be altered due to the demand for the product, for example a product with a high demand is likely to have a higher mark-up. In contrast mark-ups are likely to be reduced when there is a high level of competition in the market.

There have been calls for research that examines how product costs are used in decision-making. For example, Drury and Tayles (1994, 1995) and Brierley et al. (2001) indicate there is need to understand when product costs may not be suitable for determining selling prices, and why some companies use full costs and others use direct or variable costs in determining the cost base in making pricing decisions. As a consequence of the above one of the objectives of this research is to understand which types of product costs and how product costs are used in pricing decisions.

3.4.2.2.4 Limitations of cost-plus pricing

Drury et al. (1993) summarised criticisms of cost-plus pricing in the following way. First, as the cost-plus pricing ignores demand it is unlikely that it will be consistent with profit maximisation. Second, as the method ignores future demand, prices may be set incorrectly such as when prices are increased when demand is declining. Monroe (1990) claims that cost-plus pricing ignores demand factors and the consideration of price-volume-cost relationships. This approach involves circular reasoning because of the

⁵ Empirical studies on costing systems will be discussed in Chapter 4.

interactions between price and volume and between volume and cost. It uses volume to determine price and price, in turn, is used to determine sales. Price affects sales volume when a company is dealing with many customers and sales volume affects costs, the full cost of a product can never be accurately stated in isolation without specifying a sales volume.

Cunningham and Hornby (1993) noted that cost-plus pricing ignores the effect of the competition, the effects on price of rivals' reactions and the effect of potential competition (i.e. the marketing factors discussed in section 3.3). The price level for similar products offered by competitors will undoubtedly affect the company's performance. If the calculated price is much higher than the competitor's prices, then a negative impact on sales may ensue, unless the company has established a sustainable competitive differential. On the other hand, if the price is set much lower than competitors, the company may jeopardise customer's perception of its product quality and face retaliation from competitors. It will also incur an opportunity loss by pricing below that could be attained in light of the marketing environment. In either case, the company stands to lose as a result of ignoring the realities of the marketplace. Nagle and Holden (1995) suggest that cost-based pricing methods can result in over-pricing in weak markets and under-pricing in strong markets, the opposite of what is desired. In addition, this method clearly does not take into account what the customer is willing to pay for the product/service. There are some products where prices are not critical to customer purchases, as customers are buying the products for reasons other than price. The customer, for example, may be paying for the brand name, quality, after-sales service, etc.

Furthermore, the cost-plus method demands the allocation of both direct and fixed costs, of which the latter is a complex task and, consequently can lead to ineffective pricing decisions (Cunningham and Hornby, 1993). A major problem is costing a single product in a multi product firm that uses conventional simplistic costing systems. Simple cost accounting systems have severe limitations when looking at individual products (see Chapter 2 for a detailed discussion). Such simple averaging systems that lump large pools of cost together have serious consequences in product pricing because the sales of overpriced products and underpriced products do not average out. This feature causes

simple cost allocations to be valid only when an average product is produced in average volumes. All other products are either overcosted or undercosted depending on how far these products vary from average. These distinctions can lead management into making poor pricing decisions.

Drury (2004) argued that although it is often claimed that cost-based pricing formula serves as a pricing 'floor' shielding the seller from a loss, this argument is incorrect since it is quite possible for a firm to lose money even though every product is priced higher than the estimated unit cost. The reason for this is that if sales demand falls below the activity level that was used to calculate the fixed cost per unit, the total sales revenue may be insufficient to cover the total fixed costs. Cost-plus pricing will only ensure that all costs will be met, and the target profits earned, if the sales volume is equal to, or more than, the activity level that was used to estimate total unit costs.

Given the limitations of cost-plus pricing, a number of reasons for the widespread use of cost-plus pricing in practice are identified.⁶

3.4.2.2.5 Reasons for using cost-plus pricing

Considering the foregoing criticisms of the cost-plus there may be a number of reasons that justify the popularity of this approach.

Cost-plus pricing can occur under conditions of absence of knowledge of more sophisticated pricing techniques. Therefore, it would seem to follow that those companies who know little or nothing of the various dimensions of their market demand would probably use cost-plus pricing methods. Because of the simplicity of this method, there is no necessity to study market demand, consider competition, or look into other factors that may have a bearing on price. The use of cost-plus strategy in these circumstances would seem rational (Cunningham and Hornby, 1993).

Another major reason for the widespread use of cost-plus pricing is it might be industry-wide accepted practice. The cost-plus approach may be the only method recognised and accepted in some industries. Construction, service industries, and product customising are all examples where the cost-plus method is predominant industry-wide accepted practice.

⁶ The empirical research demonstrating the widespread use of cost-plus pricing in practice is presented in Chapter 4.

It is normal in such industries to base prices on cost information, either because the buyer is knowledgeable about the costs involved, or because of the abundance of competitive suppliers willing to perform the same function or produce an identical product for a lower price. Also, where all firms in the industry use this pricing method, prices tend to be similar and price competition is minimised. Drury (2004, p. 432) noted that cost-plus pricing may help a firm to predict the prices of other firms. Drury explains this with an example:

If a firm has been operating in an industry where average mark-ups have been 40% in the past, it may be possible to predict that competitors will be adding a 40% mark-up to their costs. Assuming that all the firms in the industry have similar cost structures, it will be possible to predict the price range within which competitors may price their products. If all the firms in an industry price their products in this way, it may encourage price stability.

In addition, organisations still consider that society will have more confidence and respect for a company that bases its prices on cost, rather than less-understood and much-suspected techniques such as competitive or demand oriented approaches. It is also argued that cost-plus pricing is fairer to both buyers and sellers. Sellers do not take advantage of buyers when buyers' demand becomes great, yet the sellers earn a fair return on their investment.

Furthermore, cost-plus pricing may be used by companies that sell highly custom-designed products to their customers (Drury, 2004). In these situations the quantity to be sold is usually specifically defined. For these companies, customer demand is an all-or-nothing proposition. In this environment, pricing for profitability hinges on understanding the costs and then quoting a price that is large enough to make a profit but small enough to make a sale. Therefore, a proper accounting for costs can be shown to prove and justify price differences based on cost.

In response to the main criticism that cost-plus pricing method ignores demand, Drury argues that the actual price that is calculated by the formula is rarely adopted without amendments. The price is adjusted upwards or downwards after taking account of the strength of demand, the force of competition, the importance of the customer in terms of future sales, and the policy relating to customer relations. Therefore, it is argued that in practice management do review their profit mark-ups based on the state of sales demand and other marketing factors which are of vital importance in the pricing decision.

Drury continues arguing that cost based pricing provides only an initial approximation of the selling price. The cost information is important information, although by no means the only information that should be used when the final pricing decision is made. Management should use this information, together with their knowledge of the market and their intended pricing strategies (see section 3.3.3), before the final price is set.

3.5 Summary

This chapter has shown how economic normative theory has contributed to determining how prices should be set. It was noted, however, that economic theory is extremely difficult to apply in practice. Economic theory assumes that a firm can estimate a demand curve for its products. However, it was discussed in the chapter the difficulties of estimating demand curves at the individual product level. Moreover, the main focus of economic theory is on market structures. Therefore, it fails to capture all of the factors that influence prices such as competitive reactions. Thus, the chapter has presented information derived from the marketing literature relating to the influence of external and internal factors (such as overall company goals, costs, competition) that the marketing literature considers to be important in the pricing decision. Presentation has also been made of the different marketing approaches to pricing.

The remaining part of the chapter presented management accounting literature with regards to its contribution to the pricing decision. In Chapter 2 it was demonstrated that different cost categories could be used for different purposes. This chapter has presented the use of full costs and variable costs as an input to making pricing and product mix decisions. It is also obvious from the previous chapter that using incorrect or distorted cost information can seriously erode both competitiveness and profitability. Thus, this chapter concluded that where the full costs are used for pricing a more sophisticated understanding of costs than averaging methods of traditional simple cost accounting is needed.

The final section of the chapter described the additional issues relating to cost-plus pricing such as its limitations and reasons for its continuous use. It was argued that cost-plus pricing is appropriate only for price-setters but that the profit margin should be adjusted to take into account demand, and the marketing aspects discussed in section 3.3, before the final price is

determined. The literature relating to empirical studies of cost-plus pricing practices as well as on the costing systems will be discussed in the next chapter.

Chapter 4

Relevant studies on product costing systems and the cost-plus pricing

- 4.1 Introduction**
- 4.2 A brief overview of the relevant studies on product/service costing systems**
 - 4.2.1 Different costing systems used: full costing/variable costing**
 - 4.2.2 The use of simplistic costing systems**
 - 4.2.3 Studies related to ABC research**
 - 4.2.3.1 Studies relating to adoption rates of ABC systems**
 - 4.2.3.2 Studies relating to factors influencing the adoption of ABC**
 - 4.2.3.3 Studies relating to the association between ABC and improvement in financial performance**
 - 4.2.3.4 Studies relating to ABC applications for pricing decisions**
- 4.3 The use of product cost in pricing decision**
 - 4.3.1 A brief overview of pricing research**
 - 4.3.2 Overview of cost-plus pricing research**
- 4.4 Limitations of previous studies**
- 4.5 Summary**

4.1 Introduction

This chapter provides an insight into the findings of the previous research studies relating to product costing practices and pricing decisions. It begins with a review of those studies that have examined the type of costing system used and the level of sophistication employed. The chapter continues with a summary of the findings relating to the use of ABC systems, the factors influencing the adoption, implementation of ABC systems, its relation to a change in financial performance, and the use of ABC information for pricing. Finally, the pricing literature particularly the literature on cost-plus pricing is reviewed.

4.2 A brief overview of the relevant studies on product/service costing systems

4.2.1 Different costing systems used: full costing/variable costing

For over fifty years practitioners and academic accountants have debated whether variable costing or full costing will lead to better decisions in a competitive environment. In the past decade it has also been argued that the use of activity-based costing will lead to better decisions than traditional absorption costing. For the most part these arguments have been normative with little empirical evidence brought to the debate. All of the empirical studies reveal that some firms have adopted each type of costing system. However, the full costing method appears to be used by the majority of companies.

A study by Hendricks (1988) showed that 84% of the companies in the USA were using full costing methods. Coates and Longden's (1989) study also supported this finding by showing that most of the hi-tech companies they examined in the USA and the UK used full costing. The Swedish study by Ask and Ax (1992) pointed out that 60% of the firms used full costing separately while 30% of the firms used full costing together with variable costing. However, studies in Finland (Lukka and Granlund, 1996) reported that variable costing was used by 42% of the companies as compared to 31% using full absorption costing. The remaining 27% of the firms used variable costing together with absorption costing. This finding may be attributable to the fact that until recently external financial accounting reporting regulations in Finland specified the use of absorption costing. Bjornenak's (1997) study of Norwegian companies showed that different costing methods were preferred in different situations. The variable costing method dominated for pricing (34%), profitability

analysis (48%), and transfer pricing decisions (33%), whereas for inventory costing, absorption costing (56%) was predominant. However, some of the firms were using both methods of costing for pricing (49%) and profitability analysis (42%) decisions. Only 20% of the firms were using both the methods for inventory costing.

A study by Drury et al. (1993) in the UK showed that only 9% of the respondents “never” or “rarely” used full costs. It was also noted in their study that 84% of the firms in the UK used absorption costing as specified by the UK financial accounting regulations. The study reported that variable manufacturing cost (which excludes non-manufacturing variable costs) and total manufacturing costs were each used at least sometimes in pricing by 68% of respondents. They also reported that more respondents used total manufacturing cost (in terms of reporting by the ‘often or always’ category) in pricing than variable manufacturing cost. Total variable cost and total cost were used less frequently being used at least sometimes by 50% and 58% of respondents respectively. Drury et al. (1993) concluded that product costs were used in pricing in a flexible way and that full costs (manufacturing or total cost) were not applied naively in pricing decision.

Hughes and Gjerde (2003) conducted a mail survey to determine what types of cost systems U.S manufacturing companies use. Based on 130 responses (a response rate of approximately 20%) they reported that 46 (35%) used traditional cost systems, 11 (8%) used ABC systems, 39 (30%) used both ABC and traditional cost systems and 29 (22%) used variable cost systems. Factors of complexity of the production process, frequency of operations at capacity, and the nature of competition were examined to ascertain if they favoured the adoption of a particular type of cost system. However, no evidence was found that either the external or internal environment of the firm was correlated with the choice of cost system.

A distinguishing feature of the above studies is that they have not specified whether the cost accumulation systems were based on recording only variable or absorption costs, or whether absorption costs were accumulated, but only variable costs extracted for decision-making.

4.2.2 The use of simplistic costing systems

The literature review identified several studies that reported the use of the most simplistic absorption costing systems that were identified as blanket/plant-wide rates, being located at the extreme left of the model of cost system sophistication continuum presented in Figure 2.2 in Chapter 2 (section 2.5). A study by Drury et al. (1993) indicated that a blanket overhead rate was used by 27% of the firms. The study also noted that the usage of blanket overhead rates differed between small (30%) and large firms (16%). Separate support department overhead rates were used by 21% of the responding firms assign service/ support department overhead costs to products. A further 45% of the firm allocated support/ service department costs to production departments and used production department overhead rates to charge these costs to the products.

Other findings by Emore and Ness (1991) in the USA; Joye and Blayney (1990; 1991) in Australia; and Joshi (1998) in India relating to the use of a single overhead cost pool (i.e. a blanket rate) reported usage rates of between 20%-30%. However, only 5% of the companies in Finland were using a single plant-wide rate (Lukka and Granland, 1996). Furthermore, the survey undertaken in Norway (Bjornak, 1997) pointed out that only one firm used the single plant-wide rate and none of the responding companies used this rate in Greece (Ballas and Venieris, 1996).

In a later UK study, Drury and Tayles (2000) reported that only 3% of the firms were using a single cost pool. They attributed the low usage rate, as compared to the earlier UK and the USA studies, to the time period between the studies. They suggested that the widely publicised criticisms of traditional costing systems during this intervening period, together with the significant improvements in information technology, may have contributed to the low usage of the single plant-wide overhead rate. Furthermore, their study also included only organisations with established costing systems and thus may have excluded organisations with simplistic costing systems that use plant-wide rates.

Joye and Blayney (1990) surveyed all manufacturing companies in Australia with sales revenues exceeding \$7 million. Based on a 21% response rate they reported that emphasis was given to simplicity in terms of cost accounting practices. One third of respondents reported that they used only a single plant-wide rate for overhead cost

allocation. The survey also asked about the reasons for allocating overhead. Pricing and cost control were the reasons most commonly cited for allocating overhead (80% and 73% respectively of the responding firms). External reporting inventory valuation (55%) was ranked third in importance. Firm size was a significant factor influencing overhead cost allocations; smaller less diversified firms were more likely to adopt a single overhead rate. As expected, direct labour was the dominant criterion used for allocation with 35% of the respondents indicating that it was the only base used for allocating overhead. Furthermore, only 41% reported the use of more than one allocation basis.

4.2.3 Studies related to ABC research

Most of the research relating to cost system design relating to product costing over the past two decades has concentrated on studying ABC systems. The early ABC literature was mainly concerned with the exposition of ABC developments and theory (Cooper, 1990; Kaplan, 1990; Cooper and Kaplan, 1992). Since the early 1990's many different strands have emerged. One element has been mainly descriptive concentrating on the characteristics and applications of ABC systems and the extent of ABC usage (Innes and Mitchell, 1995; Innes et al., 2000; Friedman and Lyne, 1995). Another element of the literature questions the ability of ABC to generate more accurate product costs. It is argued that ABC can introduce measurement error and product cost distortions when costs are indivisible, non-linear and/or unavoidable (Noreen, 1991; Datar and Gupta, 1994; Yahya-Zadeh, 1997; Mahar and Marais, 1998). A third stream has adopted a contingency theory framework and has surveyed practice to examine empirically the antecedents of adoption and non-adoption of ABC (Bjornenak, 1997; Krumweide, 1998; Malmi, 1999). A more recent theme has examined the organisational factors influencing success and failure of ABC systems (Shields, 1995; Swenson, 1995; McGowan and Klammer, 1997; Malmi, 1997). Finally, some researchers have recently undertaken studies that have examined whether there is an association between using ABC and an improvement in financial performance (Cagwin and Bouwman, 2002; Kennedy and Affleck-Graves, 2001; Gordon and Silvester, 1999).

One of the specific aims of this thesis is to examine the extent to which different explanatory variables influence the level of sophistication of product costing system design, and to examine if that in turn affects financial performance in UK companies.

Another aim is to examine the relationship, if any, between the level of costing system sophistication and the importance of cost information for pricing decisions. It is thus related to the contingency stream of ABC research described above and the use of ABC information in decision making, specifically pricing decisions and profitability analysis.

Before looking at the factors influencing the adoption of ABC systems, it is important to look at the studies relating to the adoption rates of ABC systems.

4.2.3.1 Studies relating to adoption rates of ABC systems

Since the beginning of the 1990's many surveys have been undertaken in different countries to ascertain the ABC usage rates. 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 the adoption rate was 10% in the UK. Similar findings were reported by Drury et al. (1993) with 13% of the organisations having implemented or in the process of implementing ABC.

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. They attributed this high rate to confusion over terminology, the absence of follow up questions to ascertain if the respondents were really ABC users and the respondents wish to suggest that their organisations were using more sophisticated techniques. However, similar UK usage rates in the early 1990's to the Innes and Mitchell study were reported by Nicholls (1992) where 10% of 62 organisation surveyed had implemented ABC.

Innes and Mitchell (1995) undertook a survey in 1994, and based on 251 responses (a 25.1% response rate) identified 49 organisations (19.5%) using 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 study also revealed that although some UK companies have adopted ABC, it was also observed that ABC users were cautious in the application of the ABC system.

In order to assess how the adoption of ABC has progressed over time Innes and Mitchell replicated their 1994 survey in 1999. 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, having both fallen from 19.5% and 29.6% to 17.5% and 20.3%, respectively. They concluded that there was no growth in the popularity of ABC and its adoption over the 5-year period (between their 1995 and 2000 studies) either in total or by sector. Firms in the financial sector and larger firms continued to have significantly higher adoption rates. The findings also revealed that the major deterrent of ABC adoption were the complexity and cost of the ABC system.

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 for the ABC adopters 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. (1992) similar usage rates have been reported by the UK studies. It would appear that in the early 1990's the overall usage rate may have been approximately 10% but by the late 1990's it had increased to between 15% and 20%. However, usage rates were higher in larger organisations and organisations operating in the financial sector.

The survey by Ask and Ax (1992) on product costing in the Swedish manufacturing companies concluded that most companies were trying to identify more cost drivers, although they tended to be volume related. These companies were aware of the

deficiencies in their present product costing system and were making efforts to change within the traditional costing concept. There was not much awareness of ABC systems.

Clarke et al. (1999) examined the use of ABC in large Irish manufacturing firms. From 204 usable responses the results indicated that 12% had implemented ABC, 20% were assessing it, 13% had rejected it and 55% had not considered adoption. They attributed the low adoption rate of ABC to a low level of knowledge of ABC; approximately 75% of the firms assessed and then rejected ABC but they failed to recognise virtually any benefits of ABC. Yet those firms which adopted ABC reported that ABC has many benefits, particularly more accurate product cost information for product costing and pricing (56%) and improved cost control (48%). A further survey undertaken by Pierce (2004) reported a substantial increase in the number of large Irish companies using ABC/M (27.9%) out of 122 companies responded to the survey, and a major drop in those still considering adoption (9%) while the percentage of those that had not considered ABC/M remained constant at just over 50%. The most successful and frequent use of ABC information was for budgeting confirming the ability of activity-based budgeting to overcome some of the deficiencies attributed to traditional incremental budgeting.

Studies undertaken in mainland Europe reported ABC 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). Low ABC usage rates have been reported in Denmark (Israelsen et al., 1996), Sweden (Ask et al., 1996) and Germany (Scherrer, 1996). Surveys indicated that prior to the mid-1990's 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). The surveys of ABC systems in other European countries thus suggest adoption rates below those currently found in the UK. However, the different time periods involved with each study may explain the diverse adoption rates in the UK compared to elsewhere.

Studies outside Europe indicated a usage rate of 14% in Canada (Armitage and Nicholson, 1993). Gosselin (1997) reported that 122 out of 161 Canadian organisations (76%) 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.

In the USA several surveys have examined the adoption of ABC and reported 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, a later study by the same group (1996) 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%. As ABC was initiated in the USA this may account for the apparent higher adoption rate amongst the US companies.

Joye and Blaney (1990), Dean et al. (1991), Corrigan (1996) and Booth and Giacobbe (1995) reported little use of ABC in Australia. Dean et al. (1991) reported that only 8% of Australian firms had adopted ABC by 1990 and Booth and Giacobbe (1995) found a similarly low adoption rate of 12% in 1995. Chenhall and Langfield-Smith (1998 a) 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 management accounting techniques) in terms of their relative past use, future emphasis and past benefits.

Drury and Tayles (2000) have stated that one of the reasons for the significant variations in the usage of ABC both within a country and across different countries may have been due to the difficulty in precisely defining the difference between conventional costing systems and ABC systems. Innes and Mitchel (1997) in response to the criticism by Dugdale and Jones (1997) that the use of ABC for stock valuation in their 1995 study was overstated have asserted that there is no universally accepted definition of ABC.

4.2.3.2 Studies relating to factors influencing the adoption of ABC systems

Most of the contingency-based accounting research on the choice of product costing system has focused on the choice of two discrete alternatives, ABC and non ABC systems and has been survey-based (Drury and Tayles, 2005). This section therefore, reviews the contingency based research relating to factors influencing the adoption of ABC systems. The 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. However, Drury and Tayles (2005) argued that the terms 'adoption' and 'non adoption' have been subject to different interpretations 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.

Based on a questionnaire survey replies from 53 Norwegian manufacturing companies Bjornenak (1997) examined the differences between ABC adopters and non-adopters in terms of various factors such as cost structure, existing costs systems, product diversity, size, and competition. ABC adopters (30 companies) were defined as those responding organisations that had implemented ABC, were currently implementing it, or plan to implement it. 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 findings revealed that there was a weak significance (at the 10% level) for the hypothesis that adopters have a different cost structure from non-adopters. For the existing cost system Bjornenak compared the number of cost pools and allocations between 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 but the results showed that non-adopters made significantly more customised products than adopters. This contradicts the belief that in the case of customised products, having higher diversity, an ABC system is favoured to measure costs accurately (Cooper, 1988). Bjornenak (1997) concluded that a customised production increases the cost of developing a more sophisticated costing system, and hence, this may explain the findings. The alternative interpretation of his result was that ABC was adopted by companies with a

high number of semi-standardised products. 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 findings indicated that non-adopters had higher export rates and a higher number of competitors than adopters but the findings had only very weak statistical significance ($p < 0.10$). Regarding the size of the firm, Bjornenk's study revealed a strong significance ($p < 0.05$) in the adoption rate and the size of the firm; adopters being from larger firms. He attributed this to the fact that larger companies had a larger network of communication channels and the necessary infrastructure for adopting ABC. Therefore, it can be concluded from his findings that size and customised production were the only variables with a strong statistical significance.

Malmi's (1999) Finnish study which aimed to explain what drives innovation diffusion in management accounting during its various phases, examined cost structure, competition faced, strategy, product diversity, production type and size as potential determinants of ABC adoption. All units that indicated the use of either ABC or ABM, currently implementing ABC were classified as ABC adopters in this study. Based on a 39.5% response rate, the study found no support for the hypothesis that units with high proportion of capital-related costs are more likely to benefit more from ABC than units with a low proportion of capital-related costs. That is, the differences between adopters and non adopters regarding cost structure was not statistically significant.

Competition faced was measured by the proportion of exports (%) in turnover and perceived changes in competition. Both measures were correlated with ABC adoption at the 5% level. The respondents were asked to indicate which of these two alternatives (low cost, differentiation) best described their strategy. No significant differences were reported between either of these two strategies and ABC adoption. This lack of correlation between strategy and ABC is contrary to the findings of Gosselin (1997), who found support for the hypothesis that companies following a prospector strategy are more likely to adopt the activity management approach than companies following other strategies. Malmi interpreted the lack of correlation between strategy and cost structure with ABC adoption to the poor operationalisation of the measures. Based on leading text-books' arguments that the more complex the production process, the more complex the costing system which models it (i.e. the

system should feature more cost pools and assignment bases) Malmi measured production process complexity by asking respondents to indicate whether they were mass, batch, single-product or process producers; whether they 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 positively correlated with ABC adoption ($p < 0.01$). 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), rejected ABC (N=26), and having not considered ABC (N=112). Five characteristics of the responding firms were examined: multinational firms versus national firms, firm size (annual sales), manufacturing activity, number of product lines and manufacturing overheads as a percentage of total costs. Multinational subsidiaries (14%) were found to use ABC to a statistically significantly greater extent (at $p < 0.10$) compared with national firms (5%). Significant differences ($p < 0.05$) were also observed in respect of size and manufacturing activity. A greater proportion of firms from the drug, pharmaceutical and healthcare industry used ABC. However, Clarke et al. (1999) attributed that 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.

Gosselin's study (1997) examined to what extent conceptual factors like strategy and organisational structure influence the adoption and implementation of ABC. Gosselin found that a prospector strategy is positively associated with the adoption of an activity management level of ABC adoption ($p < .01$). Prospectors were defined by Gosselin to be 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. He argued that his results supported Simons (1987; 1988; 1990) and demonstrated that strategic business units that follow a prospector strategy (Miles and Snow, 1978) adapt their cost management systems to user needs to a greater extent than units with a defender strategy. Gosselin also 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 concluded that vertical differentiation may have more impact on the adoption decision than on the implementation process.

In a mail survey of 225 USA manufacturing firms Krumweide (1998) found that different contextual and organisational factors associated with ABC success become important at different stages of implementation. The study first aimed to test the impact of certain contextual factors on the early stages of ABC adoption. The respondents were asked to select their stage of ABC implementation from one of nine stages (not considered, considering, considered then rejected, approved for implementation, analysis, getting acceptance, implemented then abandoned, used somewhat, used extensively). The explanatory variables potential for cost distortion (represented by the diversity of products, processes and support activities), size (measured by the level of sales revenue) and job (i.e. using a dichotomous variable consisting of 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. In contrast, the variables of decision usefulness of cost, TQM manufacturing practices, lean production systems and quality of IT provision were found to have no significant effect on ABC adoption.

The study also aimed to investigate the impact of various organisational and contextual factors on the implementation stages after the adoption decision has been made. Krumweide 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 significant greater probability in attaining the routine stage. The sign for non-accounting ownership was negative thus implying the higher the degree of

non-accounting ownership the lower the odds of routinising ABC. None of the contextual factors were significant. Nevertheless 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 did not necessarily lead to a greater probability of reaching the routinisation stage.

Hoque (2000) examined the relationship between just-in-time production, automation and cost allocations and the relative use of cost information for making and evaluating managerial decisions 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. Hoque found support for the hypothesis ($p < 0.05$) that firms using JIT production systems have fewer requirements for ABC allocations than non-JIT firms. Also, these JIT firms attached relatively less importance to cost information for various managerial activities such as price setting and performing customer profitability analysis. These findings Hoque argued support the argument that in JIT firms, the major proportion of their costs is direct costs and therefore there is less need to allocate indirect costs to their products/services. Studies by (Bhimani and Bromwich, 1991; Swenson and Cassidy, 1993) have also indicated that JIT companies used a simplified costing system. No significant relationship was found between automated and non-automated firms and the use of ABC and cost information. Hoque concluded that these were in contradiction with the literature, which suggested that highly automated firms have a greater need for the use of cost information for managerial decision making.

The survey by Freedman and Lyne (1995) highlighted the respondents' view that ABC systems are complex and costly. This is supported by Cobb et al. (1992), whose findings showed that small companies did not implement ABC systems because of its high costs. Surveys by Innes and Mitchell (1995; 2000) and Shields (1995) also concluded that high costs were one of the major reasons for the reluctance to implement sophisticated cost systems.

Groot (1999) argued that surveying a broad range of different company sectors may hamper a full understanding of the purposes for which ABC is being used, the benefits derived from using activity-based cost information and experiences with

designing and using ABC systems. Groot focused only on one economic sector so that technological and market circumstances were more comparable among the companies thus making comparisons between companies more meaningful. Groot's study focused on the experiences of ABC-users and non-users within the food industry in the Netherlands and the US based on a survey of 96 US food companies conducted by Ernst & Young LLP (1995a, 1995b) and 117 Dutch companies surveyed by Groot. The adoption rates were 18% in the US and 12% in Netherlands. The study indicated that the use of ABC was not proved to be more widespread in the US compared with the Dutch food industries. In the Dutch sample, size measured by the number of employees was found to be a significant factor for the adoption of ABC. Groot explained the results by arguing that a high level of automation may be found in the food industry. Therefore, more labour will be dedicated to overhead activities which makes it necessary to deploy an ABC system. Also, there was no significant difference with regards to the number of different products. However, the results indicated that the use of ABC was significantly related to the number of production lines: on average ABC firms had more production lines than do non-ABC firms. The highest ranking uses of ABC information in both countries were for profitability reviews, improving production processes and in evaluating performance of production units. However, the Dutch sample showed that the most important use was for reduction of overhead costs.

The literature review identified only two studies (Abernathy et al., 2001; and Drury and Tayles, 2005) that sought to classify product cost systems by characteristics other than by the discrete alternatives of traditional and ABC systems. Abernathy et al. (2001) adopting a case study approach collected data from five research sites in Australia and classified cost systems by the level of sophistication. 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 (i.e. according to Abernathy et al. having a low level of sophistication). 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 were 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 were 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.

The other study that examined the extent to which potential explanatory factors influence the level of complexity of product costing systems was by Drury and Tayles

(2005)¹. Another significant contribution of the study is the use of multivariate data analysis to test the hypotheses. The factors examined were cost structure, competitive environment, product diversity, degree of customisation, size of the organisation, importance of cost information for decision-making and corporate sector. Cost structure was measured by the percentage of indirect costs to total costs and was not significant. Competition was measured by asking respondents about the extent of competition for their major products and price competition in their industry, and was also found not to be significant. Product diversity was measured by the extent of variation in the consumption of support department overheads by the different products/services, and was a significant factor at the 1% level. Degree of customisation was also significant at the 5% level. Size was measured by the annual sales turnover, and was significant at the 1% level. The importance of cost information measured by only a single question relating to the importance of profitability analysis as an attention direction device for decision-making was found not to be significant. For the corporate sector variable, the results indicated that the organisations in the financial sectors had significantly higher levels of cost system complexity compared to those in the manufacturing sector. The level of cost system complexity was measured by two dimensions the number of cost pools and the number of different types of cost drivers. Both dimensions were combined into a composite measure. Drury and Tayles noted, however, that although their study sought to measure characteristics of product costing system using a different approach from that used in previous studies a better measure is advised for future research.

They state:

A more refined analysis should attempt to measure additional characteristics that may enable the costing systems to be classified by levels of sophistication rather than complexity. For example, the extent to which this process relies on arbitrary assignments or direct and cause-and-effect cost tracing should ideally be captured when measuring the level of cost system sophistication (p. 77).

In summary, the literature review indicates that most of the studies have concentrated on the choice of two discrete alternatives - the adoption or non-adoption of ABC systems. The studies have produced mixed results with only size being consistently identified as a significant explanatory variable and cost structure being consistently

¹ The term complexity was used in Drury and Tayles (2005) instead of sophistication because according to the authors only two features were used to describe the type of costing system (number of cost pools and number of different types of second stage cost drivers), also because the term sophistication is common and desirable among all companies.

identified as a non-significant variable. Some studies have reported an explanatory variable as being significant and other studies have reported the same variable as being insignificant. Drury and Tayles (2005) concluded that the different interpretations of the dependent dichotomous variables and the lack of consistency in identifying contextual variables and their measurements (studies have tended to use different questions to measure the contextual variables) have resulted in a lack of coherence in the study of the elements of the product costing systems and contextual variables, and the findings of the studies. Thus, a clear picture of previous research does not emerge resulting in it being difficult to compare and interpret the findings. Abernathy et al. (2001), thus, conclude that there is a need for further empirical research into the contextual factors influencing the choice of product costing systems.

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

The literature review identified only few studies that have examined whether there is an association between using ABC and superior financial performance. Some of the studies that have investigated activity-based costing systems have highlighted that there is no observational research that can prove a causal relationship between improving performance and implementing activity-based costing systems (Kennedy and Graves, 2001). Cagwin and Bouwman (2002), however, have argued that a match between contingent variables and activity-based costing systems can be related to improved performance.

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 by self reported five-point Likert responses to an improvement in return on investment (ROI) 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 applications for which ABC is used and the level of integration into strategic and performance evaluation systems. The enabling factors were importance of costs, information technology sophistication, business unit

complexity, level of intra-company transactions, unused capacity, and level of competition.

In the first stage of the analysis Cagwin and Bouwman tested the following hypothesis:

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) (p. 4).

The effect of ABC on ROI was positive but not significant thus indicating that there was no direct effect associated with the use of ABC. Therefore, the hypothesis was not confirmed and indicated the need to shift to the second stage of the analysis, which tested the following hypothesis that identified specific enabling conditions:

The association between the extent of use of ABC and relative improvement in financial performance is impacted by specific enabling factors which are: importance of costs, information technology sophistication, business unit complexity, level of intra-company transactions, unused capacity, and competition (p. 5).

The results indicated that the interactions of ABC with complexity and other initiatives were positive and significant at the 5% level. 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 model testing Cagwin and Bouwman did not specify 'other initiatives' as one of the enabling factors. Other initiatives were defined as JIT, TQM, computer integrated manufacturing, business process engineering, value chain analysis and flexible manufacturing systems, and measured by a single index developed from binary responses to the survey item asking if they were used to a significant extent without explaining what they are or what they consist of. However, based on the significant interaction they concluded 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. The authors recommended further research to address which of the specific initiatives provide the effect. In addition, the authors also conclude that:

There is a positive association between ABC and improvement in ROI when 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 also is an indication that other enabling conditions (information technology sophistication, absence of excess capacity and a competitive environment) affect the efficacy of ABC (p. 27).

Gordon and Silvester (1999) questioned whether the adoption of an ABC system results in an economic benefit to the firm and therefore, used an event-study approach to investigate the impact on performance 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. Performance was measured by the effect on the stock market. For the robustness of the study several procedures were undertaken. First, a literature search was conducted to ensure that the news regarding ABC adoption released in the article (i.e. Port et al., 1988) was new to the market. Second, an attempt was made to statistically control for any possible event-date confounding effects. Finally, contacts were made with the representatives of firms active in ABC to see if they knew any previous release of the information. The findings of the study indicated 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 adoption affects firm value. Although the authors recognised the limitations of measuring ABC firm performance via stock market returns they recommended organisations currently considering the adoption of ABC to carefully consider the cost benefit issues of implementing such a system.

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. Because of the difficulty in establishing an exact date of adoption the firms were matched on December 31 prior to the year of adoption by industry classification following Haka et al. (1985). Three control samples were derived based on matching by market capitalisation (to control for firm size), market to book value ratio, and net total assets. Performance was measured by stock returns. Buy-and-hold returns were computed for the ABC adopting firms and their matched counterparts for the three-years 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% earned by their non-adopting counterparts. The difference 27% was, on average, statistically 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.

The authors acknowledged several limitations to their study. First, their sample was small, which limits the power of statistical tests and makes the results sensitive to the selection of the sample and their matched counterparts. Another limitation noted is that the survey allowed firms to self-specify the adoption of ABC and this may have biased the sample to certain types of firms. Also, the authors noted that the sample firms have adopted ABC in different ways (Friedman and Lyne, 1995) and the study was not able to classify the degree of implementation by the ABC firms. For example, there was no indication of each firm's commitment to ABC, or the extent to which it was implemented. Third, 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. 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).

4.2.3.4 Studies relating to ABC applications for pricing decisions

Product pricing appears to be one of the main reasons for overhead cost allocations and, consequently, an important function of the cost accounting system. This is confirmed by Innes and Mitchell (1991). Their study showed that one of the major uses of ABC information was for managerial decision making, especially for pricing decisions. They pointed out that empirical research on ABC has shown that pricing is an important motive for those considering its adoption because of the importance of having reliable cost information for this purpose. Around two-thirds of users utilised their ABC systems in pricing decisions and a further 12% were planning to do so in future. Their experience indicated that this application was on average very important and fairly successful. ABC information had an important impact on pricing decisions with half of the respondents using ABC for this purpose claiming to have raised some

prices and 44% of them having lowering some prices in response to the novel unit cost information produced by their ABC system. Almost one-third of them considered that ABC adoption had significantly affected their sales performance.

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. Cost reduction, pricing, performance measurement/cost improvement and cost modelling were the most widely used applications for both the 1994 and 1999 surveys. 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.

Malmi (1999) observed that ABC information was used 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 questionnaire responses from 135 manufacturing units Lukka and Granlund (1996) also asked about the perceived importance of product cost information in different decision situations. Decision situations in which the importance of product cost information was considered most important included product pricing. Their results are very similar to views presented in the earlier cost accounting literature, which argues that one of the most important functions of product cost information is to give support to product pricing decisions.

Bright et al. (1992) indicated that respondents employed costing techniques and practices widely, particularly for cost control (94%), product pricing (90%), investment justification (87%) and management performance (77%) and argued that the relative importance of costing in each of these processes should be further studied and explained.

Friedman and Lyne (1995) carried out an extensive review of ABC applications involving case studies of 11 UK companies. They reported that eight of the eleven companies were using activity-based information for costing and pricing, and that

these companies identified four categories under this heading: bidding, customised pricing, product range decisions and customer profitability analysis costing. They further argued that pricing was the origin of activity based costing and a majority of companies in the sample had this as one of their major objectives for introducing activity-based costing. 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. Companies used the basic concepts of ABC systems to suit their own needs.

Bailey (1991) attempted to investigate some practical aspects of ABC implementation, which was built on structured interviews with ten companies, all of which have completed implementation of ABC and already using the results. All companies interviewed expected the benefits of cost reductions and profitability to occur in future on the assumption that information given by their ABC systems was used positively in future management decisions. 60% of companies who reported greater accuracy in product costing also reported that they were already making changes in their product pricing strategies.

The above studies suggest that since the product costing system appears to be a vital source of information for pricing, it is essential that companies have highly accurate cost accounting information systems for price-related decision-making.

4.3 The use of product cost in pricing decisions

4.3.1 A brief overview of pricing research

Little empirical work has been undertaken investigating the pricing strategies used in an industry. In fact, the limited work available is in studies of pricing objectives when a researcher erroneously labels a strategy as an objective. It is, therefore, necessary to provide an overview of the studies which have focused on pricing strategies as well as pricing objectives before considering the specific study of cost-based pricing. This will give a better overall view of what has been done in the area of investigating how managers make pricing decisions.

Only a small number of studies have empirically investigated pricing practices. Most of them have tried to determine which and how many objectives are used in arriving at prices of individual products. Studies in this area include: Kaplan et al., 1958; Shipley, 1981; Jobber & Hooley, 1987; Samiee, 1987; Coe, 1983, 1988, and 1990;

and Diamantopolous & Mathews, 1994. According to Noble and Gruca (1999) all of these studies concluded that companies usually use multiple objectives, and no single objective is overwhelmingly dominant over the others across the samples. The importance of specific objectives varied from one study to another. The Coe studies and the Diamantopolous & Mathews study demonstrated that objectives do vary within the same company over time. These studies also went further than others in investigating the impact of outside factors and concluded that the changes in pricing objectives are probably affected by these factors. This is an important contribution. If objectives are affected by environmental forces, so too should pricing strategies².

Previous empirical studies that have investigated pricing strategies have been limited generally in scope to researching only a small numbers of firms or to identifying strategies without regard to its determinants (Abratt and Pitt, 1985; Morris and Pitt, 1993). Those studies that have looked at both strategies and their determinants across a large number of firms have generally not been statistically rigorous. However, the study by Noble and Gruca (1999) examined pricing strategies and their determinants. This study was conducted by means of a survey, questioning managers about their pricing decisions for capital goods sold in US markets. The study concluded that:

The new product pricing strategies (skim, penetration, experience curve) were used for new models in the market. Skim pricing was used in markets with high levels of product differentiation by firms at a cost disadvantage due to scale. Penetration pricing was used by firms with a cost advantage due to scale in markets with high level of overall elasticity but low brand elasticity. Experience curve pricing was used for minor innovations by firms with low capacity utilization in markets with a high level of differentiation.

The competitive pricing strategies (leader, parity, and low-price supplier) were used in mature markets. Parity pricing was used by firms in a poor competitive situation, i.e., high costs, low market share, low product differentiation. These firms were also unable to take advantage of high levels of elasticity since their capacity utilization was high. In contrast, the low –price supplier strategy was used by firms with low costs due to scale advantages. Since they have low utilization, these firms can take advantage of elastic brand demand. None of the determinants were significantly related to the choice of leader pricing.

Product line pricing strategies (bundling, complementary product, and customer value pricing) were more likely to be used by firms which sell substitute or complementary products. Bundle pricing was used for pre-sale/ contract pricing in markets with high levels of brand elasticity. Complementary product pricing was used by firms that enjoyed high profitability on its supplementary sales. Using customer value pricing, a firm offers a stripped down version of its current products to appeal to more price sensitive segments or to leverage new distribution channels. This strategy was used to target a narrow segment in high growth markets where price changes are difficult to detect (p. 435).

² The studies on pricing objectives are not discussed in detail, because of their general inappropriateness to the study.

The authors noted that cost-based pricing was the most popular strategy and more likely to be used in markets where demand is very difficult to estimate. They concluded that when little or no information about demand is available cost-based pricing makes a great deal of sense.

The dominance of the cost-plus method was also a common finding of the few empirical pricing studies. For example, Goetz (1985) investigated the pricing methods of 56 dry-cleaning services in the USA and concluded that 36 companies in the sample (65%) adopted this method. Also, Zeithaml et al. (1985), in their study of the pricing behaviour of 323 service companies in 13 different sectors in the USA, found that the 63% of these companies had adopted the cost-plus method. The work by Morris and Fuller (1989) in 71 accounting companies of the USA has shown that 75% of these companies were relying on cost-based methods. Recently, Avlonitis and Indounas (2005) investigated the pricing objectives that Greek service organisations pursued along with the pricing methods that they adopted in order to set their prices. They found that the two most popular methods were cost-plus method and the pricing according to the market's average prices. These methods were the only ones adopted by the majority of the companies in their sample (58.2% and 55.3% respectively). The authors attributed their findings to the fact that these methods are easy to implement, the difficulty in determining customers' demand and needs and the fact that the companies may believe that by adopting cost-plus method they can cover their costs and at the same time charge competitive prices.

To conclude there is very little research about how managers actually formulate pricing strategies. There is even less understanding of why managers use the cost-based pricing strategies, despite the fact that it is widely used. The next section provides a literature review relating to cost-plus pricing methods usage and its determinants.

4.3.2 Overview of cost-plus pricing research

A literature search designed to uncover cost-plus pricing studies and covering periodical publications spanning the last two decades revealed only a few empirical studies with a specific focus on cost-plus pricing. These studies reported that cost-plus pricing, often using full costs, is widely used. This section provides a summary of these studies.

The first study was by Hall and Hitch's in 1939 claimed that firms used the full-cost as a rule of thumb when pricing. Approximately 80% of the firms in the survey claimed to use it some or all of the time.

A later and far more comprehensive study by Skinner (1970), based on a 10% response rate, identified 70% of the respondents claiming to use cost-plus pricing. Profit mark up was reviewed yearly by 55% of the companies and a further 38% reviewed it more frequently than yearly. 68% (80 companies) did not apply the same percentage mark up to all products and orders between reviews. Of these 80 companies 81% varied their mark up according to competition, 53% according to the strength of demand and 26% according to other factors. 75% of jobbing firms (selling customised products) claimed to use cost-plus pricing compared with 67% of firms which sold standardised products. The difference between these proportions was not statistically significant. Further evidence as to the weight given to competition and demand in pricing was obtained by asking how important these factors were in computing prices³. The results indicated that a firm's own costs and profit were allotted 9 marks out of ten, 7 for competition and 5 marks was given for demand. Skinner attributed the relative high importance of cost information in pricing to what is widely believed about British industry - that is, it is rather less 'market-oriented' than, say, American industry, and that within the marketing field it is somewhat less 'customer oriented'. However, he concluded that this is by no means the only factor determining the importance and use of cost-plus pricing.

Furthermore, four aspects of accounting methods were examined, and the practices of large firms were compared with those of the smaller. The most surprising aspect of accounting methods revealed by the study was the widespread use of variable costing. The firms were asked whether they break down their costs into fixed and variable elements, and if so, whether they normally made any use of the distinction in setting selling prices. 73% of the respondents stated that they had made the distinction, and of these, 69% used variable costs in price determination. 85% of large firms had made the distinction, which was significantly different from the proportion for the smaller firms. The findings on variable costing Skinner noted were not consistent with the results of other British investigations described by Sizer (1966) which showed very

³ Respondents were asked to mark each out of 4, however, in reporting the results Skinner converted the average marks allotted to a scale from 0 to 10.

little use of variable costing. Skinner concludes that the discrepancy between his results and earlier British surveys results might be due to changes occurring in Britain, or it may be due to special factors attributed to firms located on Merseyside, the area from where the survey was undertaken. The alternative plausible interpretation according to Skinner relates to the nature of the question asked by previous studies. Asking non-accounting managers, who may have limited knowledge about costing terms and not providing any explanation of them, may have resulted in incorrect responses.

Skinner and Atkin undertook a similar survey in 1975. Based on a 220 responses (a 22% response rate) from medium to large companies that marketed a wide range of industrial products they reported that 90% of the respondents were using cost-based pricing. Both full/ absorption costing accounted for 75% of the respondents. 41% of the respondents to the survey modified their prices based on non-cost considerations. However, the remaining 59% used cost only in determining a selling price. These non-cost considerations were: follow the market leader (11%), reference to competitors' prices (81%), investigation of customer reactions (31%), trial and error (3%), consultation with the sales force (14%) and other methods (2%). As can be seen when prices were not determined by cost the most popular method appears to refer to the general level of competitive prices. Atkin and Skinner concluded that there was no strong indication that individual industries differ widely in their approach to pricing decisions.

Respondents were also asked whether or not they formally investigated price acceptability among customers before finally fixing prices. Only 31% of respondents undertook formal investigations and not a single company used an outside company or agency for formal price investigations. It is clear that respondents were less concerned about demand estimation, therefore it can be said that in 1975 only a small percentage of the respondents were applying demand-based pricing.

Mills (1988) reviewed the results of these earlier studies and compared them with the findings of a survey conducted by Mills and Sweeting in 1986 among 100 manufacturing and 100 service companies from the UK's 7500 largest companies. The object of the study was to know how pricing decisions were made in the UK manufacturing and service companies, what input to the pricing decision did accounting have by way of providing cost information, what sort of cost information

was used and was the accounting information used in pricing decisions different for manufacturing and service companies. Data was collected by sending a similar questionnaire to that used by Atkin and Skinner so that comparisons could be made between the two studies. In both studies, cost-based methods were usually reliant on a full/absorption costing principles basis for determining prices under normal conditions. 71% of manufacturing and 68% of service companies were using cost-related pricing methods. No important differences were found between manufacturing and service companies in terms of the criteria used in the determination of prices. Of the other factors that were taken into account in determining selling prices, competitors' prices were the most important consideration. Demand considerations when undertaking pricing were compared between manufacturing and service companies. It was found that manufacturing companies investigated pricing effects on consumer demand to a greater extent than service companies. Demand consideration was also found to have increased in importance as more companies investigated the effect of proposed prices upon demand in 1986 compared with the 1974 survey.

Full costing was also found to be used far more widely than contribution costing in both manufacturing and service companies. However, the highest use of contribution costing by both manufacturing and service respondents was due to circumstances involving special orders. Industry type was also found not to have significant influence on the adoption of full/absorption or contribution costing.

Mills argued that the dysfunctional effects of full/absorption costing reliant on arbitrary allocation methods may be less important in practice than in theory and noted that the persistent use of full/absorption costing has encouraged research to discover why this may be; particularly, for standardised products. Mills argued many of the companies studied did not operate in a unique product environment; nevertheless they used full/absorption costing.

Mills concluded that between 1974 and 1986 there have only been minor changes in the method of pricing. In 1986 pricing decisions were found to be heavily based upon full cost information but market considerations were also taken into account. Mills argued that in the 1986 study there was a greater tendency to modify cost-based prices by reference to competitors' prices, suggesting that market forces and the need to be competitive have increased in importance.

In an attempt to ascertain how companies use costs in arriving at selling prices Govindarajan and Anthony (1983) surveyed over 500 industrial firms derived from the Fortune 1000. Of the 505 usable responses, 83% usually used full cost pricing and 17% reported that they used variable cost pricing. Size was not found to account for the difference in using variable versus full cost pricing. According to Govindarajan and Anthony the explanation for relying more on full cost in pricing might be that the profit maximisation model cannot be applied in most real world situations as it requires that managers search for all possible alternatives and select the one that maximises profits. Managers lack the time, the resources, or the information to act in this way. Second, they argued that the economist approach requires the application of the “law of supply and demand.” Managers usually can estimate the supply curve with reasonable accuracy but they have difficulty in estimating demand. However, the authors noted that the study is limited because no valid information about the costs that are actually used in pricing decisions was provided and no attempt was made to obtain information on the circumstances in which other practices were used, because they feared that the questionnaire would have been very long, and the response rate would have been correspondingly low.

Shim (1993) surveyed 141 firms generating a response rate of 23.5%. The majority of respondents were from top management including controllers, vice presidents, general managers, or chief financial officers. The responses indicated that 69.5% used absorption and 12% used variable cost-based pricing. Of the full-cost pricing companies 49% were reported to determine the prices based on percentage of manufacturing costs and 51% used percentage of all costs in deriving product prices. 18% used “market-based or competitive” pricing. Full-cost pricing, the predominant method, was used especially in the chemicals and electronics industries (80%, 72% respectively). Size was not found to have an effect on using cost-based pricing. The relationship between pricing methods and stages of ABC implementation was also investigated. The results were surprising, in that companies that did not plan to implement or had no intention to implement ABC showed the highest use of full-cost pricing (78%). Companies that have implemented or plan to implement ABC systems show a slightly higher percentage of variable-cost pricing or market-based pricing methods (32% and 39%) than companies that do not plan to implement ABC systems (22%).

Shim and Sudit (1995) compared the results of Shim (1993) with the (1983) survey by Govindarajan and Anthony and used these results to assess the relationship between ABC implementation by US manufacturers and their pricing practices. The article also discussed the rationale for choosing certain product costing methods. They argued that the prevalence of full-cost pricing, which requires considerable overhead cost allocation, underlines the importance of rational cost allocation. Therefore, they recommended the use of ABC because it tends to offer a better allocation scheme with activity analysis. They also argued that full cost pricing continues to be the most popular product pricing method. However, there is a shift toward variable-cost pricing or market-based (competitive) pricing. As in the 1993 survey, 25 companies (18%) reported using market-based (competitive) pricing, which was not reported in the 1983 survey. However, they noted that the 1993 survey showed only a very slow trend in this direction. Shim and Sudit argued that the more competitive environment of the late 1980's/early 1990's in terms of fierce domestic and foreign competition in the new manufacturing environment may support the use of some form of competitive pricing in the future.

Gotez (1985) argued that cost-based pricing is fairly common among manufacturers, especially those in less competitive markets. His study's objective was to see if that holds true in service firms, testing how dry cleaning firms make pricing decisions, more specifically whether prices are based more on costs or on market conditions and what are the important factors in establishing those strategies.

The sample consisted of 450 firms with a response rate of 23%. The survey indicated that costs were a greater influence than the market. However, that difference was not statistically significant. In addition, as it was expected, in firms where cost information is the dominant factor in pricing decisions, that the firm's accounting system was the primary source of that information. 64% of the cost-based firms attached significant importance to accounting data and only 40% of those in the market-based firms did. The difference between the cost-based firms, which placed a heavy emphasis on accounting data, and the market based firms, which did not was explained by Gotez as being due to the cost-based pricing firms simply having more sophisticated accounting systems. The author argued that responses to three different questions appeared to support this conclusion. First, 71% of the cost-based firms agreed entirely or in part with the following statement: "it is possible to separate

production cost of each service offered by our firm” whereas only 40% of the market-based agreed with the statement. Second, half of the cost-based firms were able to determine profits of individual service-lines compared to only 29% of the market-based firms. Finally, 61% of the cost based firms stated that they made changes to prices on any one service line at a time (independent of the others), while an equal percentage of market-based firms tended to change prices on all services at the same time. While the study does not support a definite conclusion about the relative sophistication of accounting systems in the surveyed firms Gotez argued that cost-based pricing firms appear to maintain more sophisticated systems than the others. Among the issues investigated was the relationship between pricing and “price leadership”. One interesting result of the study according to Gotez was that the majority of respondents considered themselves price leaders. However, market leadership was found to have no effect on strategies (cost-based pricing or competitive-based pricing).

A study by Gordon et al. (1981) aimed to determine the importance of various pricing objectives: whether prices are cost based or market based, the type of external information used in setting prices, company and industry characteristics that might influence pricing practices and policies, and the effect of product life style, economic market structure and price leadership on pricing.

The study consisted of 44 manufacturing companies (22 from Canada and the other 22 from the United States) and involved personal interviews with the key executives responsible for making pricing decisions. The interviews were structured around a detailed questionnaire involving both open-ended and close-ended questions. Four industries were chosen for the study - food processing, chemical, transportation equipment, and heavy equipment. The variation in industries selected relating to product type (speciality and mass produced products), environmental conditions and customer characteristics allowed consideration of several different factors affecting the actual management practice regarding pricing decisions. Also, the industries represented at least two different classical economic markets i.e. oligopoly and monopolistic competition.

The study results indicated that both costs and market conditions were important to price determination for product lines. The variant of cost-plus pricing frequently used was a percentage markup over costs. Even in those firms where competitors' prices

were of prime importance, cost information was also important in assessing whether or not the firm can sell the product line at the established market price.

One interesting result of the study was that the larger firms in the study indicated a stronger preference than their smaller counterparts for the use of competitive or market conditions in setting prices. This is in contradiction with previous studies. Conversely, pricing based on costs was more dominant for customised products, as opposed to standardised products. Also, companies that vigorously competed on the basis of product quality tended to rely more heavily on costs. Price following and leadership were also examined in terms of the emphasis given to pricing based on costs or market conditions. Market-pricing dominated for products where a price-following policy has been carried out. Full costs were given more consideration than variable costs in terms of pricing. In addition, the results of the study provided only limited support for the argument that pricing methods should vary among market structures, industries, and countries.

Bruegelmann et al. (1985) aimed to examine the conditions under which variable cost pricing was used. The sample consisted of 11 American manufacturing firms. The findings of the research suggested that both absorption and variable cost approaches were used. However, the more significant was the frequent use of variable costing. Eight of the companies surveyed used variable cost pricing in responding to competition in the marketplace. Four companies indicated the use of variable cost pricing when introducing new products to the marketplace, or when entering a new market with an existing product line. The study also revealed that five companies used variable pricing for special orders. Also, five of the companies interviewed used variable costing as the basis for establishing a bid price. However, the study was limited due to the small size of the sample. Therefore, according to Bruegelmann et al. any conclusions drawn must be qualified.

Recently, Guilding et al. (2005) collecting data from a survey of 280 UK and Australian companies to investigate the relative importance of cost-plus pricing and the contingent factors relating to competition intensity, company size and type of industry affecting the application of cost-plus pricing. The importance of cost-plus pricing was measured by two items. The first item was by asking the respondents to indicate the relative importance of a cost-plus selling price when determining final selling price and the second item related to the proportion of the organisation's sales

that uses a cost-plus approach in price setting. The descriptive statistic regarding the relative importance of cost-plus pricing indicated that 65% of respondents attached relatively high importance of cost information in price setting. However, there was a large cross company variation in the proportion of each company's cost-plus sales. A fairly large proportion of companies used cost-plus pricing for a small sub-set of their total sales. With regard to industrial sectors the results indicated that the retail sector used cost-plus pricing for a significantly greater proportion of its sales than other sectors. Furthermore the miscellaneous industrial group attached low importance to cost-plus pricing. Guilding et al. (2005) attributed this result to the fact that 48% of the Australian respondents categorised their companies in this industrial group. Therefore, due to the limited ability to sell differentiated products in this industry the authors argued that the majority of companies might be price takers that do not value cost information to be important in their price setting.

As for the contingency aspect of the study the study reported a positive significant relationship between competition intensity and the importance attached to cost-plus pricing ($p < 0.10$). In addition, the authors emphasised that competition is an important factor that affects the accounting system design and use of accounting data. Therefore, they recommended that future research uncover these relationships but using a more refined (less subjective) indicator of competition intensity. Support was also given to a negative significant relationship between companies in the manufacturing industry and importance attached to cost-plus pricing ($p < 0.10$). In addition, although it was argued that larger firms may have more market dominance and therefore may be price makers the findings indicated a positive but not significant relationship between company size and importance of cost-plus pricing. The authors explained the failure to uncover a relationship between company size and cost-plus pricing, in that larger firms may offer a large range of products and services each having limited market share. In addition, they noted that the study abstracted variables at the total company level such as competition, size, and type of industry, but did not include variables relating to the products or services attributes.

It can be concluded that the empirical studies generally report more extensive use of full-cost pricing. The consistent practice of full-cost pricing according to Shim (1993) underscores the importance of proper cost allocation and product costing.

4.4 Limitations of previous studies

The literature review identified the following weaknesses relating to previous studies:

- The product costing studies have mainly focused on the use of direct labour hours and machine hours as allocation bases; little attempt has been made to identify the extent of the use of the other cost drivers. Furthermore, these studies have mostly not attempted to analyse the results based on the purposes of the product cost information.
- Most of the studies that have examined the influence of explanatory variables on cost system design using ABC or traditional costing systems as the dependent dichotomous variable. Only Drury and Tayles (2005) and Abernathy et al. (2001) viewed the cost system design from a broader perspective. Furthermore, there appears to be no universally applied definition to the previous studies in terms of distinguishing between traditional and ABC systems.
- The previous contingency based studies on the adoption of ABC have focused almost entirely on manufacturing organisations. Clarke and Mia (1993) noted that adoption rates, as well as reasons for adoption or rejection of ABC, may differ significantly between industry groups. Furthermore, apart from the study by Groot (1999) no study has attempted to control for technological and market differences.
- Apart from the studies by Gosselin (1997), Krumwiede (1998) and Drury and Tayles (2005) most of the contingency ABC adoption studies have not taken into account the inter-relationship between the factors that have been tested as being conducive to the adoption of ABC. The studies have used bivariate statistical tests to examine independently, without controlling for the impact of other variables in the model. Also, most of these studies have measured the explanatory variables by relying on Likert scale scores from single questions rather than using composite scores from multiple questions. Thus, the previous contingency product costing studies have major limitations relating to using a narrow perspective for capturing the characteristics of the product costing system and methods of measuring the contingent variables. Drury and Tayles (2005) advised future research to strengthen the construct validity of the

contextual factors by using composite scores derived from aggregating the scores from multiple questions.

- A contingency theory framework has been widely used in ABC adoption research (e.g. Bjornenak, 1997; Krumwiede, 1998; Malmi, 1999). This stream of research, however, has two limitations. First, it has not used a consistent set of variables, and where the same variables have been applied, different questions have been used to measure the variables. Thus, coherent findings have not emerged and it has been difficult to interpret any consistency in the findings. Second, apart from the study by Cagwin and Bouwman (2002), little attention has been given to whether the hypothesised fit between the contingent variables and certain characteristics of management accounting systems also results in better organisational and managerial performance/effectiveness. Furthermore, real issues still exist concerning the definition and measurement of organisational performance.
- Cooper (1997) has emphasised the importance of profitability analysis in making decisions and hierarchical approach to the product profitability maps to make better decisions. Little research has, however, been undertaken in these areas in terms of the frequency with which such analysis is made; what cost information is used more extensively for profitability measures and the importance that is given to the product profitability analysis.
- Most of the descriptive research to date on how pricing decisions are made has focused on the objectives which drive the pricing decision. It was noted in the chapter the lack of research on the impact of the contextual and environmental variables on pricing methods. In this context, Avlonitis and Indounas (2005) advocate future research to investigate the different characteristics of the market, the company's sector of operation and size on pricing objectives and methods.
- The findings on cost-plus studies improve our understanding of how managers use costs in pricing decisions. However, there are two major weaknesses apparent in studying cost-plus pricing. First, the quality of statistical analysis of the results of the various studies is disappointingly low (e.g., descriptive statistics such as percentages, cross tabulations, and so on). Second, few

studies have used rigorous statistical techniques to examine the significance of the contextual factors that might affect the widespread use of cost-based pricing based.

- The literature review did not identify empirical studies that have thoroughly investigated the relationship between the type of costing system used and the use of cost-plus pricing.

4.5 Summary

This chapter has highlighted the following findings relating to previous studies that are relevant to this research:

- The majority of the firms in the UK and the USA tend to use full costing methods but a significant number of firms tend to use simplistic costing systems, such as blanket overhead rates. The surveys also indicated that direct labour hour was extensively used as the second stage overhead absorption rate despite the criticisms relating to over-reliance on this method.
- The surveys relating to ABC adoption rates indicate an initial low adoption rate of about 10% in the early 1990's but approaching 20% by the late 1990's. However, varying usage rates have been reported. The major deterrents for the adoption rate were identified as the complexity of the ABC system and also the higher costs involved in setting up the ABC system. Reported adoption rates vary between countries but the variation may have arisen because of the different ways in which ABC adoption has been defined.
- The studies relating to factors influencing the adoption of ABC have produced mixed results and only size appears to be a consistent explanatory factor. Cost structure has also been consistently reported as being a statistically non-significant explanatory factor. The contingency studies have mainly focused on the factors influencing ABC adoption and few studies have examined the factors influencing the choice of product costing systems based on wider definitions than ABC or traditional systems.
- Improved costing information for making pricing decisions was identified as a major use of ABC information and an important factor in the decision to adopt ABC systems.

- The pricing studies have reported that cost-plus methods reliant on full/absorption costing principles were the primary basis for determining prices. Most of the studies indicated that factors of size, type of industry and type of product (standardised/ differentiated) were not found to have influence on the adoption of full/variable cost pricing. Larger firms tend to show a stronger preference for the use of competitive pricing. Also, pricing based on costs tends to be more associated with customised than standardised products. Price leadership was also examined and it was found that market-pricing was dominant among price followers.
- Virtually all of the studies relating to pricing are old being undertaken prior to the mid 1980's.

Chapter 5

Research model and hypotheses development

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- 5.2 The need for the study and justification for constructing the research theoretical model**
- 5.3 Research objectives**
- 5.4 Research hypotheses**
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 - 5.4.3 Hypotheses relating to the effectiveness of level of cost system sophistication**
- 5.5 Summary**

5.1 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 this research and to develop the hypotheses that will be tested in Chapter 8. This is primarily based on the key findings, limitations and recommendations from the literature review of the product costing systems and the cost-plus pricing research. 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 suggested relationship between research variables and the formulations of the hypotheses are presented in section 5.4. Finally, section 5.5 provides a summary of the chapter.

5.2 The need for the study and justification for constructing the research theoretical model

Four areas of research are important for this study. First, prior literature on product costing systems provides evidence on the need to study observed product cost system design practices. Second, prior cost-plus pricing research suggests various issues relating to how companies are using cost information in their pricing decisions. Third, prior research suggests several contingent variables influencing the extent of costing systems sophistication and in turn organisational performance. Fourth, prior research indicates the importance of profitability analysis for decision making. These studies provided the motivation for developing the research theoretical model and the research hypotheses for this study. The limitations and conclusions of the abovementioned studies were highlighted in chapters 3 and 4 and will be reiterated in this section for ease of presentation and consistency of discussion.

The theoretical model of this research includes interrelated parts, which are contingent variables, the level of cost system sophistication, the importance of cost-plus pricing, and organisational performance. Figure 5.1 explains the overall research theoretical model, which is the conceptual framework of this research. In order to present the relationships between the aforementioned parts, the decision was made to divide the overall research theoretical model into three models.

Figure 5.1: The overall research theoretical model

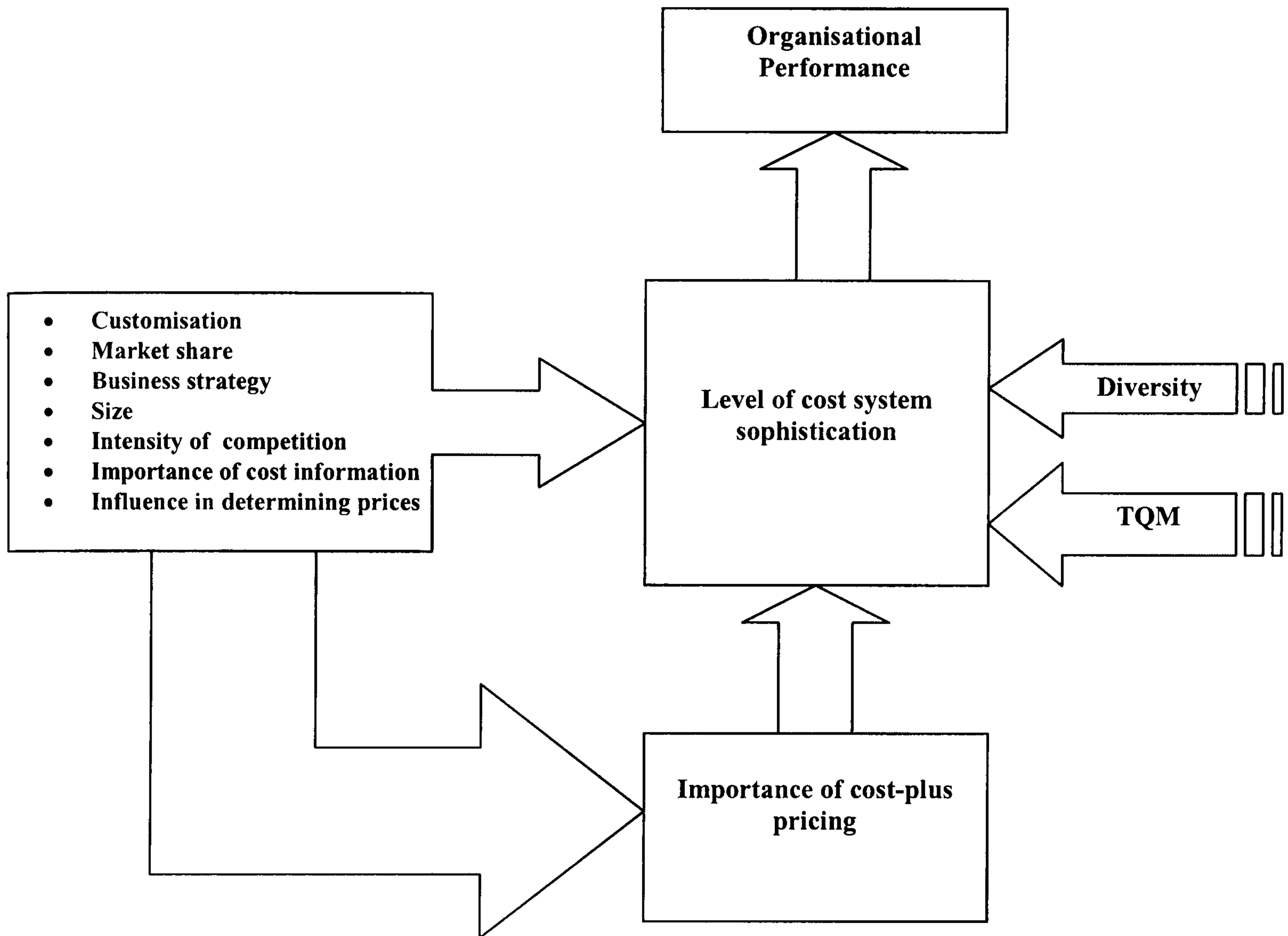
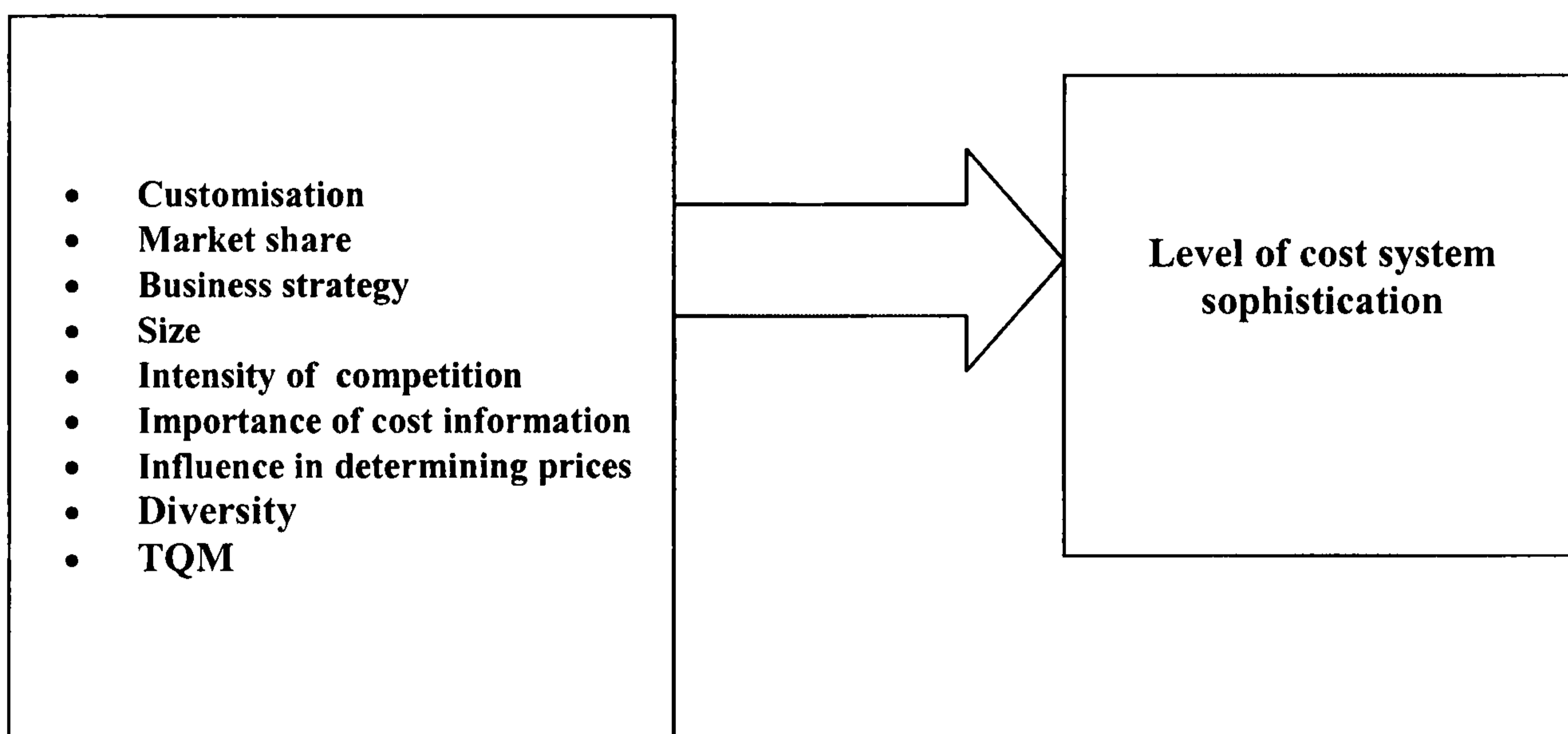


Figure 5.2 explains the first research theoretical model. It shows the relationship between the two parts of the model. The first part is concerned with nine contingent variables which are customisation, market share, business strategy, organisation size, intensity of competition, importance of cost information, influence in determining selling prices, manufacturing/service diversity and total quality management. The second part is concerned with the level of cost system sophistication.

Figure 5.2: The first theoretical model



The arguments and justifications that explain the rationale of constructing the first research theoretical model are primarily forwarded based on previous theoretical and empirical research relating to product costing systems and through the limitations that emerged from the literature review identified in Chapter 4 (section 4.4) in order to achieve the fourth objective listed in section 5.3.

Virtually all of the costing systems studies that have considered the influence of explanatory variables on the adoption of cost system design have focused on distinguishing between the adoption of traditional or ABC (e.g. Bjornenak, 1997; Malmi, 1999; Clarke et al., 1999). Traditional costing systems vary from simplistic (consisting of a single cost pool and cost driver) to sophisticated, consisting of many 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. Thus, it can be difficult to distinguish between simplistic ABC and traditional systems. Only a few studies (Drury and Tayles, 2005) and case study research by Abernathy et al. (2001) have adopted a broader perspective to examine the level of sophistication of cost system design. Several researchers have noted the difficulties that have been experienced in distinguishing between ABC and non-ABC systems and some researchers have questioned whether systems described by survey respondents as ABC are really ABC systems (Dugdale and Jones, 1997; Abernathy et al., 2001; Lukka and Granlund, 2002). For instance, Abernathy et al. (2001) state that:

The literature frequently ignores the dimensions along which costing system sophistication varies (p. 275).

While we drew on the ABC literature to guide our research study, our inquiry focuses on broad costing system design choices rather than on ABC systems. This is an important distinction (p. 264).

Also, Malmi (1999) states that:

It seems that at least at the conceptual level of ABC systems have evolved over time, making it impossible to define what exactly is diffusing it. Furthermore, academics do not share a common view of what makes an accounting system an ABC system (p.656).

In the same vein, Drury and Tayles (2005) noted the limitation of previous ABC literature and recommended future research to measure attributes of costing systems based on their level of sophistication. They state:

All of the studies have concentrated on the choice of two discrete alternatives – the adoption or non-adoption of ABC. However, the terms ‘adoption’ and ‘non-adoption’ have been subject to different interpretations with some studies defining adoption as actual ABC implementation or a desire to implement it. The dependent dichotomous variables have thus varied across studies and it is therefore difficult to interpret the findings (p. 49).

A more refined analysis should attempt to measure additional characteristics that may enable the costing systems to be classified by levels of sophistication rather than complexity (p. 77).

In addition to the limited perspective for capturing the characteristics of product costing systems (i.e. the dependent variable) previous contingency product costing research has also major limitations relating to methods of measuring the contingent variables and methods of statistical tests conducted.

In this context, Abernathy et al. (2001) state that:

The lack of consistent findings from the empirical surveys indicates that these conditions are poorly understood both in the literature and in practice. This suggests a need for on-going research into the empirical influence of the technical antecedents of costing system choices (p.262).

There are numerous directions for further research that stem from this study. First, the theoretical framework is simplistic. It focuses narrowly on the impact of one element of a firm’s strategic position, namely product diversity. In addition we were unable in our study to systematically control for the impact of other variables likely to influence costing system design choices (p. 277).

In the same vein, Drury and Tayles (2005) state that:

A common theme that emerges from the ABC contingency literature is the lack of consistent findings from the empirical surveys. It would appear that the factors influencing the design of product costing systems are poorly understood (p. 48).

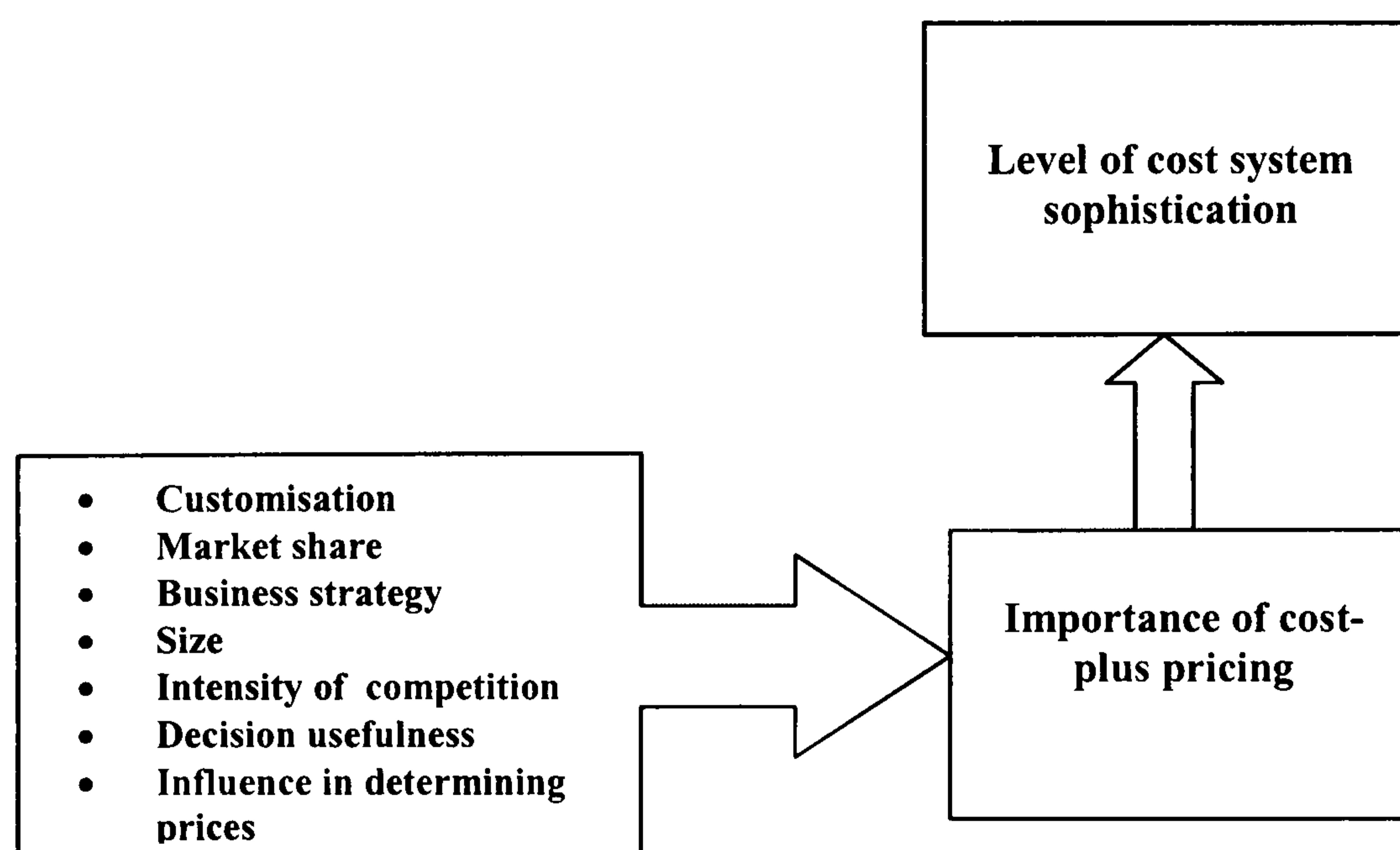
There is a need for tests to be undertaken using higher powered multivariate statistical tests that systematically control for the impact of the other explanatory variables that are likely to influence cost system design choices (p. 56).

Based on the aforementioned arguments, the current research seeks to apply the contingency theory framework by adopting a wider perspective than the previous studies to capture aspects of the product costing systems. The research seeks to explore the relationship between several contingent variables (market share, degree of customisation, manufacturing/service diversity, total quality management, business strategy, intensity of the competition, importance of cost information, organisation size, the influence in determining selling prices) and the level of cost system

sophistication. The measure of cost system sophistication that is used to represent the characteristics of product costing systems is presented in Chapter 6 section 6.6.2.

Figure 5.3 explains the second research theoretical model. It shows the relationship between the three parts of the model. The first part is concerned with seven contingent variables which are market share, degree of customisation, the influence in determining selling price, business strategy, intensity of the competition, importance of cost information and organisation size. The second part is concerned with the importance of cost-plus pricing. The third part is concerned with the level of cost system sophistication. In terms of the third research objective listed in section 5.3 the direct relationships between the contingent variables and the importance of cost-plus pricing are represented in the figure by a single directed arrow connecting contextual variables with the importance of cost-plus pricing. For the fifth objective, the indirect relationships between the contingent variables and level of cost system sophistication acting through the importance of cost-plus pricing are represented in the figure by the pathways connecting the contingent variables with the level of cost system sophistication via the importance of cost-plus pricing. The importance of cost-plus pricing is viewed in this case as an intervening or mediating variable between the contextual variables and cost system sophistication.

Figure 5.3: The second theoretical model



The arguments and justifications that explain the rationale for constructing the second research theoretical model are primarily based on previous theoretical and empirical research in cost-plus pricing and through the limitations that emerged from the literature review (see Chapter 4 - section 4.4) in order to achieve the third and fifth research objectives listed in section 5.3.

The literature review identified only a few empirical studies with a specific focus on cost-plus pricing. The findings of the cost-plus pricing surveys seem to indicate that in general firms are still rather cost-oriented in their price setting. However, little has been done to investigate the contingent factors affecting the application of cost-plus pricing. Diamantopoulos (1994) noted that while there has been a great deal of research documenting the use of cost-based pricing by managers, there has been little effort towards explaining why managers use cost-based pricing. Brierley et al. (2001, p. 232) make reference to pricing and conclude:

...there is a need to expand prior research to include an understanding of the relative importance of product costs for determining prices, and the circumstances under which product costs may be a less suitable basis for determining selling prices.....

In a similar vein, Guilding et al. (2005, p.134) state that:

The degree of importance attached to cost-plus pricing suggest there is a considerable scope for further studies designed to improve our understanding of the nature and different forms that cost-plus pricing may assume in a range of organisational settings.

Also, they conclude that:

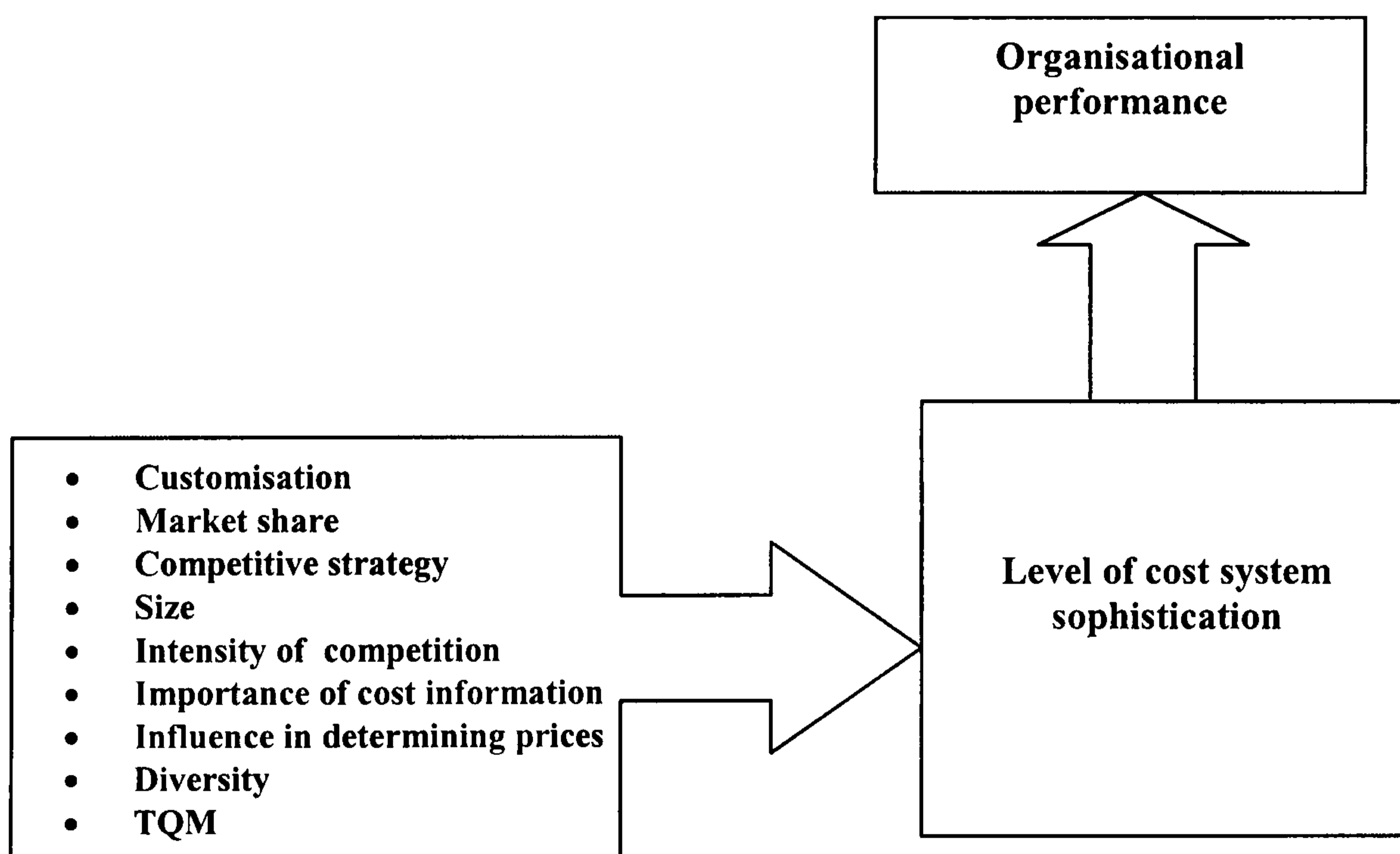
Further insights may be achieved by conducting a contingency analysis that appraises the impact of product and service attributes on the importance attached to cost-plus pricing (p.134).

In light of the findings of the literature review and also Brierley et al. (2001), Guilding et al. (2005) and the observations by Diamantopoulos (1994), it appears that further work concerned with the application of cost-plus pricing is needed. In order to address the relative paucity of recent research concerned with cost-plus pricing, this study aims to appraise the relative importance of cost-plus pricing, the cost information that is used and to develop and test hypotheses concerned with contingent factors that might explain the observed practices in relation to pricing decisions.

Figure 5.4 explains the third research theoretical model. It shows the relationship between the three parts of the model. The first part is concerned with nine contingent variables which are customisation, market share, business strategy, size, intensity of competition, importance of cost information, influence in determining prices, diversity of manufacturing/service and total quality management. The second part is

concerned with the level of cost system sophistication. The third part is concerned with organisational performance. The relationship between cost system sophistication and organisational performance is problematic and there is no clear theory or empirical evidence to validate the unidirectional relationship between cost system sophistication and organisational performance. Thus, it is not the intention of this research to test direct relationships between cost system sophistication and organisational performance as implied by the arrow going from cost system sophistication to organisational performance. However, it is emphasised that it is the internal consistency, fit or coalignemnt between the contextual variables and cost system sophistication that contribute to organisational performance rather than cost system sophistication or any other variable acting by itself (this is further explained in Chapter 8) .

Figure 5.4: The third theoretical model



The arguments and justifications that explain the rationale of constructing the third research theoretical model are primarily forwarded based on previous theoretical and empirical research in product costing systems and through the limitations that emerged from the literature review noted in Chapter 4 in order to achieve the sixth research objective listed in section 5.3.

It was argued in Chapter 4 that little attention has been given to whether the hypothesised fit between the contingent variables and certain characteristics of management accounting systems also results in better organisational performance. The contingency theory literature has emphasised that research models neglecting this key variable (i.e. performance/effectiveness) do not address the notions of the contingency approach. In this vein, Pennings (1992) state that the theoretical and pragmatic relevance of the structural contingency theory is anchored in its presumed ability to explain the question about organisational effectiveness. Unfortunately, much of the reviewed costing systems contingency research, as apparent in Chapter 4, has neglected organisational performance or effectiveness. In this context, Cagwin and Bouwman (2002, p.3) state that:

There also has been no empirical evidence that demonstrates that ABC improves financial performance. The issue of whether increasing use of ABC is directly associated with improvement in financial performance, without regard to firm- and industry-specific environmental conditions, has not been empirically tested.

This research identified an overall positive synergistic effect from concurrent use of the initiatives, but did not address which specific initiatives provide the effect or whether there may be a causal ordering of initiatives that is important. Further research is needed to investigate question such as (1) which combinations of initiatives provide a positive effect when used concurrently with ABC (p. 27).

Although it is difficult to obtain both large sample sizes and the volume of information necessary to adequately measure the constructs of interest, the subject is of significant importance to pursue (p. 27).

In the same vein, Kennedy and Affleck-Graves (2001, p. 23) state that:

Little evidence has been presented that documents a direct link between a change to an ABC system and increases in either shareholder value or firm profitability.

Shields et al. (2000) recommend the use of structural equation models for examining the effects on performance because they facilitate including additional variables and simultaneous testing of complex relationships, they also state that:

The direct and indirect models were developed by piecing together the results of prior accounting studies that individually typically investigated one or two of the nine hypotheses embedded in the direct and indirect models. Future research could expand the indirect model in order to develop a more complete understanding of the design and effects of control systems (p. 197).

Also, Gordon and Silvester (1999, p. 232) cite other researchers' recommendations for future research and state that:

Innes and Mitchell (1995, p. 151) argue that there is a need for more empirical (and objective research on the topic). Young and Selto (1991, p. 296), Anderson (1995, p. 48) and Shields (1995, p. 154) also call for further empirical research on the performance effects of ABC. Shank (1989,

p.47) points out that there is nothing conceptually new in activity-based accounting. Hence, the question regarding the net value of ABC remains unresolved, in large part due to the limited systematic and objective empirical evidence regarding its performance effects.

In addition, Cooper (1997) has emphasised the importance of profitability analysis in making decisions and a hierarchical approach using product profitability maps to make better decisions. There is also evidence to suggest that companies are placing increasing emphasis on profitability analysis (Chenhall and Langfield-Smith, 1998; Al-Omiri and Drury, 2002). Despite the increasing importance that has been attributed to profitability analysis within the literature and in practice no research has, however, been undertaken in these areas in terms of the frequency with which such analysis is made. For example, whether the product profitability information is used directly for decision making or used as attention-directing signals for further studies and also the importance that is given to the product profitability analysis. Therefore, this research as well as focusing on the information that is extracted from the costing system as the input for determining selling prices for price-setting firms also focuses on the content and role of profitability analysis for price-taking firms. A distinctive feature of the research is that rather than focusing on the information that is accumulated within the costing system it focuses primarily on the information that is extracted for different purposes. This research seeks to address this omission (the second research objective listed in section 5.3) by reporting the findings derived from a survey of UK companies relating to information that is contained in profitability reporting, generated for managing the existing mix of firms' activities. The findings relating to profitability analysis are represented in Chapter 7.

5.3 Research objectives

The major objectives of the research are:

1. To investigate and compare the level of sophistication of management accounting systems for product costing purposes in price-taking and price-making organisations;
2. To appraise the incidence, nature and role of profitability analysis and to ascertain the information that is used/extracted from within the profitability analysis for attention-directing and decision-making purposes;
3. To examine the relationship between hypothesised contextual/contingent variables and the importance of cost information in making pricing decisions;

4. To examine the *direct* relationship between hypothesised contextual/contingent variables and the level of sophistication of product costing systems;
5. To examine the *indirect* relationship between hypothesised contextual/contingent variables specified in (3) above, acting through the importance of cost information for pricing decisions, and the level of sophistication of product costing systems
6. To examine the relationship between the contingent variables, the level of product cost system sophistication and organisational performance.

The first two objectives are concerned with descriptive research and they are addressed in Chapter 7. Achieving these objectives does not involve formulating hypotheses for testing. In contrast, the final four objectives 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 final four objectives.

5.4 Research hypotheses

In the following sub-sections the main hypotheses of the research are described. They are divided into three groups. The first group of hypotheses is related to the contingent variables that might affect the level of cost system sophistication. The second group is related to the contingent variables that might affect the extent of importance of cost-plus pricing, and indirectly affect the level of cost system sophistication acting through the importance of cost-plus pricing. The third group of hypotheses is related to the effectiveness of sophisticated costing system.

5.4.1 Hypotheses relating to factors influencing the level of sophistication of management accounting systems

The first part of this study tests certain contextual factors for their impact on the level of cost system sophistication. Based on the literature review the following factors specified in Figure 5.2 have been identified as influencing the level of cost system sophistication:

1. Market share
2. Degree of customisation
3. Manufacturing/service diversity

4. Total quality management
5. Business strategy
6. Intensity of the competition
7. Importance of cost information
8. Size of the organisation
9. The influence in determining selling prices

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 8.

5.4.1.1 Market share and level of cost system sophistication

Generally companies with larger market shares often need to allocate more resources to invest in sophisticated management accounting systems. This is because they are more likely to have a more complex product environment handling large number of activities in a diversified range thus creating the need for a more sophisticated costing system that more accurately assigns indirect costs to products/services. Kaplan (1990) argues that more accurate cost information generated by sophisticated cost accounting systems such as ABC may help maintain high market share. However, increasing market share is not an easy task especially in mature markets. This is particularly true when a company is the market leader. Therefore, it is expected that an elaborate cost accounting system would be necessary to establish a meaningful and achievable strategy in order to establish and maintain a greater market share and eventually more profits resulting in the formulating of the following hypothesis.

H1: *The higher the market share the higher the level of cost system sophistication*

5.4.1.2 Degree of customisation and level of cost system sophistication

Krumwiede (1998) suggests that ABC may be expected to be adopted in non-job shop manufacturing processes because of the uncertainties associated with made to order production. Furthermore, Bjornenak (1997) suggested that highly customised production normally means high product diversity (especially complexity diversity, material diversity and set-up diversity) that generally favours the adoption of ABC systems. However, his survey reported that non-ABC adopters made significantly more customised products than adopters. He justified this finding on the basis that customised production also normally substantially increases the cost of developing a

sophisticated costing system. Thus, operating ABC or sophisticated systems may not meet cost versus benefits criteria where high customisation exists.

Drury and Tayles (2005) also provide further support for Bjornenak's finding. They argue that standardised products result in standardised activities thus enabling cost standards to be set. Therefore, a standard costing system can be operated that avoids the need to operate an actual costing system that requires the constant tracking of costs. Thus, sophisticated costing systems are likely to be less costly to operate for standardised products compared with customised products because with the latter it is unlikely to be feasible to establish standard costing systems. Kaplan and Cooper (1998) also recommend that if an ABC system is adopted there is a greater need to rely on intensity drivers in a customised product environment that directly charge for the resources used each time an activity is performed. Such a costing system is likely to be very expensive to operate. The literature therefore suggests that a customised product/service environment increases product/service diversity thus favouring the adoption of more sophisticated costing systems. However, this is outweighed by the increased costs of operating sophisticated systems in customised product settings resulting in sophisticated systems not being justified on cost versus benefits criteria where high customisation exists.

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

H2: *The lower the degree of customisation the higher level of cost system sophistication*

5.4.1.3 Manufacturing/service diversity and level of cost system sophistication

The level of cost system sophistication may differ because of differences in company operations. Malmi (1999) argues based on the assumption made by the conventional wisdom of management accounting that the more complex the production process, the more complex the costing system used to model it. Hughes and Gjerde (2003) explain when a company produces and sells only one product; there is little need to introduce a cost system because all overhead is incurred to support the one product. Product/service diversity complicates cost systems to be used. In addition, Cooper (1988) and Kaplan (1990) have emphasised the need for an accurate costing system when there is product diversity. In a similar vein, Estrin et al. (1994) claim that product diversity causes traditional costing system to report distorted product costs.

This is due to the fact that simplistic traditional costing systems rely on a small number of cost pools and cost drivers. Therefore, they are unlikely to capture the diversity of consumption of activity resources when high diversity exists. Therefore, it is necessary to have sophisticated cost systems that can capture the variation in resource consumption by the different products/services to avoid computing distorted product costs.

According to Drury and Tayles (2005) to capture the variability in resource consumption when products consume different proportions of support department resources (i.e. product diversity exists) a costing system that incorporates many cost pools, with each cost pool representing a separate support activity is required. In particular, a sophisticated costing system that establishes separate cost pools for batch-level activities incorporating non-volume based cost drivers that measure the consumption of resources by batch sizes rather than volume is required to capture volume diversity. If volume-related cost drivers are used low volume products are likely to be undercosted and high volume products overcosted (Cooper, 1988) and therefore result in product cost distortion (see Chapter 2 sub-section 2.3.2.2). Thus, firms with manufacturing/service diversity, that produce large volumes of standardised products (i.e. they do not have customised products) have a greater need to adopt a sophisticated product costing system to minimise product cost distortion.

Based on the above discussion the following hypothesis is formulated:

H3: *The greater the level of manufacturing/service diversity the higher the level of cost system sophistication*

5.4.1.4 The extent of the application of total quality management approaches and the level of cost system sophistication

Total quality management (TQM) is considered to be one of the most important components of advanced management practices. TQM promotes involvement of the entire organisation in continuously improving organisation activities with a focus on the customer. A study in the US showed that 30% of the organisations surveyed believed that their TQM programmes had made a competitive difference (McAdam and Bannister, 2001). Where customers are paramount for decision making in TQM it is vital to attract customers by providing quality products/services at low prices. In this environment accurate product cost information based on cost drivers that are the causes of costs being incurred is required.

Researchers such as Johnson and Kaplan (1987) and Cooper and Kaplan (1991) argue that traditional costing systems are inappropriate in the new environment. Therefore, several researchers (e.g. Anderson and Sedatole, 1998) advocate the use of activity-based costing in organisations adopting TQM initiatives. 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 implemented concurrently. They argued that researchers (for example Cooper and Kaplan, 1991; Anderson, 1995; Evans and Ashworth, 1995; Show, 1998) noted that ABC and other strategic initiatives complement and enhance each other, rather than being individually necessary and sufficient conditions for improvement. Krumwiede (1998) has also suggested that firms often link ABC to their formal quality management practices. The association of sophisticated costing systems and the extent of the application of TQM approaches is therefore examined by the following hypothesis:

H4: *The extent of the use of total quality management has a positive impact on the level of sophistication of the costing system.*

5.4.1.5 Business strategy and level of cost system sophistication

Business strategy refers to how a business unit competes in its market to achieve a competitive advantage relative to its competitors (Porter, 1980). Porter (1985) suggested that a business can develop a sustainable competitive advantage by implementing one of the following strategies:

- Overall cost leadership
- Differentiation
- Focus

Firms adopting a *cost leadership* strategy aim at becoming the lowest cost producer in the industry. However, companies pursuing a low cost strategy do not imply that they can ignore quality features or other bases for differentiation. Porter (1985) claimed that if a firm can achieve and sustain overall cost leadership, then it can charge prices lower than its rival and also its low cost position can result in higher returns. Cost leadership requires large-scale production economies of scale, the pursuit of cost reductions from experience and tight cost and overhead controls (Porter, 1980). Therefore, such firms are expected to be producing a narrow range of high volume products resulting in low product diversity. In these circumstances, firms may find

that a traditional unsophisticated volume-based costing system will report reasonably accurate product costs.

By *differentiation*, a firm is seeking uniqueness in its industry, by offering products, which are different from its competitors, to gain a competitive advantage. Such companies generally deal with customised products/services that are perceived by customers as being unique as a result of pursuing superior product features, brand image, product innovation, etc. (Miles and Snow, 1978; Porter, 1980). Porter (1985) states that for differentiation to be effective, the cost of being unique has to be lower than the price premium achieved from the uniqueness. Govindarajan (1988) argues that companies pursuing a differentiation strategy cannot ignore costs. Therefore, firms adopting a differentiation strategy need to have a sophisticated non-volume-based costing system that reports accurate product costs in order to be able to determine whether the higher revenues generated from the products or services exceeds the extra costs associated with differentiation strategy.

The *focus* strategy segments the market and focuses on a particular market segment.

Porter (1985, p.15) states that:

By optimizing its strategy for the target segments, the focuser seeks to achieve a competitive advantage in its target segments even though it does not possess a competitive advantage overall.

In other words focus strategy can be a cost focus whereby the firm seeks a cost advantage in its target segment or a differentiation focus whereby a firm seeks differentiation in its target segment.

Management is 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, based on the above discussion, it can be expected that companies that pursue a differentiation strategy are more likely to have a sophisticated costing system. Conversely, companies pursuing a low cost strategy are less likely to have a sophisticated costing system. In order to develop an effective business strategy, this variable included two dimensions: low cost and differentiation. However, due to the difficulty in measuring the low cost dimension the decision was made to exclude this aspect from the analysis (see Chapter 8 sub-section 8.3.1).

Based on the above discussion the following hypothesis will be tested:

H5: *A differentiation strategy has a positive impact on the level of cost system sophistication.*

5.4.1.6 Intensity of competition and level of cost system sophistication

Several studies (Libby and Waterhouse, 1996; Simons, 1990; Khandwalla, 1972) suggest that companies facing intensely competitive market environments tend to employ relatively more sophisticated management accounting systems. Bruns and Kaplan (1987) identify competition as one of the factors for stimulating managers to consider redesigning their costing systems.

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 as competition increases, there is a greater chance that a competitor will exploit any costing errors made by undercosting or overcosting products or services. Thus, more reliable cost information may be needed as competition increases. Therefore, Cooper (1988) argues that organisations facing fierce competition should implement ABC. In the same vein, Bjornenak (1997) has also argued that competition affects the value of ABC through increasing the costs caused by errors in the traditional costing systems. He argues that it is beneficial to improve the costing systems to avoid competitors taking advantage of costing errors. Thus, organisations facing intense competition have a greater need for accurate cost information. Drury and Tayles (2005) argue if this requirement (i.e. accuracy) can be met from unsophisticated costing systems then such systems will suffice. However, if this requirement can only be met from costing systems with higher levels of sophistication increasing levels of competition provides greater incentives for organisations to employ such systems. The above discussion suggests that greater competition increases the probability of organisations requiring sophisticated costing systems.

Based on the above discussion the following hypothesis is formulated:

H6: *The intensity of competition has a positive impact on the level of cost system sophistication.*

5.4.1.7 Importance of cost information and level of cost system sophistication

A major role of product costing systems according to Drury and Tayles (2005) is to provide relevant cost information to manage the cost and mix of existing products. According to Anderson (1995) and Estrin et al. (1994) the differing needs by organisations for accurate cost data for strategic decisions and cost reduction may affect ABC adoption. Similar views are expressed by Cagwin and Bouwman (2002) in that they state that 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. Factors affecting the importance 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 (Estrin et al., 1994). Therefore, based on the above discussion the following hypothesis is formulated:

H7: *The higher the importance of costs the higher the level of cost system sophistication*

5.4.1.8 Size and level of cost system sophistication

Researchers have discussed the size of the organisation as a dominant of its choice of accounting system. It has been considered as a significant internal contingent variable that affects the management accounting practices. Increased sophistication in financial control has been associated with increased organisational size (Child, 1975). There is also considerable evidence that size is an important factor influencing the adoption of more complex administration systems (Moore 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, 2000; Innes and Mitchell, 1995; Bjornenak, 1997; Malmi, 1999). A possible reason for this according to Drury and Tayles (2005) is that larger firms have relatively greater access to resources to experiment with the introduction of innovative systems such as ABC. In a similar vein, 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.

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 resources consumption by different cost objects. On the other hand, Drury and Tayles (2005) argue smaller organisations are likely to have a smaller product range with low levels of diversity and fewer production departments. In these circumstances simplistic costing systems may suffice. Therefore, based on the above discussion, the following hypothesis is tested.

H8: *Organisation size has a positive impact on the level of cost system sophistication*

5.4.1.9 The influence in determining selling prices and level of cost system sophistication

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 the costing system plays an important role in generating information for periodic profitability analysis in shedding light on those unprofitable products/services which its marketing effort should be directed. Accurate cost information, however, is not as crucial for profitability analysis since the information is likely to be used for attention-directing purposes so that either low profit margins or loss-making products may be highlighted for more detailed studies. Drury and Tayles (2005) state that if profit margins are satisfactory for all products lower levels of accuracy will suffice since the profitability analysis is likely to report all activities as being profitable for either high or lower levels of cost assignment accuracy.

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 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 this context, Hughes and Gjerde (2003) state that when companies set their selling prices in accordance with prevailing market price, their cost systems influence product margins and decisions regarding whether or not to continue to produce and sell the products. When companies determine selling prices under competitive bidding or various forms of cost-plus pricing, the product costs determined by the cost system directly influence selling prices. Incorrect selling prices result in revenues that fail to maximise potential profitability.

Therefore the following hypothesis is formulated:

H9: *The higher the influence in determining selling prices the higher the level of cost system sophistication*

5.4.2 Hypotheses relating to factors influencing the importance of cost-plus pricing and the relationships between cost-plus pricing and the cost system sophistication

The following sub-sections describe the hypotheses that have been formulated relating to the second theoretical model and the third and fifth objectives specified in section 5.3.

5.4.2.1 Market share and the importance of cost-plus pricing

Firms with lower market shares tend to operate in smaller niches where products may tend to be more customised to the customer needs (i.e. there is no established price). Hence they may attach more importance to cost plus pricing. Gordon et al. (1981) findings indicate that firms who desire to penetrate the market to maximise market share tend to rely on pricing based on market factors rather than costs. Therefore, it is expected that firms with lower market shares attach greater importance to cost-plus pricing. Thus, the lower the market share the greater the importance that is given to cost-plus pricing resulting in the formulation of the following hypothesis:

H1: *Market share negatively influences the importance attached to cost-plus pricing*

5.4.2.2 Degree of customisation and importance of cost-plus pricing

Drury (2004) argued that companies that sell highly custom-designed products to their customers are more likely to use cost-plus pricing because established market-determined prices are unlikely to exist. Gordon et al. (1981) noted that companies which produced customised products tended to rely more on cost-plus pricing instead of pricing based on market factors. The reason for this they argue is that companies selling customised products were prone toward basing prices upon achieving return on investment objectives, while firms producing standardised products were prone towards sales objectives. Guilding et al. (2005) argued that customising the products or services to the specific needs of customers will result in increased price customisation, therefore, it can be expected to increase the importance attached to cost-plus pricing.

H2: *The degree of customisation is positively related to the importance attached to cost-plus pricing*

5.4.2.3 Influence in determining selling prices and the importance of cost-plus pricing

The accounting normative literature suggests that a relative price making orientation provides a considerable appeal for the use of cost-plus pricing. It has been argued that companies that have no influence over the prices to charge operate in very competitive markets where the items provided by one company are very similar to those produced by others. Also in a market where there are a few dominating firms (market leaders) many firms become price followers and must accept the price determined by market forces. Therefore, it has been argued that in this case costs are not used as a direct input for setting selling prices. Instead the prices are set to match

the market prices (see Chapter 3 section 3.4.1). Gordon et al. (1981) empirically indicated that price follower firms considered market conditions more heavily than costs as compared to price leaders. Guilding et al. (2005) implied that producers of undifferentiated products who are price takers may not value cost information to be important in determining prices.

Therefore the following hypothesis is formulated.

H3: *The degree of influence in determining selling prices is positively associated with the importance attached to cost-plus pricing*

5.4.2.4 Business strategy and the importance of cost-plus pricing

Porter (1985) states that for differentiation to be effective, the cost of being unique has to be lower than the price premium achieved from uniqueness. In addition, Hughes and Gjerde (2003) argued that although product differentiation softens price competition in the market, it is a costly strategy to pursue. Therefore, in order to be effective the cost increases associated with product improvements should be passed to customers. Thus, in this environment cost-plus pricing may be of importance so that the prices that are set to ensure that the higher revenues generated from the products or services exceeds the extra costs associated with differentiation. In addition, if the product is differentiated than competitors' products, competition-based pricing does not inform the firm about the possible range of prices that may be appropriate. Thus, the higher the product differentiation, the weaker the reliance on competition-based pricing. Therefore, in situations of high product differentiation the importance of cost-based pricing is expected to increase. It is worth mentioning, however, that the contrary is expected for low cost producers. Because, as Porter (1985) claims, to achieve and sustain overall cost leadership firms must command prices lower than their rivals. Products that are not differentiated compared to competitors only obtain a position of competitive advantage if they can be offered at a lower price than competitors' products. Therefore, it can be expected that low cost producers tend to rely more on market information than on cost information in their price settings. However, this research will not test this relationship due to the difficulty in measuring the low cost dimension. Therefore, the following hypothesis is formulated.

H4: *A differentiation strategy has a positive impact on the importance attached to cost-plus pricing*

5.4.2.5 Intensity of competition and the importance of cost-plus pricing

Gordon et al. (1981) claimed that the importance attached to the price of directly competing products and near substitutes, as well as the quality of competing products, were all significantly correlated with pricing based on market conditions.¹ These results they argued were expected because as the price and quality of competing products become more important to the survival of product line, it stands to reason that the dominant pricing method would have to be market conditions rather than costs. This is especially the case in competitively intense markets, where products might need to compete more on price. Therefore, it is expected in markets with intense competition, especially when the products do not have a superior value over competitors' products but aim to attack a competitor's superior position, that competition information is more important than the cost information. Shim and Sudit (1995) argued that the more competitive environment of the late 1980's/early 1990's in terms of fierce domestic and foreign competition in the new manufacturing environment may support the use of some form of competitive pricing in the future. Therefore, the following hypothesis will be tested.

H5: *The intensity of competition has a negative impact on the importance attached to cost plus pricing.*

5.4.2.6 The importance of cost information and importance of cost-plus pricing

Gotez (1985) argued that in firms where cost information is the dominant factor in pricing decisions (i.e. cost-based pricing firms) a significant importance was attached to cost accounting data, while cost information was deemed less important in the market-based firms². It can be said that firms placing a heavy emphasis on accounting data for various decision making are attributing a greater reliability to cost data, and thus, having the confidence to use cost information instead of market information for pricing decisions. Therefore, this suggests that the importance that is attached to cost-plus pricing is strongly influenced by the importance that is given to cost information.

H6: *The importance of cost information is positively related to the importance attached to cost-plus pricing*

¹ For details of the study see Chapter 4 sub-section 4.3.2.

² Details of this study is provided in Chapter 4 sub-section 4.3.2.

5.4.2.7 Size and importance of cost-plus pricing

Gordon et al. (1981) argued that the larger companies in terms of sales and assets tended to price above competitive levels, while the smaller firms were inclined to price at competitive levels. In the same vein, Guidling et al. (2005) argued that larger companies can be expected to be major players in the markets and therefore have a greater capacity to influence price charged. Consistent with the rationale that larger companies' have greater propensity to act as price makers than smaller companies, it is expected they will have greater cause to attach high importance to cost information when pricing goods and services.

H7: Organisation size has a positive impact on the importance attached to cost-plus pricing.

5.4.2.8 Importance of cost-plus pricing and level of cost system sophistication

Innes and Mitchell (1991) argued that one of the major uses of ABC information is for managerial decision making, especially for pricing decisions. They pointed out that empirical research on ABC has shown that pricing is an important motive for those considering its adoption because of the importance of having reliable cost information for this purpose. Friedman and Lyne (1995) argued that pricing was one of the major factors influencing the emergence of activity based costing and that it was considered by the majority of companies in their sample to be one of their major objectives for introducing activity-based costing. Baily's (1991) noted that the majority of companies who reported greater accuracy in product costing also reported that they were already making changes in their product pricing strategies. Shim and Sudit (1995) discussed the rationale for choosing certain product costing methods. They argued that the prevalence of full-cost pricing, which requires considerable overhead cost allocation, also requires rational cost allocations. Therefore, according to them the use of ABC is recommended because it tends to offer a sophisticated allocation scheme with activity analysis. In a similar vein, Gotez (1985) argued that cost-based pricing firms have more detailed information about costs because they probably have more sophisticated accounting systems than other firms. In addition, several empirical studies (Malmi, 1996; Lukka and Granlund, 1996; Bright et al., 1992) suggest that one of the most important functions of ABC is to give support to product pricing decisions. This implies that the importance of cost-plus pricing is associated with higher levels of sophistication of cost accounting systems. Therefore, the following hypothesis is formulated.

H8: *The importance attached to cost-plus pricing has a positive impact on the level of cost system sophistication*

Confirmation of this hypothesis would be provided only if the importance of cost-plus pricing was associated with the use of more sophisticated costing systems on average for every firm, regardless of its circumstances. Alternatively, if the confirmation of the results is dependent on specific enabling conditions being present then this hypothesis will not be confirmed. Thus, it is necessary to focus on hypothesis nine, which incorporates specific enabling conditions.

Chapter 3 identified specific factors (e.g. customisation, price making orientation) that affect the importance of costs-plus pricing that justified proper accounting for costs. Therefore, this leads to the following hypothesis:

H9: *The association between the importance attached to cost-plus pricing and the level of cost system sophistication is impacted by specific enabling variables which are: market share, degree of customisation, the degree of influence in determining selling prices, differentiation strategy, competition intensity, the importance of cost information, and size.*

5.4.3 Hypotheses relating to the effectiveness of level of cost system sophistication

It has been argued in section 5.2 that the relationship between management accounting systems and organisational performance is not empirically clear. In addition, research on the economic benefits from using elaborate costing systems such as ABC is ambiguous (Gordon and Silvester, 1999). Gordon and Silvester (1999) note that it is possible that ABC may have differential impacts across firms depending on contingent firm-specific factors. In the same vein, prior research (e.g. Shields, 1995) suggests that the benefits derived from implementing ABC vary greatly among firms depending upon several behavioural and organisational dimensions. In addition, Cagwin and Bouwman (2002) argued that researchers (such as Pattison and Arendt, 1994; Estrin et al., 1994; Cooper and Kaplan, 1991) have identified specific environmental conditions such as complexity and competition that affect the potential benefits from the use of ABC. Therefore, Cagwin and Bouwman (2002) suggest that the theory supports the proposition that under appropriate 'enabling conditions' the improved costing information provided by ABC (or sophisticated costing systems) leads to improved decision-making, and therefore should be associated with improved performance. Therefore, the coalignment or fit among the nine contingent variables specified in Figure 5.1 and sophisticated costing system usage may be expected to affect organisational performance. As a result, the

claimed and limited evidence on the effectiveness of sophisticated costing systems usage, leads to the following hypotheses:

H1: *The fit or coalignment among the level of cost system sophistication, market share, customisation, manufacturing diversity, total quality management, influence in determining selling prices, business strategy, intensity of competition, size and the importance of costs has a positive impact on organisational performance.*

5.5 Summary

The literature review that has been carried out in Chapters 2-4 identified several important gaps and justifications for building the research theoretical model. These were discussed in section 5.2. The illustration forwarded in respect of the research theoretical models highlighted that the current research extends earlier studies to achieve the research objectives. The anticipated relationships between the contingent variables, the level of cost system sophistication, the importance of cost-plus pricing, and organisational performance were discussed in order to underpin the formulation of the hypotheses. Moreover, management accounting studies (e.g. Drury and Tayles, 2005; Abernathy et al., 2001) have urged researchers to develop measurement instruments to identify the extent of usage of sophisticated costing systems. Therefore, the operational definition as well as the measurement instruments of the research variables; particularly the level of cost system sophistication, the importance of cost-plus pricing and organisational effectiveness will be presented in the next Chapter.

Chapter 6

The Research methodology

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6.1 Introduction

The major justifications for the study were outlined in Chapter 1 in order to set the scene for the entire investigation. This was further elaborated upon in chapters 2-5 and this chapter describes the research design process, including the procedures necessary for obtaining the information to structure or solve the particular research problem. Accordingly, the aim of this chapter is to describe the research methodology that has been applied for undertaking this research and to explain the steps followed and the methods employed by the researcher to collect the data. This chapter starts with an overview of the research paradigm and methodology. This is followed by a detailed description of the data collection methods adopted in this research including a justification for the research population and sample selection. The procedures undertaken relating to questionnaire design and layout, pilot work, question types and format, the covering letter, content of the final version of the questionnaire, administering the questionnaire, the respondents, checking for non-response bias and reliability and validity evaluation are also discussed. Finally, the chapter concludes with discussion and justifications of the statistical methods and techniques used in the data analysis in order to fulfil the objectives of the study.

6.2 Research methodology and paradigm

Eldabi et al. (2002) emphasise that conducting any type of research should be governed by a well-defined research methodology based on scientific principles. In this context, Creswell (1994) points out that the choice of any particular method (e.g., survey, case study, and experiment) depends on the research paradigm or philosophy that researchers follow to conduct their research. The term ‘research philosophy’ refers to the philosophical basis for the research according to a number of assumptions addressing how the search for the truth, reflected in the fulfilment of the objectives of the research, is to be attained. Easterby-Smith et al. (2002, p. 27) state that:

There are at least three reasons why an understanding of philosophical issues is very useful. First, because it can help to clarify research designs. Second, knowledge of philosophy can help the researcher to recognise which designs will work and which will not. It should enable a researcher to avoid going up too many blind alleys and should indicate the limitations of particular approaches. Third, knowledge of philosophy can help the researcher identify, and even create, designs that may be outside his or her past experience. And it may also suggest how to adapt research designs according to the constraints of different subject of knowledge structures.

The two main research paradigms or philosophies about the way in which knowledge is developed and research is conducted in social sciences in general and the

management accounting literature in particular are “positivism” and “phenomenology”. These two research paradigms are sometimes described in the literature by different terms. The positivistic approach can sometimes be labelled as traditional, quantitative, or empiricist whilst the phenomenological approach can be labelled as post-positivistic, subjective, or qualitative (Hussey and Hussey, 1997).

The major difference between the positivistic (quantitative) and the phenomenological (qualitative) paradigms of scientific inquiry can be illustrated through the overall approach followed by each of these paradigms, with regard to the generation of knowledge (i.e. deductive theory testing and inductive theory building). As highlighted by Perry (1998), the deductive approach represents the positivistic paradigm, whereas the inductive approach represents the phenomenological paradigm. In this way the positivistic paradigm, as Saunders et al. (2000) explain, seeks to develop a theory and hypothesis (or hypotheses) about the relationship between two or more variables from the available literature, which is then tested empirically by gathering data on the relevant variables and then applying statistical tests to the data in order to identify significant relationships. The findings may either confirm the theory or result in the modification of the theory (Hussey and Hussey, 1997). Also quantifiable data is obtained from a large sample to generalise the findings and to conduct statistical analysis (Saunders et al., 2000). Thus, cross sectional studies employing a survey methodology are often used in this paradigm.

The starting point for the phenomenological paradigm is the belief that social practices are not natural phenomena. Instead they are socially constructed and emerge as a result of the social practices of organisational participants. In this vein, Easterby-Smith et al. (2002) explain that the philosophy behind the phenomenological paradigm views the “reality” as not objective and exterior, but as being socially constructed and given meaning by people. Thus, the phenomenological paradigm appreciates people’s feelings, thinking, the different interpretations and meanings, which people give to various phenomena. This involves thoroughly explaining why and how people view different experiences, rather than searching for external causes and fundamental laws to explain their behaviour (Easterby-Smith et al., 2002). Therefore, in contrast to the positivistic paradigm, the context in which a phenomenon is taking place is quite important in explaining such a phenomenon in the phenomenological paradigm. Normally, this is facilitated through devising a case

study research design, in order to develop an in-depth and detailed understanding of a particular organisational phenomenon (Eisenhardt, 1989; Creswell, 1994; Yin, 1994; Creswell and Maieta, 2002; Creswell, 2003).

Hussey and Hussey (1997) summarise the features of the two main paradigms as shown in Table 6.1.

Table 6.1: Features of the two main paradigms

Positivistic (quantitative) paradigm	Phenomenological (qualitative) paradigm
Tends to produce quantitative data	Tends to produce qualitative data
Uses large samples	Uses small sample
Concerned with hypothesis testing	Concerned with generating theories
Data is highly specific and precise	Data is rich and subjective
The location is artificial	The location is natural
Reliability is high	Reliability is low
Validity is low	Validity is high
Generalises from sample to population	Generalises from one setting to another

Source: Hussey and Hussey (1997, p. 54)

Each of the two main methodologies has its advantages and disadvantages. Table 6.2 provides a summary of some of the strengths and weaknesses of the two research paradigms.

Table 6.2: Strengths and weaknesses of positivistic and phenomenological paradigms

Paradigm	Strengths	Weaknesses
Positivist (quantitative paradigm)	<ul style="list-style-type: none"> - They can provide wide coverage of the range of situations. - They can be fast and economical. - Where statistics are aggregated from large samples, they may be of considerable relevance to policy decisions. 	<ul style="list-style-type: none"> - The methods used tend to be rather inflexible and artificial. - They are not very effective in understanding processes or the significance that people attach to actions. - They are not very helpful in generating theories. - Because they focus on what is, or what has been recently, they make it hard for policy makers to infer what changes and actions should take place in the future.
Phenomenological (qualitative paradigm)	<ul style="list-style-type: none"> - Data-gathering methods are seen as natural rather than artificial. - Ability to look at change processes over time. - Ability to understand people's meaning. - Ability to adjust to new issues and ideas as they emerge. - Contribute to theory generation. 	<ul style="list-style-type: none"> - Data collection can be tedious and require more resources. - Analysis and interpretation of data may be more difficult. - Harder to control the pace, progress and end-points of the research process. - Policy makers may give low credibility to results from qualitative approach.

Source: Amaratunga et al. (2002, p. 20)

Hussey and Hussey (1997) point out that the two paradigms must be viewed as two extremes of a continuum, and that none of these two paradigms is considered better than the other. The choice of either paradigm is determined partly by the current knowledge of the topic and research problem under investigation. Oppenheim and Naftali (2000) argue that choosing the best design or best method is a matter of appropriateness. No single approach is always or necessarily superior; it all depends on what is needed to be found and on the type of question, which the research seeks to answer.

According to Ryan et al. (1992) contingency theory research (which is adopted by this research) attempts to determine general relationships that are replicated across a large number of organisations. Thus, it provides a good illustration of the positivistic paradigm. Therefore, and given the research objectives and the empirical investigations in the field of product costing, contingency research has been conducted using a quantitative research philosophy in order to explore expected relationships, which might emerge from interactions among a set of research variables. Also, because of the desire for greater generalisability and external validity

a cross sectional survey methodology, based on data collected from a large number of organisations just once and over a short period of time, is adopted for this study. The following are the justifications for choosing the positivistic paradigm in this research:

1. Generalisation. Survey-based research seeks to identify relationships that are common across organisations, and hence provide a general statement or theory about the phenomenon being researched (Bryman, 1993; Eldabi et al., 2002).
2. Causality. The quantitative research is concerned with establishing the causal relationship between concepts (Bryman, 1993; Eldabi et al., 2002).
3. Saving in time and effort. Adopting a cross-sectional survey methodology leads to a saving in times, effort and resources required in comparison with longitudinal and case studies methodologies (Creswell, 2003).
4. Unlike case studies, under a positivistic paradigm questionnaires can be used for large-scale surveys (Hussey and Hussey, 1997).

6.3 Data collection methods

Two main methods of data collection are commonly used within a survey methodology - mail questionnaires and interviews. Factors including the size of the sample, the extent to which they are clustered in one place or are widely scattered, the time and resources available and the sensitivity and complexity of data collected are to be considered according to De Vaus (2001) in the choice of a particular data collection method. To achieve the research objectives and to provide answers to the research questions, which require a potentially large sample of a targeted population in geographically dispersed locations, the mail survey method was chosen as the most appropriate way to gather the necessary input for this study. The advantages of mail surveys are:

1. ability to collect fairly large amounts of data,
2. avoids interviewer bias and allows the respondents anonymity,
3. a fair degree of sample control,
4. higher response rate compared with other methods,
5. relatively low costs in comparison with the other ways that are very expensive in terms of time and travel (Saunders et al., 2000 Pennings, 1987), and

6. enables the research findings to be generalised to the sampled or whole population rather than few organisations or contexts (Hussey and Hussey, 1997; Saunders et al., 2000; De Vaus, 2001).

6.4 Research population and sample selection

Oppenheim (1992) states that the term population is defined as all those individuals, companies or cases who fall into the category of concern. The population for this research is defined as large manufacturing and non-manufacturing companies in the UK. The justifications for selecting this category of organisations are as follows:

1. Only large organisations are considered in the population of this study, while small companies are excluded. The reason for this is that small firms, employing less than 200 employees, are expected not to rely on sophisticated and well designed cost accounting systems. Instead, they are likely to rely more on informal systems.
2. The population consists of manufacturing and service companies. The reason for this is that previous contingency based studies on the adoption of ABC have focused almost entirely on manufacturing organisations (see Chapter 4, section 4.4).

Because of the specialist nature of the survey it was necessary to ensure that those completing the questionnaire were qualified and that the targeted firms had established costing systems. To meet these requirements the sample was drawn from the membership database of the Chartered Institute of Management Accountants (CIMA). One thousand firms were randomly selected from the Chartered Institute of Management Accountant database. The sample of 1000 firms was chosen to allow the researcher to collect sufficient data for this study. The criteria used to collect the sample are:

1. Random selection of manufacturing and service firms with number of employees of over 200,
2. The respondents were selected on the basis of their job titles, the aim being to select those respondents who were likely to have specialist knowledge relating to the information requested within the questionnaire,

3. The sample was selected from those business units that employed two or more CIMA qualified members.¹ The analysis of the CIMA database suggested that units employing one or no CIMA members would be unlikely to have established formal costing systems².

According to the above criteria, one thousand manufacturing and service organisations were selected. Also, an attempt was made to assure a reasonably large response from within one industry. This required maximising the number of firms within any one industry, subject to the above constraints. Therefore within the 1000 firms, 250 companies were selected from the food industry. The justifications for selecting this category of organisations are as follows:

1. There is evidence to suggest that firms act somewhat differently from industry to industry. Therefore, it may be necessary to isolate a specific industry in order to test some relationships.
2. Undifferentiated cross-sectional studies create problems in terms of the difficulty surrounding the understanding of the effects of environmental variables such as competition intensity, market growth. Some of these variables have the same control effects for all the firms within the sector (Singh and Ranchhod, 2004). Therefore, by carrying out this research also within one industry, some of these variables can be controlled.
3. In many of the previous cross-sectional management accounting survey studies conducted in the UK, the highest response obtained from the industries mailed was from the food industry. Therefore in order to obtain a high response rate within one industry the selection of the food industry was considered to be the best choice. In addition, this choice enables the industry variable to be controlled for part of the sample and also enables the results to be compared for a specific industry with the results obtained from the sample of all other manufacturing and services companies.
4. A review of the literature (see Chapter 4) revealed that the majority of the more recent cost accounting systems studies appear to be based on cross-

¹ The sample focused on business units, since more than one cost accounting system may exist in large companies. For single-unit firms the term 'unit' also refers to the firm as a whole.

² This conclusion was derived from the observation that most of the business units employing only one CIMA member were small and the members' job title suggested they performed a more generalist accounting function rather than a management or cost accounting function.

sectional studies of the manufacturing industry. It appears that there has been no empirical research focusing on a specific industry such as the food sector; therefore, this study also seeks to examine cost information for pricing and profitability analysis links within this sector.

According to Green et al. (1988) there are two major issues involved with surveys. They are, first, assuring the input is accurate (response bias) and second, obtaining a sufficiently high response rate to assure the results are representative of the sample. For these reasons an extensive review of the survey development literature, discussion with other researchers of their experiences and the pre-testing of the survey documents underpinned the formulation and development of the final document used.

6.5 Questionnaire construction and pre-testing

6.5.1 Questionnaire general format

In order to maximise the probability of responses and minimise non-response bias Dillman's (1978) "Total design method for surveys" was mainly considered for constructing the questionnaire. This approach considers understanding respondents' behaviour, and the reasons for it, as the key issue for constructing effective surveys and maximising response rates. According to Dillman constructing effective mail questionnaires includes not only the questions but also other critical aspects such as general appearance, clear instructions and the ordering of the questions. Leaving any of these attributes unattended will make the overall design of the questionnaire less appealing. For instance, Dillman (1978, p.120) argues that:

The respondent's first exposure to the look and feel of the questionnaire provides the first of several critical tests that the questionnaire must pass.

The questionnaire (see Appendix A for the final version) consisted of eight pages, which consisted of two A3 sheets of paper, folded in the middle and stapled to form a booklet. Printing questionnaires on both sides of the page as in booklets requires less paper and makes them appear shorter and more professional, which should increase the motivation for the respondents to participate (Dillman, 1978). The front page or cover creates respondents' first impression. It was therefore reserved for material that would stimulate interest in the research. It contained the logo and name of Huddersfield University placed at the top of the cover, followed by the study title and a summary of the main message in the covering letter with instructions for

completing the questionnaire. A return address was also included in the front cover to enable respondents to return the questionnaire in case it was separated from the covering letter and return envelope. In addition, the name, job title and address of the respondent were printed at the top right-hand side of the front page to facilitate the administration process of the questionnaire and the follow up procedures. The confidentiality of information including respondents' names and their organisations was assured in the front page, and in the covering letter.

The questionnaire contains a combination of open-ended and closed type questions. In long and comprehensive mail questionnaires, it is recommended that closed-ended questions are used since they can be quickly answered and easily coded, so that the use of open questions should be minimised (De Vaus, 1993; Mangione, 1995).

Therefore the main type of question used in constructing the questionnaire was the closed-ended type. In addition, a few open questions in the form of "others (please specify)" were used. Also open questions were used in questions in order to obtain specific and short answers about the business unit size and type of operations. Two types of closed questions were used in the questionnaire. These include category questions and scale questions. According to Saunders et al. (2000) category questions are designed so that each respondent's answer can fit only one category. The main type of closed questions used in this questionnaire was scale or rating questions. Rating questions include a list of alternatives that range from not much of a particular attribute to a great deal of that same attribute (Mangione, 1995). Rating scales are often used in terms of a Likert scale in which respondents indicate how strongly they agree or disagree with a statement or series of statements by ticking a box or number. Finally, although the length of scales is a debatable issue, seven-point scales were used throughout the questionnaire based on the argument that more points on a scale provide an opportunity for greater sensitivity of measurement (Roberts, 1999). In addition, itemised scales were generally used, with each category in the scale mostly being defined throughout the questionnaire. This is consistent with Emory and Cooper's (1991) argument that itemised scales provide more information and help respondents to develop and hold the same frame of reference as they complete the questionnaire.

6.5.2 Questionnaire order and appearance

The questionnaire was structured to flow easily, moving the respondents through questions in a logical sequence (Aaker and Day, 1980). Every effort was made to make the questionnaire appear clean and uncluttered in order to add to the impression of a simple task. A questionnaire with good flow is easier to use, motivates respondents and helps them to remember and provide accurate information (Mangione, 1995). Consistent with the guidance suggested by Dillman (1978) and Saunders et al. (2001), the flow of the questionnaire was based on the following two principles. First, the most relevant questions to the survey purpose and of interest to the respondents (i.e. financial directors) were placed at the beginning of the questionnaire (i.e. questions about cost accounting systems), while less relevant questions (i.e. personal questions) were placed at the end. The importance of the topic and respondent's opinion to its development was communicated in the covering letter in order to establish respondents' willingness to participate. Thus, starting the questionnaire with personal or less relevant questions to the topic is likely to jeopardise respondents' initial enthusiasm to participate (Dillman, 1978). Second, questions that are similar in content were grouped under five major topics or sections. For instance all questions related to cost accounting systems were grouped together under Section A whereas questions relating to profitability analysis, pricing decisions, contextual factors, effectiveness and the respondent's personal attributes were grouped under Sections B, C, and D respectively. Titles were added to each section to aid the respondents in identifying the structure. At the end, in order to encourage the respondents to complete the questionnaire, they were asked if they were interested in a summary of the results of the survey.

The questionnaire was pre-tested to reduce ambiguities and misunderstanding of the questions and to improve relevance of the questions.

6.5.3 Pre-testing procedures

The content of the final survey package is the result of iterative and well-established test procedures. Several versions of the questionnaire were initially prepared and a pilot survey was undertaken in order to test the overall adequacy of the document that had been developed. The pilot should test the length, layout, format for the questions used, the amount of space left for responses and the sequencing of questions (Hunt et

al., 1982). Dillman (1978) adds that the pilot should assure that each of the questions is measuring what is intended to measure, that the questionnaires creates a positive overall impression, one that motivates people to answer it, and so on. The pilot study was conducted in September, 2004. The first phase involved pilot studies with managers working in the same environment as those of the target managers in the main survey. The second phase included discussions with faculty members, doctoral students and other interested parties.

The pilot study mailing included a cover letter addressed to each CIMA participant as well as a copy of the questionnaire and a prepaid envelope. The covering letter asked them to complete the questionnaire and to identify areas they did not understand or additional issues relevant to the study that had been omitted.

The pilot survey was mailed to 30 CIMA members on September 17, 2004. The sample used for the survey was drawn from the mailing list that was specified earlier. Five completed questionnaires were returned. Three of the original sample had moved thus giving a response rate of 18.5%. At the pilot stage it was considered inappropriate to attempt to increase the response rate by the use of follow-up reminder letters. The responses to the questionnaire suggested that the respondents found the questionnaire understandable and easy to complete. The initial 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.

One interview was undertaken as part of the pilot study with a finance director who provided useful feedback and indicated that generally the questionnaire was suitable for meeting the objectives specified. The same pilot survey was handed to professors in the University of Huddersfield, because of their expertise and experience in the subject. All offered considerable constructive criticism of the survey and provided suggestions for improving the format. The researcher's supervisor and second supervisor independently also provided extensive comments on the different versions of the questionnaire, which led to several modifications and substantial improvement in the final survey document.

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.

6.6 Survey mailing

6.6.1 The covering letter

The final version of the questionnaire (see Appendix A) was mailed towards the end of October 2004. The covering letters (see Appendix B) enclosed with the final questionnaire were individually addressed and personally signed. The letters were printed on the University of Huddersfield letterhead in order to add credibility to the study.

The letters covered four points: (1) what the study is about and why it is important, (2) the length of time required to complete the survey based on earlier testing, (3) the emphasis on the confidentiality of individual company information, and (4) the development of trust through an offer to send them a copy of the aggregated results.

As Dillman (1978) and Jobber (1990) both argue that the inclusion of return postage is important. A prepaid envelope was included in the mailing.

The section that follows describes in detail the rationale used for the inclusion, wording and sequence of items in the final questionnaire sent. It also explains the intended use of the items and it proceeds in the sequence in which the items appear in the questionnaire.

6.6.2 Final content of the questionnaire

Section A deals with product/service costing information. Question A1 was designed to ascertain how indirect costs are accumulated and assigned to products or services for decision making. This question also provided a broad indication on the sophistication of indirect cost accumulation process. Question A2 was self-developed to measure the sophistication of costing systems of the responding organisations. Eight items were used. The respondents were asked to indicate the state of their costing systems in terms of their sophistication/simplicity in respect of assigning indirect costs (items A2a, A2b). Also based on the discussion developed in Chapter 2 activity based costing systems were considered to be a sophisticated form of costing

system. Therefore, respondents were asked to indicate whether their costing systems resembled activity-based ones (item c). Accuracy and satisfaction with the information provided by costing systems were shown to be major attributes of sophisticated costing systems (see Chapter 2 section 2.5). Therefore respondents were asked to indicate the level of accuracy and satisfaction with their costing systems in items A2e and A2f. Items A2g and A2h focused on the use of arbitrary/cause-and-effect indirect cost allocations. Questions A3-A5 aimed to collect data for describing the sophistication of the indirect cost assignment process in the organisation. These questions were adapted from Drury and Tayles (1999). Question A6, derived from Krumwiede (1998), aims to determine the importance of cost information by examining its importance relative to qualitative and strategic aspects.

Section B relates to questions on profitability analysis. Question B1 determines the frequency of routine profitability analysis by products/services. Question B2 examines the importance of routine periodic profitability analysis for decision making. These questions were adapted from the study by Drury and Tayles (2000). Question B3 is self-developed and asks the respondents to identify the extent of usage of each potential profitability measure for signalling the need to make a variety of decisions.

Section C relates to factors influencing pricing decisions. The first question C1 sought to ascertain the relative importance of cost-based pricing, competitive-based pricing and demand-based pricing strategy. There are several strategies within each strategy, which are quite similar to these primary strategies with respect to intent and expected outcomes, but not strictly identical. It was considered that the expansion of the number of primary strategies beyond the three described would add complexity to the survey with very little added benefit. Question C2 examines the extent to which the business units are price setters or price-followers in terms of pricing decisions, and question C3 is concerned with measuring the ease of determining demand. Question C4 focuses on the use of cost-plus pricing and its importance by asking respondents to indicate the proportion of their organisation's external sales that use a cost-plus pricing method in price setting. Therefore the importance of cost-plus method of pricing was measured by two items C4 and C2a (which indicates the relative importance of cost information when determining final selling price). Guilding et al. (2005) followed this approach in measuring the importance of cost-

plus pricing. Question C5 concentrates on what cost information is used to determine the cost-plus selling price and C6 measures market share and is adapted from (Hoque and James, 2000).

Question C7 was designed for validity checking purposes (see Chapter 8). In Question C7 respondents are presented with a list of three pricing strategies and the criteria used for selecting the strategy. The question identified the most commonly used and recognised strategy terms in the literature that were most relevant to the study. A brief description of each strategy was included to provide clarification of the terms used if the respondent were unsure of the meaning of the primary term. Rather than providing a technical definition, the description indicated the actions a firm would take and some of the results expected in applying this strategy. It was felt this would be the most readable and easily understood method of presentation. The extent to which target costing was used was derived from Question C8.

Section D asked respondents about the context in which their business units operate, thus providing details relating to most of the contextual factors specified for achieving the research objectives. Question D1 focused on the competitive environment. Items (a)-(e) were adapted from Guilding and McManus (2002) and the remaining items in this question were adapted from Hoque et al. (2001). Question D2 was designed to collect data on the extent of standardised or customised products and services marketed by the organisations. Items measuring the two dimensions of strategy (low cost strategy/differentiation) were adapted from Govindarajan's (1988) instrument. Respondents were asked in Question D3 to position their business units, relative to their leading competitors in six dimensions related to their business strategies. The previous studies (e.g. Banker et al., 1993) measured total quality management by the involvement of the entire business units in continuously improving quality. Thus, in this research the conceptual definition of total quality management implementation focuses on aspects of quality initiatives. Examples include quality incentives, quality of processes and continuous quality improvement. Question D4 and D5 were adapted from Krumwiede (1998). The former sought to obtain information on the quality initiatives adopted by the organisation and the latter focused on the complexity of manufacturing or service provision in the organisation.

Question D6 with sub-sections, was included to examine the performance of the organisations in relation to their competitors. The purpose of this question was to

examine the relationship between the sophistication of the cost system design and the performance of the organisation. The approach used in this question was suggested by Govindarajan (1984). It has also been used in several other studies (e.g., Chong and Chong, 1997; Govindarajan and Fisher, 1990; Govindarajan, 1988; Chenhall and Langfield-Smith, 1998). A two stage rating system was employed. First, respondents were asked to rate along seven-point scales ranging from not important to vitally important the importance of eight performance measures to their organisation. Second, respondents were asked to score, again on seven-point scale ranging from poor to outstanding, how they perceive their organisations actually performed along each of these eight performance dimensions. Respondents were also asked to indicate the overall performance of their business units compared to their competitors over the last three years.

The remaining questions in section D requested information relating to details about the respondent's business unit including size and the business sector within which it operates.

6.6.3 Survey administration

The aim was to obtain a minimum of 150 usable surveys for this study to ensure a response rate of at least 15%. A sample size of this magnitude should be sufficient for running a factor analysis on the variables and to have sufficient input so that proper analysis can be undertaken to determine whether the results are meaningful and satisfactory. On this basis it was decided to mail 1000 surveys, with the expectation of receiving at least 150 usable responses.

Two samples were extracted using the CIMA database as specified earlier. Since it was believed that pricing practices would vary somewhat between industries it was decided to concentrate the first mailing on a single industry and a sample of 250 firms from the food industry was established. The distribution of the food industry by company size was roughly equivalent to the distribution for the entire mailing list. The second sample included 750 manufacturing and service companies. Both samples were mailed on 21 October 2004.

The mailing of the questionnaire resulted in 130 responses from the recipients consisting of 88 completed questionnaires and 57 uncompleted because the addressee has gone away. Of this total 10 did not participate, but had returned some indication

of having received the survey with reasons for non-completion such as not having a costing system, or due to the company's policy not to participate in surveys. After about three weeks, a reminder letter was sent to the respondents. The letter included information about the website for downloading the questionnaire for the respondents who had misplaced or not received the questionnaire (see Appendix C). This resulted in 41 usable completed questionnaire and 41 were returned uncompleted.

On 4 December, 2004, a second reminder was sent out to respondents to enhance the response rate and also allow for testing for non response bias (see Appendix D). The respondents were asked to indicate if they were not prepared to participate in the survey to provide information relating to their type of business activity, number of employees and annual sales turnover. This information was collected in order to check for the non-response bias (see Section 6.7). As a result, the second reminder produced 23 usable questionnaires. For the purpose of non response bias check, 66 responses were received containing only information about business type, number of employees and annual sales turnover. Consequently, the total usable responses (i.e. fully completed questionnaires) were 152 representing a 17% response rate based on the following measure:

Response rate = total number of response / total number in sample – (unreachable + ineligible).

Table 6.3 shows the response profile of the survey. According to Saunders et al. (2000) examination of recent business surveys reveals response rates as low as 15-20 % for postal surveys. Thus, this response rate is considered to be satisfactory.

Table 6.3 Survey response profile

Response profile	Main survey	1 st reminder	2 nd reminder	Total
Usable questionnaires	88	41	23	152
Left job/unreachable	57	36	16	109
Ineligible/partially completed	6	2	1	9
Refusals/company policy	4	3	6	13
Total	155	82	46	283

6.6.3.1 Characteristics of respondents and responding firms

Table 6.4 summarises the main characteristics of responding firms in terms of industry types, number of employees and annual sales turnover. The table shows that the responding firms represent a wide range of manufacturing and non manufacturing types, and no one industry exceeds 30% of the sample.

Table 6.4: Characteristics of responding firms

1. Type of businesses	Frequency	Percent
Plastic products	18	11.8
Textile, cotton, wool, clothing	5	3.2
Aerospace & defence equipment	7	4.7
Food, drinks & tobacco products	41	27
Constructions and equipment	5	3.2
Chemicals & pharmaceutical products	5	3.2
Electronics & electrical including IT products	4	2.7
Paper & stationery, cartoons, boxes, packaging	9	6
Steel & materials (e.g. ceramic)	5	3.2
Domestic products including furniture & electrical	7	4.7
Engineering products including automotive parts, engines	4	2.7
Wholesale/retail	12	8
Financial & commercial	6	4
Other services	23	15
Not respondent	1	0.6
Total	152	100

2. Number of employees	Frequency	Percent
200-500 employee	61	40.1
501-1000 employee	43	28.2
1001-2000 employee	24	16
2001-4000 employee	11	7.2
More than 4000 employee	13	8.5
Not responded	-	-
Total	152	100

3. Annual sales turnover	Frequency	Percent
Less than £50 million	46	30.2
£50 million – less than £100 million	35	23
£100 million – less than £200 million	34	22.3
£200 million - £500 million	12	7.9
More than £500 million	18	11.9
Not responded	7	4.7
Total	152	100

Table 6.5 shows the main characteristics of respondents in terms of job title. The table shows that respondents were considered to be knowledgeable and able to provide relevant information about their cost accounting systems since most of them occupied senior positions in their firms, and were concerned with accounting or finance.

Table 6.5: Characteristics of respondents

1. Respondents job title	Frequency	Percent
Director of finance	36	23.6
Finance manager	20	13.1
Financial controller	29	19
Chartered management accountant, head of management accountant,	25	16.5
Chief financial officer, chief accountant, corporate accounting manager	3	2
Senior accountant, group accountant, financial accountant, cost accountant, commercial accountant, business accountant, operations accountant, site accountant, accountant	16	10.6
Controlling manager, controller, cost controller, operations controller, group financial controller	12	7.9
Senior manager , business planning manager, managing director,	5	3.2
Other including business analyst, commercial director, project manager, MIS manager	6	4
Not responded	-	-
Total	152	100

6.7 Check for non-response bias

It is important in any survey to consider the impact of non-response and its effects. An analysis of the impact of non-response is crucial because research design, according to Hussey and Hussey (1997), is dependent on generalising from the sample to the population under investigation. Kervin (1992) defines non-response as biased when cases with certain characteristics are more likely to be refusals or non-contacts. According to Lessler and Kalsbeek (1992) non-response bias occurs due to the inability to get a usable response from some sample members. As non-response bias could affect the generalisation of the research findings to the population, it was decided to check for non-response bias. Lessler and Kalsbeek (1992) noted that if there are no major differences between respondents and non-respondents, then it can be said that the sample obtained is not significantly different from the original sample.

Thus, non-response bias is assessed by using two procedures. The first involves comparing the characteristics of early respondents with those of late respondents. This method assumes that respondents who return their questionnaire late are more like refusals compared with those who return them early (Kervin, 1992). This method is particularly useful when the researcher has used reminders or follow-up letters assuming that those firms that responded after the reminder letter would not have

responded had the reminder not been sent. Therefore, comparing respondents to the initial survey with respondents after the reminder letter had been sent can assess the extent of non-response bias. Non-response bias exists when there is a significant difference between the two groups of respondents. Chi-square and Mann-Whitney U statistical tests were used to determine whether there was a significant difference between the two groups of respondents (respondents before sending reminders and respondents after the reminder had been sent) in respect of the characteristics of industry type, size in terms of both number of employees and annual sales. The results of these tests are reported in Tables 6.6 and 6.7. The results show no significant differences between the 'early' and 'late' respondents regarding industry type, number of employees and annual sales.

The second method compares the characteristics of respondents with non-respondents from the sample. Test for non-response bias often involves collecting additional data from a sample of non-respondents (Choong and Grover, 2000). For this purpose, non-respondents were asked in the second reminder letter to indicate information relating to their business sector, number of employees, and sales turnover. Chi-square and Mann-Whitney U statistical tests were used to determine whether there was a significant difference between the two groups of respondents (respondents and non-respondents) in respect of the characteristics of industry type, size in terms of both number of employees and annual sales. The results of these tests are reported in Tables 6.8 and 6.9. The results show no significant differences between the respondents and non-respondents regarding industry type, number of employees and annual sales ($p > 0.05$).

Therefore, the results of the two procedures suggest that non-response bias does not apply.

Table 6.6: Chi-square comparing industry type between early and late respondents

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.405	4	.493
Likelihood Ratio	3.374	4	.497
Linear-by-Linear Association	2.381	1	.123
N of Valid Cases	152		

Table 6.7: Mann-Whitney test comparing size between early and late respondents

Ranks

	REMINDER	N	Mean Rank	Sum of Ranks
number of employess	before reminder	88	73.78	6492.50
	after reminder	64	80.24	5135.50
	Total	152		
sales	before reminder	88	77.14	6788.50
	after reminder	64	75.62	4839.50
	Total	152		

Test Statistics^a

	number of employess	sales
Mann-Whitney U	2576.500	2759.500
Wilcoxon W	6492.500	4839.500
Z	-.894	-.211
Asymp. Sig. (2-tailed)	.371	.833

a. Grouping Variable: REMINDER

Table 6.8: Chi-square test comparing industry type between respondents and non-respondents

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.575	4	.813
Likelihood Ratio	1.793	4	.774
Linear-by-Linear Association	.202	1	.653
N of Valid Cases	218		

Table 6.9: Mann Whitney test comparing size between respondents and non-respondents

Ranks

	respondent-non	N	Mean Rank	Sum of Ranks
number of employess	respondent	152	107.31	16310.50
	non	66	114.55	7560.50
	Total	218		
sales	respondent	152	106.06	16121.50
	non	66	117.42	7749.50
	Total	218		

Test Statistics^a

	number of employess	sales
Mann-Whitney U	4682.500	4493.500
Wilcoxon W	16310.500	16121.500
Z	-.780	-1.222
Asymp. Sig. (2-tailed)	.436	.222

a. Grouping Variable: respondent-non respondent

6.8 Validity and reliability evaluation

Validity and reliability measurements are the basic criteria for evaluating the accuracy and precision of quantitative research. Measurements of the research variables must be valid, that is, they should be accurate meaning that they should arrive at the same answer to that if an alternative measurement method had been used. They must also be reliable, that is, they should be precise so that the same answer would be obtained

on re-measurement based on the assumption that the situation has not changed (Jankowicz, 1991).

6.8.1 Validity

Validity is the extent to which the research findings accurately represent what is actually happening in the situation under consideration (Hussey and Hussey, 1997). In other words, validity refers to the extent to which a test measures what we actually wish to measure. Criterion, content and construct validity are commonly used validity tests that are usually used to assess measurement validity (Hair et al., 2003).

Criterion validity measures the degree to which a construct performs as expected relative to other variables identified as meaningful criteria (Hair et al., 2003). Two types of criterion validity can be performed. The first is concurrent validity, which refers to the extent to which a measurement scale relates to other well-validated measures of the same subject (Oppenheim, 1992). It is established when the results obtained from the scale used are consistent with the results of other available scales that are used to describe the same subject (Oppenheim, 1992). The second is predictive validity, which Sekaran (2003) refers to as the ability of the measuring instrument to differentiate among individuals with reference to a future criterion (i.e. criterion data are measured after the passage of time).

Content validity ensures that the measure includes an adequate and representative set of items that represent the concept (Sekaran, 2003). It is considered as an important first step for assessing construct validity (Graver and Mentzer, 1999). The more the scale items represent the domain or universe of the concept being measured, the greater the content validity (Sekaran, 2003). According to Cooper and Schindler (2001) content validity is judgemental and requires knowledge of the theoretical nature of the construct. Therefore, it can be approached through a careful definition of the items to be scaled, the scales used and also through the use of a panel of persons to judge how well the instrument meets the standards. To meet the content validity requirements, an extensive literature review was undertaken to define and clarify the scales and measures used in this research. Many items and scales used in this research were adopted from several studies that place emphasis on meeting the requirements of validity and reliability. In addition, the questionnaire items were scrutinised and pre-tested by several researchers undertaking doctorates relating to business studies and a

panel of academic experts (see section 6.5.3) judged the content validity of the questionnaire.

Construct validity testifies how well the results obtained from the use of the measure fits the theories around which the test is designed (Sekaran, 2003). Face or construct validity can be attained through pre-testing procedures. This study has carried out a number of pre-trial stages and pilot work was undertaken to ensure enhanced construct validity. Furthermore, Sekaran (2003) indicates that construct validity is assessed through convergent and discriminant validity. The measurement model in SEM specifies the measures (indicators) for each construct and assesses content validity, unidimensionality, convergent validity, discriminate validity and reliability (Hair et al., 1998). Unidimensionality is considered as a way of statistically assessing the construct validity and refers to the degree to which a set of indicators represent only one underlying concept in common (Hair et al., 1998). According to Hair et al. (1998) when using multiple item scales of a construct, it is imperative to assess the unidimensionality of the construct and the possibility of multiple sub-dimensions that can be represented in a second order factor analysis. Thus, the test of unidimensionality requires that each construct should consist of items loading highly on a single factor. According to Hair et al. (1998) assessing the unidimensionality and the appropriateness of the selected measures can best be approached with either exploratory factor analysis (EFA) or confirmatory factor analysis (CFA). Recent developments and research suggest that CFA is a more rigorous and precise test of unidimensionality as compared to EFA (Garver and Mentzer, 1999). Goodness of measurement model fit using SEM is the criterion for assessing unidimensionality in SEM.

Convergent validity is established when the scores obtained with two different instruments measuring the same concepts are highly correlated (Sekaran, 2003). In other words, convergent validity assesses the degree to which the measures of each construct are correlated (Hair et al., 1998). *Discriminant validity* is established when, based on theory, two variables are predicted to be uncorrelated and the scores obtained by measuring a variable discriminate that variable from other items representing the other variable (Sekaran, 2003). Thus, it represents the degree to which the measure of a construct does not correlate well with the measures of other constructs (Chau, 1997). In this research, the assessment of unidimensionality,

convergent and discriminant validity of the measurement instrument for each construct or latent variable is achieved through the use of exploratory factor analysis (EFA) in which all factor loadings were of an adequate extent to confirm the dimensions of the concepts. In addition, confirmatory factor analysis (CFA) is used to assess the overall fit of the measurement model and the magnitude, direction and significance of the estimated parameters between the latent variables and their indicators. All results of both exploratory and confirmatory factor analysis are presented in Chapter 8.

6.8.2 The reliability

The reliability of a measure indicates the extent to which it is without bias (error free) and hence ensures a consistent measurement across time and across the various items in the instrument (Sekaran, 2003). In other words it is concerned with the precision of measurements such that the same results would be obtained on re-measurement (Jankowicz, 1991). Reliability provides an indication about the consistency of the instrument. It is primarily a matter of stability. For example, if an instrument is administered to the same individual on two different occasions the question is, will it yield the same result? (Easterby-Smith et al., 2002). Test-retest, internal consistency and parallel form reliability are different forms of reliability. However, the most commonly used form of reliability is internal consistency assessed by Cronbach's alpha (Saunders et al., 2000). Thus, Cronbach's alpha is adopted in this research to assess the overall reliability of the measurement scale for each defined construct of the study. Alpha provides an estimate of the proportion of the total variance that is not due to error and thus representing the reliability of the scale (Oppenheim, 1992). The recommended minimum acceptable limit of reliability "alpha" for this measure is 0.60 (Hair et al., 2003). The results of reliability tests are presented in Chapter 8.

6.9 Statistical methods used in data analysis

The decision was made to adopt the positivistic paradigm based on the nature of this research and the justifications mentioned earlier in this chapter. In order to fulfil the objectives of the research a number of statistical methods are used to analyse the data. These methods are:

- Descriptive statistics: frequency and mean
- Mann Whitney and Wilcoxon tests

- Exploratory Factor Analysis
- Structural equation modelling

The following discussion explains the reasons behind using each of these techniques.

6.9.1 Descriptive statistics: Frequencies and mean

Descriptive statistics can be defined as those methods concerned with the collection, presentation, and characterisation of a set of data in order to describe the various features of that set of data (Berenson and Levine, 1999). According to De Vaus (1996), frequency distributions count how many people give particular answers to each question. Frequencies and means are used to describe the characteristics of the responding firms. For example frequencies and statistical means were calculated for those questions measuring attributes of sophistication of costing systems and to describe cost bases according to their importance in pricing/profitability analysis.

6.9.2 Mann Whitney test and Wilcoxon test

Mean differences are used to interpret the outputs from the descriptive statistics. A relatively large number of statistical tests exist to determine whether a difference between two or more groups is significant. (Hair et al., 1998; Field, 2000; Sekaran, 2000; Bryman and Cramer, 2001). Such tests mainly fall into two categories, which are parametric and non-parametric tests. In deciding which is the most appropriate type of statistical test to use for undertaking the statistical significance tests relating to the differences between two or more groups the nature of the data to be analysed plays a pivotal role. That is, whether the data is of a categorical/nominal or of a non-categorical/nominal nature and also whether or not it is normally distributed. The main rule prescribed in the statistical literature (Siegel and Castellan, 1988; Hair et al., 1998; Bryman and Cramer, 2001) is that a parametric test can be used under two conditions. These are that the level or scale of measurement is of equal interval or ratio scaling and the distribution of the population scores is normal. However, if the data fails to satisfy these conditions then the cautious decision should be to employ non-parametric statistical tests.

The comparisons used in this research include those between manufacturing and non-manufacturing organisations and price makers and price takers based on data of an ordinal/non-categorical nature using ordinal Likert scales. In these circumstances it is appropriate to use non-parametric statistical tests. Therefore, the Mann Whitney test

was employed since it is the recommended non-parametric test for two unrelated. The Wilcoxon test is also used in situations in which two sets of scores are compared. It is equivalent to the Mann Whitney test for repeated measures data (Field, 2000).

6.9.3 Exploratory factor analysis

Exploratory Factor Analysis (EFA) is conducted in order to identify and extract the underlying conceptual dimension(s) or component(s), which emanate from each of the constructs used, developed and designed by this research. According to Hair et al. (1998), factor analysis is a class of multivariate statistical technique whose main objective is to define the underlying structure in the data matrix. It addresses the interrelationships between variables by defining a set of common underlying dimensions (Hair et al., 1998). Once these dimensions are determined, two main uses for factor analysis can be achieved. They are summarisation and data reduction. Summarisation refers to the process of describing the data in much smaller number of variables whereas data reduction describes the process of calculating the score for each underlying dimension and substituting them for the original data.

Explanatory factor analysis was used to extract the factors from each construct used and it is developed in this study according to the criterion presented in Chapter 8 using the composite scores from summated scales (subject to them meeting the requirements of reliability tests). The factor analysis employed is the principal component factor analysis method along with varimax rotation.

6.9.4 Structural equation modelling

Structural equation modelling (SEM) was utilised to test the hypothesised relationships based on the output of the factor analysis. SEM is a multivariate technique combining aspects of multiple regression (examining dependence relationships) and factor analysis (representing unmeasured concepts-factors with multiple variables) to estimate a series of interrelated dependence relationships simultaneously (Hair et al, 1998). SEM is a model-based approach to multivariate data analysis that consists of both a measurement model and a structural model (Hoyle, 1995).

The measurement model specifies relationships between the observed measures and latent variables or constructs (Byrne, 1995; Medsker et al., 1994). Confirmatory factor analysis (CFA) is utilised in the measurement model to establish the loading of each

measured variable on the latent variable. Hair et al. (1998) noted that CFA is useful in the validation of scales for the measurement of specific constructs. The structural model involves the evaluation of the hypothesised relationships between the constructs. A regression equation in the context of SEM is called a structural equation, and the parameter, a structural parameter (Bentler, 1995). Structural parameters are equivalent to coefficients in a multiple regression model but they are considered to have more theoretical meaning than ordinary regression weights since they account for the measurement error in the variables. In contrast, ordinary regression coefficients can be affected by the amount of measurement error. In summary, SEM represents a logical coupling of regression and factor analytic approaches (Maruyama, 1998) and allows for simultaneous analysis of the measurement and structural models. SEM is usually accompanied by some kind of path diagram that provides a representation of the research model. Different symbols for constructing a complete path diagram for SEM can be used (Byrne, 1994; MacCallum, 1995). The primary components of a path diagram that represent the structural equation model are:

- Rectangles are used to indicate observed or measured variables,
- Ellipses are used to indicate latent variables.
- Straight arrows (single headed) represent a directional relationship (the regression coefficient), curved arrows (double headed) depict two directions and indicate a non-directional association (i.e. correlation) (Hoyle, 1995),

In addition, it should be noted that two types of arrows labelled E and D are accompanied with the endogenous variables. E represents error term related to the observed variables, and D shows residual or disturbance which represents that part of the endogenous variable that is not accounted for by the linear influences of the other variables in the model (MacCallum, 1995).

There are four types of variables in EQS. Observed variables are simply variables that are directly measured (MacCallum, 1995), while latent variables are unobserved variables implied by the covariances among two or more indicators (Hoyle, 1995). An exogenous variable is one that does not receive a directional influence from any other variable in the system whereas an endogenous variable is one that receives a directional influence from some other variables in the system (MacCallum, 1995).

According to Hoyle (1995) relations between variables, observed or latent, in structural equation models are of three types:

1. Association is a relation between two variables treated within the model as non-directional; it is identical in nature to the relation typically evaluated by correlational analysis.
2. Direct effect is a directional relationship between two variables; it is a type of relation typically evaluated by ANOVA or multiple regression. Within a model, each direct effect characterises the relation between an independent and dependent variable, although the dependent variable in one direct effect can be the independent variable in another.
3. Indirect effect is the effect of an independent variable on a dependent variable through one or more intervening or mediating variables.

However, SEM applications involve several steps⁶ including:

- Model specification refers to the specification of the proposed model to be estimated and the pattern of relationships among the variables.
- Identification refers to the ability of the model to generate estimates. The model is identifiable and therefore its parameters can be estimated if the number of free parameters to be estimated is less than or equal to the number of observed variables or indicators. The model then is said to be over identified or just identified respectively.
- Estimation refers to the estimation techniques that are used in SEM. Several estimation techniques are available in SEM including weighted least squares (WLS), generalised least squares (GLS) and asymptotically distribution free (ADF). They are usually used when the assumption of multivariate normality is not met. However, maximum likelihood technique of estimation is the most commonly used approach in SEM, particularly when the assumption of multivariate normality is met. In addition, extensive research (e.g. Chou and Bentler, 1995; Hoyle and Panter, 1995) has also found ML to be quite robust to the violation of normality.

⁶ For an extensive discussions on SEM application steps, see Schumacker and Lomax (1996).

- Testing fit involves interpreting model fit or comparing fit indices to determine if the data fits the theoretical model. Several indices and methods are available to evaluate the model goodness-of-fit in SEM (Medsker et al., 1994, Chau, 1997). The various measures of model goodness-of-fit and their recommended values used in this research are listed in Chapter 8 section 8.2.3.
- Model modification involves adjusting a specified and estimated model by either freeing parameters that formerly were fixed or fixing parameters that formerly were free. According to Hoyle (1995, p. 8):

The bases for modification typically is an inspection of parameter estimates, an evaluation of some form of the residual matrix, or in the spirit of stepwise regression, the use of statistical searches for adjustments that will result in more favourable indicators of fit.

SEM has become one of the most popular multivariate statistical tools to test the relationships proposed in research models in different disciplines including psychology, marketing and management (Medsker et al., 1994; Smith and Langfield-Smith, 2004). However, very few management accounting empirical studies have utilised SEM (e.g., Anderson and Young, 1999; Sheilds et al., 2000; Van der Stede, 2000). According to Smith and Langfield-Smith (2004) this may be due to the lack of awareness of this powerful statistical technique among management accounting researchers and/or due to the limitations of the data. For example, SEM requires a fairly large sample (recommended minimum of 100) for a reliable analysis, which is sometimes hard to obtain in management accounting research (Sharma, 2002).

Thus, in response to the growing number of calls for methodological rigour in instrument validation and model testing in management accounting research SEM was utilised in this research using the EQS 5.7 statistical software package (Bentler, 1995).

6.10 Summary

The steps undertaken to conduct this research and collect the empirical data have been explained in this chapter. The research philosophies and methodologies available for researchers were discussed. The positivistic paradigm employing a cross sectional survey methodology was considered as the most appropriate approach for conducting this research and achieving its objectives.

A questionnaire was used as a method of data collection. The questionnaire construction and pre-testing procedures have also been discussed in detail in this chapter. The research population and sampling frame has also been explained and justified. A total of 152 usable questionnaires out of 1000 were received, representing a 17% response rate. This response rate is considered satisfactory and sufficient for conducting rigorous multivariate analysis. Checking for non-response bias involved comparing early respondents (i.e. from the main survey) and late respondents (i.e. follow-up reminder responses) and the characteristics of respondents with non-respondents from the sample in terms of business sector, number of employees and annual sales turnover. No significant differences were found thus suggesting the absence of non-response bias. In addition, the issues of reliability and validity were also evaluated. Finally, the chapter concluded with a rational explanation and discussion of the statistical methods used in this research to address its objectives. The chapter provided a brief description of the structural modelling procedures that will be employed in this research. Further elaboration of the measurement model, the structural model evaluation and hypotheses testing will be provided in Chapter 8.

Chapter 7

A Description of the research findings

7.1 Introduction

7.2 General profile of respondents

7.3 Description of costing system sophistication operated by respondents

7.3.1 Indirect cost allocation

7.3.2 Number of first stage cost pools and different types of second stage drivers

7.3.3 Level of sophistication of costing system

7.4 Cost-based pricing

7.4.1 Importance of cost information for pricing decisions

7.4.2 Cost-plus pricing

7.4.3 Cost information incorporated for cost-plus pricing

7.5 Profitability analysis

7.5.1 The frequency and importance of profitability analysis

7.5.2 Cost information incorporated in profitability measures

7.6 Summary

7.1 Introduction

The analysis of results is divided into three parts: (1) the response rate and data quality (2) the description of the variables and (3) the testing of the propositions. The first part was discussed in section 6.6.3 in the previous chapter. This chapter concentrates on the second aspect. It provides descriptive statistics of all three types of dependent variables found in the survey: the level of cost system sophistication, cost-plus pricing and profitability analysis. Based on this, the analysis presented and discussed here primarily seeks to fulfill the following two objectives of the research:

1. To investigate and compare the level of sophistication of management accounting systems for product costing purposes in price-setting and price-taking organisations.
2. To appraise the incidence, nature and role of profitability analysis and to ascertain the information that is used/extracted from within the profitability analysis for attention-directing and decision-making purposes.

The final part of the analysis investigates the relationship between these dependent variables and contextual factors as proposed in Chapter 5. It is presented and discussed in the next chapter.

7.2 General profile of respondents

In section 6.6.2 of Chapter 6 it was pointed out that the final section of the Questionnaire (Section D) 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 (Questions D8, D10). The responses are summarised in Table 7.1. It can be seen from Table 7.1 that 72% of the respondents were employed in the manufacturing sector and 28% in the non-manufacturing sector. This low proportion of non-manufacturing organisations included in this survey was expected based on the design of the mailing list. The sample omitted organisations whose objectives were not profit making. Most of the organisations within this category (e.g. hospitals, universities, municipal authorities etc.) are likely to operate in the service (non-manufacturing) sector. Also the sample selection (see section 6.4 in Chapter 6) excluded smaller companies.

Such companies are more likely to be non-manufacturing. Table 7.1 also breaks down the responses by company size. The table indicates that 31.7% of the respondents had an annual sales turnover of less than 50 million, and 20.7% had a turnover exceeding 200 million.

The respondents in section D were also asked to provide details of the cost structure of their business units into direct and indirect costs (Question D7). The responses indicate for all organisations the average direct and indirect costs were 66% and 34% respectively. Thus, direct costs are the predominant costs. This finding contradicts the assertion made by Johnson and Kaplan (1987) that indirect costs are now the dominant costs.

An analysis of total costs by business sectors is presented in Table 7.2. It shows that non-manufacturing units have the largest percentage of direct costs 68%, while manufacturing companies have an average percentage of direct costs of 65%, which contradicts the assertion made by Kaplan and Cooper (1998) that manufacturing companies have higher proportion of direct costs than non-manufacturing. A similar finding was reported by a UK study by Drury and Tayles (2000). They reported that both sectors of companies in the UK had similar direct and indirect cost structure averaging around 70% for direct costs and 30% for indirect costs. Other surveys that have focused on manufacturing companies confirm this result by reporting very similar results in terms of cost structures in the manufacturing sector direct costs and indirect costs averaged around 75% and 25% respectively of total costs (surveys in the UK (Drury et al., 1993), USA (Green and Amenkhienan, 1992), Australia (Joye and Blayney, 1990) and Belgium (Kerremans et al., 1991).

Table 7.1: Information on the respondents' business sector and annual sales turnover

	Number of cases (N)	Percentage (%)
Business sector		
Manufacturing	110	72.8
Wholesale/retail	12	7.9
Service	14	9.3
Financial and commercial	6	4.0
Other	9	6.0
Total	151	100
Annual sales turnover		
Less than £25 m	20	13.8
£26-£50m	26	17.9
£51-£75m	18	12.4
£76-£100m	17	11.7
£101-£200m	34	23.4
£201-£300m	12	8.3
Over £300m	18	12.4
Total	145	100

Table 7.2: Average cost structure as a percentage of total costs of manufacturing and non manufacturing

	Direct costs	Indirect costs
Manufacturing	65%	35%
Non-manufacturing	68%	32%

7.3 Description of costing system sophistication operated by respondents

7.3.1 Indirect cost allocation

The first section in the questionnaire was intended to gather information relating to costing systems. The respondents in Question A1 were asked to indicate whether they use direct costing and ignore indirect costs, or choose to allocate indirect costs for decision making. The data collected in this question also provided the information to identify whether the absorption costing systems consisted of arbitrary allocation bases to assign indirect costs and/or cause and affect allocation bases¹.

Approximately 30% of the firms assign only direct costs for decision making purposes, 30% assign direct costs and indirect costs using only allocation bases based on cause-and

effect relationships and, besides assigning direct and cause-and effect indirect costs, a further 40% assign indirect costs where no cause and effect allocation bases can be established. The above analysis indicates that absorption costing systems dominate (70%) but that a significant percentage of respondents also use cause-and effect allocations for decision making. Table 7.3 reflects the distribution of the types of allocations used by business sectors and sales turnover. In reviewing the table it is possible to make some preliminary observations. First, a greater proportion of the respondents in the non-manufacturing sector have used cause and effect allocations (31.7%) compared with 28% in the manufacturing sector. Information was specifically extracted for the food industry. This analysis revealed that direct costing was used by 37% of the respondents in this industry. Also, whilst 28.2% of food companies are operating absorption costing system that relies only on cause-and-effect allocations, a higher percentage 34.7% rely on arbitrary allocations.² The corresponding figures for the other manufacturing companies (excluding food companies) are 25.3%, 31% and 43.7%. However, none of the differences between the business sectors is statistically significant. Returning to Table 7.3, the data also shows that there are no major significant differences when the type of costing system is analysed by size.

Table 7.3: Analysis of costing system by business sector and sales turnover

Business sector	% Direct costing	% Absorption costing system		Total
		Cause-and effect allocations	Arbitrary allocations	
Manufacturing	34 (30.6%)	32 (28.8%)	45 (40.6%)	111
Non-manufacturing	13 (31.7%)	13 (31.7%)	15 (36.6%)	41
Total	47(30.9%)	45(29.6%)	60(39.4%)	152
Sales turnover				
<£100m	28(34.6%)	23(28.4%)	30(37%)	81
£100m-£300m	10(21.7%)	15(32.6%)	21(45.7%)	46
Over £300m	6(33.3%)	5(27.8%)	7(38.9%)	18
Total	44(30.4%)	43(29.6%)	58(40%)	145

7.3.2 Number of first stage cost pools and different types of second stage cost drivers

Cooper (1989) has stated that to capture product/service costs more accurately it is necessary to establish many different cost pools and employ many different types of

¹ Arbitrary allocations are defined in the questionnaire (see Note 1 in Appendix A) as where the allocation bases are unlikely to be the significant determinant of the indirect costs. While cause-and-effect allocation bases are defined as where the allocation base is a significant determinant influencing the variation of the costs in the long-term.

² The justification for pointing out food industry is explained in section 6.4 in Chapter 6.

second stage cost drivers. He suggests that these two factors are indicative of a higher level of cost system sophistication. The respondents were asked to indicate in Question A3 the number of cost centres that is used in the first stage of the two-stage overhead assignment procedure. Of the 110 respondents that answered this question 10% used less than 5 cost pools and only one second stage driver, and are thus using unsophisticated absorption costing systems. On the other hand 36.3% of the respondents used more than 15 cost pools. Nevertheless, Kaplan and Cooper (1998) have stressed that even if the number of cost pools deployed is large, indirect costs assignment to products/services will be inaccurate if the number of second stage cost drivers used is limited. Therefore, Question A4 asked the respondents the number of different types of cost drivers that are used in the second stage for assigning overheads to products/services. Four or more different types of second stage cost drivers were used by 37.8% of the respondents whereas 20% used only a single cost driver.

In order to provide further insights relating to the sophistication of the respondents' costing system a cross tabulation of the number of cost pools by the number of second stage cost drivers is shown in Table 7.4. The figures in the bottom right hand corner of this table reflect the more sophisticated product costing systems and those in the top left hand corner reflect the least sophisticated systems. Table 7.4 indicates that 43% (N = 47) use fairly unsophisticated costing systems involving less than 16 cost pools and less than 4 different types of cost drivers whereas the remainder (57%) use more sophisticated systems (i.e. more than 15 cost pools and 4 or more cost drivers). According to Kaplan and Cooper (1998), a simple ABC system, which is considered to be in the highest level of costing sophistication in this study is one that has 30-50 cost pools and many second stage cost drivers. Table 7.4 indicates that only 7% out of the responding organisations used more than 20 cost pools and 4 or more different types of second stage cost drivers.

The next question (A5) asked the respondents to indicate the relative percentage usage of a list of seven different types of second stage 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 7.5, which shows the average percentage usage rates. The highest average percentage usage rate was for direct labour-based methods, being 44%. Thus direct labour continues to be the predominant method despite the strong

criticisms by Kaplan and Cooper on the use of this rate, especially if direct labour constitutes a small proportion of costs. Volume-based overhead rates (i.e. the sum of rows 1 to 5) have an average percentage usage rate of 82%. The average usage for activity-based overhead rates was 12%. The average usage rate for the other category was 6%. The cost drivers entered by the respondents for this category were sales value based rate (three respondents answered with average usage of 100%), floor area occupied, asset value and standard time values.

Table 7.4: Cross tabulation of the number of cost pools by the number of different types of cost drivers

Number of cost centres	Number of cost drivers						
	1	2	3	4	5	6	7 or more
less than 5 (N = 23)	11 (10%)	6 (5.4%)	3 (2.7%)	2(1%)	1 (0.9%)	-	-
6-10 (N = 31)	4 (3.6%)	13 (12%)	5 (4.5%)	5(4.5%)	2 (1%)	-	2 (1%)
11-15 (N = 15)	2 (1%)	2 (1%)	1 (0.9%)	5(4.5%)	1 (0.9%)	-	4 (3.6%)
16-20 (N = 14)	1 (0.9%)	2 (1%)	4 (3.6%)	3(2.7%)	1 (0.9%)	-	3 (2.7%)
21-25 (N = 4)	-	1 (0.9%)	2 (1%)	1 (0.9%)	-	-	-
26-30 (N = 2)	1 (0.9%)	-	-	-	-	1 (0.9%)	-
Over 30 (N = 21)	4 (3.6%)	3 (2.7%)	3 (2.7%)	3 (2.7%)	3 (2.7%)	-	5 (4.5%)
Total (N = 110)	23 (21%)	27 (24.5%)	18 (16%)	19 (17%)	8 (7.2%)	1 (0.9%)	14 (13%)

Table7.5: Frequency and average usage of second stage cost driver rates

Overhead rates	Average percentage usage by all firms (N = 93)
1. Direct labour cost based rate	44
2. Machine hour based rate	17
3. Material cost based rate	6
4. Units produced based rate	11
5. Production or cell time based rate	4
6. Activity based cost driver rates	12
7. Other	6
Total	100

7.3.3 Level of cost system sophistication

Question A2 was used to determine the sophistication of the indirect cost assignment system. It had 8 sub-sections and the respondents were requested to indicate their opinions on the characteristics of their costing systems in terms of assigning indirect costs to products or services on a 7-point Likert scale of 1 (strongly disagree) to 7 (strongly agree). The responses are summarised in Table 7.6.

The responses from row (a) of the table (mean = 3.356) indicate that only 5.3% attached a score of 6 or 7 (strongly agree) as compared to 26% scoring 1 or 2 (strongly disagree), to the statement that the costing system is highly sophisticated and resembles a 'state of the art' system. The responses suggest that the majority of firms are using fairly unsophisticated cost assignment systems. This is partially confirmed by the results on the assertion in row (d) that the costing system can be described as being fairly simplistic, (mean = 3.542) with 32.2% scoring 6 or 7 (strongly agree) and 13.8% scoring 1 or 2 (strongly disagree). The mean score was (4.347) for the statement in row (b) that significant changes have been made to the costing systems within the last ten years in terms of the methods used for assigning indirect costs to products or services with 25% scoring 6 or 7 and 17.7% scoring 1 or 2. Given the responses to items (a) and (d) the replies to item (b) suggest that only fairly simplistic changes may have been made to improving the sophistication of the costing system. It should also be noted that the mean score (3.66) was below the mid-point of the 7-point scale on the agreement scale relating to the costing system resembling an activity-based costing systems [row (c)] with 30.9% scoring 1 or 2 and 14.4% scoring 6 or 7. This suggests that 14.4% have adopted a product costing system which represents an activity based costing system. Rows (e) and (f) of Table 7.6 report the results of the mean responses and the strength of opinion on the satisfaction and accuracy of the cost system. The mean score for satisfaction is 4.429 with 11.9% assigning scores of 1 or 2 and 29.6% scores of 6 or 7. In contrast, for accuracy 19% assigned scores of 1 or 2 and 13.2% scores of 6 or 7 (mean = 3.920). The findings suggest that even though the respondents were aware of a lack of accuracy of their costing systems and despite the observed unsophisticated costing systems the respondents tended to be satisfied with their cost systems. Assigning indirect costs using allocation bases based on cause-and effect relationships/arbitrary allocations is another indicator of

the level of sophistication of the costing system. The figures in rows (g and h) in Table 7.6 provide this information. The use of arbitrary allocations in row (g) has a mean of (3.785), with 23% scoring 6 or 7 (strongly agree) and 17.8% scoring 1 or 2 (strongly disagree). In contrast, the use of more advanced allocations (i.e. where cause and effect relationships can be established) has a mean score of (3.693) with 9.9% scoring 6 or 7 (strongly agree) and 23% scoring 1 or 2 (strongly disagree).

The correlation matrix for the items in Question A2 is shown in Table 7.7. It is observed from the table that the firms indicating that they have highly sophisticated systems also seem to be giving consistent replies in terms of making recent changes in order to improve the cost allocation methods, using ABC type systems, being satisfied with the costing methods, and describing their costing systems to be fairly accurate. (The association between the responses to questions A2b, A2c, A2e A2f with A2a show a significant positive correlation.). Furthermore, firms that indicated having a highly sophisticated systems also seem to be giving consistent replies in terms of strongly agreeing that their systems are not simple (a high negative association between A2a and A2d). It is also apparent from the table that firms that indicated that they are using some form of activity-based costing are also satisfied with the costing system, consider that the costing systems are fairly accurate and tend to agree that their costing systems are sophisticated. In addition, using cause-and-effect cost allocation (the matrix shows a positive significant correlation between A2a, A2e, A2b, A2f, A2h and A2c and a negative correlation between A2c and A2d). It should be noted that responses relating to the costing systems being considered to be fairly simple are negatively correlated with most of the responses of other items that support a high level of cost sophistication, and positively correlated with the responses on the extensive use of arbitrary cost allocation. (A negative significant correlation is found between A2a, A2b, A2c, A2f, A2h and A2d, however, the association between A2d with A2g shows a significant but positive correlation.). The correlation matrix thus suggests that firms applying simple costing systems rely on arbitrary allocations rather than cause-and-effect allocations.

The operationalisation and measurement process for the eight items “level of cost system sophistication” in Question A2 employs three types of statistical techniques³. These are: exploratory and confirmatory factor analysis, internal consistency reliability tests (i.e. Cronbach’s alpha), and the summated scale measurement techniques. Exploratory factor analysis was conducted in order to identify and extract the underlying conceptual dimension(s) or component(s), which emanate from each of the main eight items, developed and designed by this research in Question A2. The validity check using confirmatory factor analysis showed that the eight items loaded on to two factors. Questions A2d and A2g were reverse coded because high scores for questions A2 (a, b, c, e, f, h) support the high levels of cost system sophistication whereas the reverse applies with Questions A2d and A2g. The factor loadings were rotated using the Varimax rotation. Two main factors (with factor loadings exceeding the loading of 0.45 that is recommended by Hair et al. (1998) for a sample size of 150) accounting for 52.42% of the total variance were extracted. The first component in the factor analysis included items (e, f, c, h) shown in Table 7.8 and the second items (a, b, d and g). Because the first component loads on to questions relating to resembling an ABC system such as the extent to which the cost system resembles an ABC system, the use of cause-and-effect allocations and the accurate assignment of indirect costs it is labeled ‘the extent to which the costing system resembles an ABC system’. In contrast, the second dimension tends to relate to questions indicating the extent that the costing system resembles a simplistic or more sophisticated system. Because of the second dimension included more general and less specific ABC type questions it is labeled ‘the extent to which the costing system resembles a complex costing system.’

Applying the internal consistency reliability test, results in a Cronbach Alpha of 0.64 for the items within the first factor and 0.63 for the four items (a, b, d, g) making up the second factor. Both measures exceed the recommended minimum acceptable level for Cronbach’s alpha of 0.60 suggested by Hair et al. (1998). The final stage described above is to use a summated scale for all the items incorporated within each of the two factors. Therefore, the summated scale representing a new variable / factor, using the average

³ Sections 2.5, 6.6.2 explain in detail how each of the eight “cost level sophistication” constructs were operationalised and measured, through conceptually developing the items measuring each of them from the relevant extant literature.

score (Hair et al., 1998)⁴ is used to measure the level of cost system sophistication. The discussion in section 2.3 Chapter 2 indicated that more sophisticated costing systems include a greater number of first stage cost pools and a greater number of different types of second-stage drivers. To ascertain the extent to which the above two factors/dimensions captured these attributes the correlations for the summated scores for both factors were derived by ascertaining the extent to which they were correlated with the responses to questions A3 (number of cost pools) and A4 (number of different types of cost drivers). The second factor was not significantly correlated with the responses to either question but the first factor was significantly correlated ($p < .05$) with both the number of cost pools ($r = .197$) and the number of different types of cost drivers (.301). The correlations thus provide strong support for the use of the first factor (the extent to which the costing system resembles an ABC system) but do not provide support for the second factor (the extent to which the costing system resembles a complex costing system) in terms of being a good measure of cost system sophistication.

Question A6 was used to indicate the extent of agreement on the use of cost data. Table 7.9 indicates that cost data is an extremely important factor in pricing decisions and had the highest mean ranking on the scale (5.806). The second most important ranking was for cost data must be highly reliable to compete in the markets with a mean score of (5.73). Although the respondents appear to be aware of the importance of accurate cost data they admitted in question A2f that their costing systems may not be accurately assigning indirect costs to products. The third most important was that cost data is extremely important for cost reduction efforts a mean score of (5.68). It should also be noted that 44% of respondents strongly agreed with the statement that decisions are based on 'strategic reasons' rather than cost issues (A6f). However, the responses to Question A6e showed that 30% of the respondents strongly agree that many special cost studies are performed.

The correlation matrix (Table 7.10) for the sub-questions of A6 indicated that there is a significant positive correlation between most of the responses. The highest correlation ($r = 0.587$) relates to the strong association between the responses that cost data is an extremely important factor in making pricing decisions (Q6c) and that cost data must be

⁴ Note that the rationale for using these statistical techniques is explained in Chapter 6 section 6.9.3 .

accurate (Q6a). This response provides some support for the assertions made in this thesis that firms using cost information for pricing decisions may have a greater need for more accurate product costs. However, there is a significant negative correlation of (-0.178) between questions A6d and A6f suggesting that firms indicating that cost data is extremely important for product mix/discontinuation decisions are less likely not to base their decisions mainly on strategic reasons rather than cost issues. Conversely, those respondents not agreeing with the statement that cost data is extremely important for product mix/discontinuation decisions appear to be more likely to support the statement that these decisions tend to be based more on strategic reasons.

A distinctive contribution of this study is that it compares the level of sophistication of product costing systems for product costing purposes in price-setting and price-taking organisations. This is the first objective of the study listed in section 1.5 of Chapter 1. Therefore, Question C2 asked respondents about the extent of power they have in setting prices. With this question the respondents could vary their answer from (1 strongly disagree) to (7 strongly agree). A respondent that fully agrees with the statement in row (a) is considered to be indicating that his/her firm represents a price maker whereas a similar response in row (b) is considered to represent a price-follower firm. In total 149 respondents answered this question. Table 7.11 gives an overview of the frequencies. About 31% of respondents strongly indicate that they can be considered to be price followers by scoring 6 or 7 to row (b), while 24% strongly indicate that they are more price-setters scoring 6 or 7 to row (a). However, the majority of firms (approximately 47%) attached a score of 3, 4 or 5 to rows (a) and (b) indicated that they are somewhere in between. This suggests that they have some market power, but do not consider themselves to be market leaders.

Based on this, and in order to achieve the above mentioned objective, the “Mann-Whitney test” was employed⁵. This test detects whether there are statistically significant differences between two groups, which are in this case the responses collected from price makers and price following firms. In this way, the test employed here detects whether there is a statistically significant difference between the two groups (i.e. the respondents

⁵ Note that the rationale for using this test is explained in Chapter 6 section 6.9.2.

scoring 4 or more to items C2a and C2b), in terms of each group's response to the two dimensions characterising the level of cost system sophistication, which are:

1. Factor 1: the extent to which the costing system resembles an ABC system by a summed variable measured by the items (e, c, h, f).
2. Factor 2: the extent to which the costing system resembles a complex costing system by a summed variable measured by the items (a, b, d, g).

The results arrived at from conducting the Mann-Whitney Test show that the two groups of firms significantly differ, in terms of the second dimension. It can be seen from Table 7.12 that the mean representing this factor is clearly higher in the case of price makers, compared with price followers. The findings therefore suggest that price makers generally have more sophisticated costing systems than followers when the level of cost system sophistication is measured in terms of a scale ranging from the extent to which the costing system resembles a complex costing system. However, if cost system sophistication is measured in terms of the first factor/dimension (the extent that ABC type systems are employed) then there are no significant differences in the level of sophistication between the two groups. A possible reason for this is that only a small percentage of firms has implemented ABC systems so that most firms are clustered within a non-ABC category resulting in the measurement scale failing to distinguish between price makers and price followers.

The Mann-Whitney test was also used to ascertain if the extent to which the costing system resembles an ABC system and the extent to which the costing system resembles a complex costing system (the two dimensions representing level of cost system sophistication) are the same for manufacturing and non-manufacturing companies. The results indicated that there is a significant difference between manufacturing and non-manufacturing in terms of the first dimension (Table 7.13). The analysis suggests that service companies consider that cost information should be suitable and accurate; therefore they tend to apply more sophisticated costing systems such as ABC or a costing system that rely on cause-and-effect allocations. This is consistent with Drury and Tayles (2000) which suggest that service companies are more likely to implement ABC systems. They reported that 51% of the financial and service organisations surveyed compared

with 15% of manufacturing organisations, had implemented ABC. Innes et al. (2000) also noted that firms in the financial sector continue to have significantly higher adoption rates. In terms of the second dimension of cost system sophistication (the extent to which the costing system resembles a complex costing system) the non-manufacturing sector also had a higher mean sophistication score but this was only significant at the 10% level. However, when comparing food manufacturers with other manufacturers the results indicated no differences in terms of both dimensions of cost system sophistication.

Table 7.6: Level of cost system sophistication

	N	Mean	% rating 1, 2	% rating 3, 4, 5	% rating 6, 7
(a) The costing system is highly sophisticated and resembles a 'state of the art' system.	115	3.356	26.3	44.0	5.3
(b) Significant changes have been made to the costing system within the last 10 years in terms of the methods used for assigning indirect costs to products or services.	115	4.347	17.7	32.9	25.0
(c) The costing system can be described as resembling an activity-based costing system.	115	3.660	30.9	30.3	14.4
(d) The costing system can be described as being fairly simplistic.	115	3.542	13.8	29.6	32.2
(e) We are satisfied with the costing methods used for assigning indirect costs to products or services for decision-making purposes.	115	4.429	11.9	33.6	29.6
(f) The costing system accurately assigns indirect cost to products or services for decision-making.	115	3.920	19.0	42.2	13.2
(g) Significant use is made of arbitrary cost apportionments to allocate costs to cost centres when computing overhead recovery rates	115	3.785	17.8	32.8	23.0
(h) Significant use is made of cause-and-effect allocations or direct charging to allocate costs to cost centres when computing the overhead recovery rates	115	3.693	23.1	40.2	9.9

Table 7.7: Spearman correlation matrix for the cost system sophistication measures

	A2a	A2b	A2c	A2d	A2e	A2f	A2g
A2a. The costing system is highly sophisticated							
A2b. Significant changes have been made to the costing system within the last 10 years	0.443**						
A2c. The costing system can be described as an activity-based costing system.	0.323**	0.417**					
A2d. The costing system is fairly simplistic.	-0.617**	-0.331**	-0.286**				
A2e. We are satisfied with the costing methods used for assigning indirect costs	0.318**	0.239*	0.270**	-0.155			
A2f. The costing system accurately assigns indirect costs	0.375**	0.320**	0.329**	-0.198*	0.654**		
A2g. Significant use is made of arbitrary cost apportionments	-0.177	-0.128	-0.097	0.273**	-0.070	-0.041	
A2h. Significant use is made of cause-and-effect allocations	0.144	0.144	0.258**	-0.240*	0.197*	0.276**	-0.076

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 7.8: Exploratory factor analysis for cost system sophistication

Items and measures description	Factor 1	Factor 2
A2f. The costing system accurately assigns indirect costs	.868	
A2e. We are satisfied with the costing methods used for assigning indirect costs	.813	
A2c. The costing system can be described as an activity-based costing system.	.497	
A2h. Significant use is made of cause-and-effect allocations	.453	
A2d. The costing system is fairly simplistic.		.820
A2a. The costing system is highly sophisticated		.731
A2g. Significant use is made of arbitrary cost apportionment		.590
A2b. Significant changes have been made to the costing system within the last 10 years		.502

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

Rotation converged in 3 iterations

Table 7.9: The use of cost data

	N	Mean	% rating 1,2	% rating 3, 4,5	% rating 6 or 7
(a) The cost of products or services must be accurate to compete in our markets.	151	5.735	3.3	22.5	74.1
(b) Cost data are extremely important because of cost reduction efforts.	151	5.682	3.9	26.5	69.5
(c) Cost data are an extremely important factor when making pricing decisions.	150	5.806	3.3	27.3	69.4
(d) Cost data are extremely important when making product mix or discontinuation decisions.	150	5.360	7.3	35.3	57.3
(e) The business unit performs many special cost studies.	151	4.457	14.6	55	30.5
(f) The decisions specified in (d) above tend to be based more on 'strategic reasons' rather than cost issues.	150	4.993	6	50	44

Table 7.10: Spearman correlation matrix for the use of cost data

	A6a	A6b	A6c	A6d	A6e
A6a. Costs of products/services must be accurate to compete in markets	1.00				
A6b. Cost data are extremely important for cost reduction effort	0.447**	1.00			
A6c. Cost data are extremely important for pricing decisions	0.587**	0.253**	1.00		
A6d. Cost data are extremely important for product mix/discontinuation decisions	0.347**	0.326**	0.362**	1.00	
A6e. Many special cost studies are performed	0.229**	0.393**	0.357**	0.305**	1.00
A6f. Decisions specified in (d) are based on strategic reasons rather than cost issues	-0.94	0.128	-0.91	-0.178*	-0.012

Table 7.11: Degree of power in setting prices (price maker/price follower)

	N	Mean	% rating 1, 2	% rating 3, 4, 5	% rating 6, 7
(a) Price-maker	149	3.979	28.2	47.6	24.2
(b) Price-follower	149	4.236	21.7	47.2	31.1

Table 7.12: The mean differences between price maker and follower in terms of level of cost system sophistication dimensions

Level of cost system sophistication		N	Mean	Standard Deviation	P-value 1-tailed
Factor 1	Price maker	56	4.0129	1.25	0.314
	Price follower	55	3.7697	1.10	
Factor 2	Price maker	57	3.9547	1.33	0.048
	Price follower	55	3.4848	.89	

Table 7.13: The mean differences between manufacturing and non-manufacturing in terms of level of cost system sophistication dimensions

Level of cost system sophistication		N	Mean	Standard Deviation	P-value 1-tailed
Factor 1	Manufacturing sector	83	3.742	1.18	0.005
	Non-Manufacturing sector	33	4.439	1.13	
Factor2	Manufacturing sector	82	3.630	1.12	0.095
	Non-Manufacturing sector	33	4.027	1.22	

7.4 Cost-based pricing

In some organisations established selling prices will exist and a firm will have little or no influence on the prices of products or services. In contrast, other organisations have a significant influence in determining the selling prices arising from factors such as being the market leader or selling products/services that are highly customised. The findings in the previous section suggest that a price maker firm is more likely to maintain sophisticated costing systems. Questions C1, C4, C5 and C7 relate to the use of cost information for pricing purposes. Responses to these questions were analysed as shown in the following sub-sections.

7.4.1 The importance of cost information for pricing decisions

The respondents in Question C1 were asked to assign a score between 1 and 7 to three different price determinants (cost information, competitors' prices, and customer behaviour i.e. demand), with 1 indicating strongly disagree (i.e. least important) and 7 strongly agree (i.e. most important). In total 150 companies answered this question. For each price determinant an average score was calculated. The higher the average score of a price determinant, the higher the importance in pricing decisions. Table 7.14 shows the frequency of the replies. The table indicates that respondents consider multiple factors when determining the selling prices. The responses to Question A6c indicated that cost information was considered to be an extremely important factor when making pricing decisions but the responses to Question C1 indicate that in general firms are more market than cost oriented in pricing decisions. The mean scores were respectively 5.526 and 5.233 (with 58.7% and 54% strongly agreeing by scoring 6 or 7) for rows (b) and (c) for competition-based pricing and customers' ability and willingness to pay. In contrast, the mean score for cost information as the determinant factor in pricing was 4.38 with 30.7% scoring (6 or 7) and 20% scoring (1 or 2). These findings contradict the conclusions of

other surveys, namely the importance of the cost information in pricing decisions (Skinner, 1970; Skinner and Atkin, 1975; Mills, 1988; Shim, 1993) which claimed that costs were more influential in pricing decisions than market information. The replies to Question C3 on the extent to which the organisations use estimates of demand for different possible selling prices when determining the selling price confirmed the results of C1c by which 61.7% of respondents entered a score at or above the mid point in terms of the use of demand estimates for pricing decisions.

Table 7.15 shows the relative importance of each strategy (i.e. factor). If a strategy was dominant over the other strategies it is included in the first three lines. "Dominant" in this case is defined as the strategy having a larger weight (score) than any of the other strategies mentioned in respect of the responses to question C1. If the same weight is given to the three strategies it is included in the fourth line. If a high score was given to both competitive and demand factors to be considered when deciding the price it is shown in line (e). It is clear that pricing strategies were used by the respondents in different ways and in different combinations. For the dominant strategy cost-based pricing and competition based pricing both had an equal number of total mentions (21.5%) compared with 19% for demand-based pricing. However, the distribution in the table shows that demand-based pricing is also used jointly with competition-based pricing with 24.8% of the respondents scoring an equal but higher score (4 or above) than the cost-based one, which explains the higher importance weight data for both of them in Table 7.15.

When comparing items (a) with those for items b, c and e (i.e. those not considering cost to be a dominant factor) in terms of cost system sophistication the Mann Whitney test showed a significant difference in terms of the first dimension ($p < .05$) and the second dimensions at the 10% significance level ($p = .059$). Table 7.16 implies that firms that regard cost information to be more important than market information when setting prices have higher level of cost system sophistication. For every price determinant an average score was calculated per business sector. Table 7.17 suggests that cost information is considered to be a major factor in determining selling prices in both sectors (manufacturing/ non-manufacturing) with mean scores for both sectors above mid point (4.238, 4.756). When comparing both frequency distributions, the non-manufacturing

industry appears to focus more on cost data than the manufacturing sector. The manufacturing sector appears to be more market oriented with mean scores respectively of 5.642 and 5.321 for competition and demand factors compared with 5.219 and 5.0 for the non-manufacturing. The Mann-Whitney test was applied to ascertain whether there were statistically significant responses to each of the three questions for each sector. The results were not significant at the 5% level. A comparison of the food industry with the other industries also indicated no significant differences.

Table 7.14: Important factors in pricing

Pricing Strategies	N	Mean	% rating 1, 2	% rating 3, 4, 5	% rating 6, 7
(a) Cost-based pricing	150	4.38	20	49.3	30.7
(b) Competition-based pricing	150	5.526	2.6	38.7	58.7
(c) Demand-based pricing	150	5.233	8	38.1	54

Table 7.15: Relative importance of pricing strategies

	Frequency	Percent
(a) Cost information is the dominant factor	32	21.5
(b) Competitors' prices is the dominant	32	21.5
(c) Demand information is the dominant factor	29	19.5
(d) Same weight is given to the three factors	19	12.8
(e) larger weigh is given to (b) + (c)	37	24.8
Total	149	100

Table 7.16: The mean differences between cost based and market based pricing in term of level of cost system sophistication

Level of cost system sophistication		N	Mean	Standard Deviation	P-value 1-tailed
Factor 1	Cost information is the dominant factor in pricing	22	4.51	1.237	0.012
	Other factors (competition, demand) are dominant over cost	91	3.73	1.113	
Factor2	Cost information is the dominant factor in pricing	21	4.16	1.258	0.059
	Other factors (competition, demand) are dominant over cost	91	3.59	1.106	

Table 7.17: The importance of price determinants in manufacturing and non-manufacturing

Pricing strategies	Manufacturing				Non-manufacturing			
	Mean	1,2	3,4,5	6,7	Mean	1,2	3,4,5	6,7
(a) Cost-based pricing	4.238	24 (22.01%)	57 (52.29%)	28 (25.25%)	4.756	6 (14.63%)	17 (41.46%)	18 (43.90%)
(b) Competition-based pricing	5.642	1 (0.91%)	43 (39.44%)	65 (59.63%)	5.219	3 (7.31%)	15 (36.58%)	23 (65.09%)
(c) Demand-based pricing	5.321	9 (8.25%)	39 (35.77%)	61 (55.96%)	5.0	3 (7.3%)	18 (43.90%)	20 (48.78%)

7.4.2 Cost-plus pricing

Questions C4, C5 and C7c asked respondents about the specific use of cost-plus pricing, which is defined as setting the price at a point that seeks to provide a specified percentage profit margin over costs. In Question C7c the respondents were asked to indicate the extent of use of cost-plus pricing on a seven point scale ranging from 1 (not at all) to 7 (to a considerable extent). Of the respondents answering this questions (N=141) 50% scored at or above the mid point of the scale, which is lower than the 65% usage reported by Guilding et al. (2005) in a survey on UK firms. A possible explanation for the lower percentage in this study is that in Question C7c the respondents were asked about the use of this pricing strategy for determining the selling price specifically for their *major* products or services. This is supported by another finding of Guilding et al.'s study that a substantial number of companies are using cost-plus pricing for a relatively small sub-set of products and services. Respondents may be using cost-plus pricing, but may be not necessarily using it for pricing their main products. A comparison of cost-plus pricing between the service sector (51% at or above the mid-point of the 7-point scale) and the manufacturing sector (48%) indicated that there was no significant difference between the two sectors. Relatively fewer firms in the food industry (45.4%) compared with the other industries (50%) used “cost-plus” for price setting. However, the difference is not significant at the 5% level.

In Question C4 firms were asked to indicate the proportion of their organisation's external sales that use a cost-plus approach in price setting. Responses were recorded on a 7-point ordinal scale that corresponded to seven percentile ranges.⁶ Although respondents regard cost-plus pricing as important, it appears that a fairly large proportion of companies use cost-plus pricing for a small sub-set of their total sales. 61.3% of the respondents entered a score below mid point (i.e. less than 30% of the organisation sales). An explanation for this observation might be that market-based pricing strategies require more time and are therefore applied to the firm's more important products, leaving cost-plus pricing for the less important products. It is pertinent to note that with respect to Table 7.18, the non-manufacturing sector seems to use cost-plus pricing for a greater proportion of its sales with 30.5% of respondents indicating that cost-plus pricing is applied to more than 70% of their sales. The corresponding figure for the manufacturing sector is 16.9%. In terms of the food industry a high percentage of respondents from this industry (23%) are using cost plus pricing for pricing most of their products (over 70% of their sales) compared with only 13% for the other respondents. However, the mean differences were not significant at 5% for all of the above comparisons.

Surprisingly the cost-plus method was considered to be slightly more popular among price followers (Horngren et al., 2005, Drury, 2004). When the data were split over price-followers versus price-setters it becomes apparent that 47% of the price setters use the cost-plus method, while this is true for 50% of price followers. This difference between groups is not significant at the 5% level, indicating that price setters do not differ significantly in the use of cost-plus than price followers.

Instead of using cost-plus pricing whereby cost is used as the starting point to determine the selling price, target costing is the reverse of this process (Drury, 2004). The respondents in Question C8 were given a definition of target costing and were asked to indicate the extent of its usage. Of the 134 respondents that answered this question 39.4% use some form of target costing scoring 4 or more on the measurement scale. The mean score was (3.26) which is below mid point with 44.1% scoring 1 or 2 and 17.2% scoring 6 or 7. The Mann-Whitney test was used to ascertain if the extent of usage is different

⁶ "1" corresponded to 0%-10%, "2" corresponded to 11%-20%, "3" corresponded to 21%-30%, "4" corresponded to 31%-40%, "5" corresponded to 41%-50%, "6" corresponded to 51%-70%, and "7" corresponded to "Over 70%."

across both sectors (manufacturing and non-manufacturing). Although, it was thought that target costing is most popular among manufacturing companies the results of the comparison were not significant at the 5% level. The Mann-Whitney test also showed no significant differences when the use of target costing is analysed by size (companies with annual sales turnover of less than 50 million and those of more than 300 million).

Table 7.18: Cross industry analysis of the proportion of sales that use a cost-plus approach in price setting

	Mean	SD	1(low)	2	3	4	5	6	7(high)
Manufacturing	3.207	2.312	39 (36.7%)	16 (15%)	12 (11%)	6 (5.6%)	7 (6.6)	8 (7.5%)	18 (16.9%)
Non-manufacturing	3.750	2.578	11 (30.5%)	6 (16.6%)	3 (8.3%)	1 (2.7%)	2 (5.5%)	2 (5.5%)	11 (30.5%)

7.4.3 Cost information incorporated for cost plus pricing

Question C5 examines the use of different cost bases that may be used for driving the 'cost' for adding the margin to determine the cost-plus selling price. This question takes account of the fact that respondents may use different costs in different situations when using cost-plus pricing. In total 102 respondents answered this question thus confirming that 72% of all respondents used cost plus pricing for some of their products/services. The responses to question C5 are presented in Table 7.19. Row (a) examines the use of direct variable costing and indicates that 31.5% attached a score of 6 or 7 on the agreement scale. Further analysis indicated that 50.4% of the respondents attached a score above the mid point of the measurement scale. The table also indicates that another form of direct costing (i.e. direct variable and fixed costs) is used in pricing but not as extensively as direct variable costing. Row (b) show that only 11% of the respondents scored 6 or 7. Item (c) of question C5 focused on the extent to which only direct costs plus cause-and-effect allocations were used. The mean score was 2.775 indicating that the extent of average usage was significantly lower than moderate extent (labeled 4 on the 7-point scale). Items (d) and (e) of question C5 relate to the extent to which some form of full absorption costing is used involving arbitrary allocations of most (item d) or all costs (item e). There is little difference between the two items but it was considered appropriate to provide both full costing options so that the respondents could choose which option specified approach that they used. The responses indicate that full costs

(involving the assignment of all costs) is the most widely used absorption costing method (mean = 3.128 and 25.7% assigning a score of 6 or 7)

Table 7.19: Cost bases used in pricing

	N	Mean	% rating 1, 2	% rating 3, 4, 5	% rating 6, 7
(a) A profit margin is added to direct variable costs (i.e. excluding fixed costs and the assignment of any indirect costs)	108	3.638	44.5	24.1	31.5
(b) A profit margin is added to a cost comprising of direct variable and direct fixed costs (i.e. excluding the assignment of any indirect costs)	107	3.0654	44.8	43.9	11.2
(c) A profit margin is added to a cost comprising of row (b) above plus only those indirect costs that are assigned to products or services using cause-and-effect allocations (i.e. where the allocation base significantly influences the variation of costs in the long-term)	107	2.775	56.1	31.7	12.1
(d) A profit margin is added to a cost comprising of row (c) above plus a further addition for those indirect costs that have been assigned using arbitrary allocation bases (i.e. the bases are unlikely to be the significant determinants of the indirect costs).	108	2.435	64.8	27.8	7.4
(e) A profit margin is added to a cost base that attempts to assign a fair share of <u>all</u> organisational costs (i.e. a full cost is used)	109	3.128	56	18.4	25.7

It is apparent from Table 7.19 that more than one cost base is used for cost-plus pricing but none of them have a mean score in excess of the moderate extent score of 4. The responses tend to confirm that market factors are more important than cost factors in making pricing decisions (see section 7.4.1). Table 7.19 is difficult to interpret because the different cost bases tend to be significantly correlated with each other. For example, rows (d) and (e) ($r = .423$; $p < .01$) and (a) and (b) ($r = 0.28$; $p < 0.01$) are positively correlated. The correlation matrix did, however, reveal that the use of both direct costing methods (rows a, and b) were significantly negatively correlated with row (e) consisting of the allocation of all costs ($r = -0.421$ for (a) and (e) and -0.245 for (b) and (e) and $p < 0.05$). This suggests that the greater the extent that a direct costing approach is used the lower the likelihood is that a full costing absorption costing method is used. This was

confirmed by an examination of the individual responses. Respondents generally relied on using either a direct costing method or an absorption costing method and tended not to indicate that they extensively used both direct costing and absorption costing approaches as a cost base. To provide greater insights to the responses to Question C5 the responses with the highest score for a direct costing method (rows a, and b) and those for a full absorption costing method (rows d and e) were extracted. For example, if scores of 5 were assigned to row (a) and (7) to row (b) a variable for the highest score for a direct costing was established with a score of 7. The same approach was used for a variable named ‘highest score for a full absorption costing method.’ The results were as follows:

Table 7.20: The use of direct/cause-and-effect allocations/full costing in pricing

	Mean	% rating 1,2	% rating 6,7
Direct costing method (highest score for C5a or C5b)	4.22	29.3	37.6
Direct costing plus cause-and-effect allocations	2.775	56.1	12.1
Full absorption costing method (highest score of C5d or C5e)	3.422	47.7	26.6

The above table indicates that a direct costing measure appears to be the most widely used measure for determining the cost base for using cost-plus pricing. To ascertain whether there was any statistically significant differences in the responses the Wilcoxon matched pairs test was used⁷. The results indicated that a direct costing measure was used to a significantly greater extent than a full absorption costing measure ($p=0.03$) and that direct costing plus cause-and-effect allocations were used to a significantly less extent compared with a direct costing measure ($p=.00$) or a full absorption costing measure ($p=0.01$).

When comparing the mean scores for the different cost bases used for cost-plus pricing between manufacturing and non-manufacturing companies, the mean differences were not significant for all of them at 5%. The food industry, however, had a higher usage of direct variable cost based pricing (row a), and less reliance on full costing including all organisational costs (row e) than other industries. The mean scores for these two items

⁷ Note that the rationale for using this test is explained in Chapter 6 section 6.9.2.

were 4.45 (row a) and 2.60 (row e). The Mann Whitney test showed significant differences at the 5% level.

7.5 Profitability analysis

A distinctive feature of the research is that rather than focusing on the information that is accumulated within the costing system it focuses primarily on the information that is extracted for different purposes (i.e. cost-plus pricing, and profitability analysis). The following sub-sections seek to address the second objective listed in section 1.5 of Chapter 1 by reporting the findings relating to information that is contained in profitability reporting generated for managing the existing mix of a firm's activities. In particular, it focuses on the role of profitability analysis and the information that is extracted from the costing system as the input for the most important attention-directing profitability measures. Issues relating to this objective were examined in Section B of the questionnaire. The responses are analysed in the following sub-sections.

7.5.1 The frequency and importance of profitability analysis

Question B1 examined the frequency of routine profitability analysis. The responses (see Table 7.21) indicated that an extremely high percentage of the organisations 86.7% analysed profits by products and services on a monthly or quarterly basis. Only 7.2% of the respondents did not routinely analyse profits by products/services categories. It is apparent that organisations analyse profits by both product and service categories very often. This is supported by the strong agreement relating to the importance of periodic profitability analysis in signaling the need to make key decisions (Question B2). This question had a mean score of 5 (see Table 7.22) with 44% of the responses indicating a score of 6 or 7 (important and vitally important). This result was robust across the two sectors and at the individual food industry level. A similar result was reported by Chenhall and Langfield-Smith (1998) which suggests that companies are placing increasing emphasis on profitability analysis. Product profitability analysis was ranked third out of 43 management accounting practices in the Chenhall and Langfield-Smith study.

It was argued in section 3.4.1 in Chapter 3 that in price taking firms it was expected that cost-plus pricing is likely to be limited. In such firms it is to be expected that cost

information is viewed primarily as a key factor to be considered when attempting to optimise the output and mix of products and services in light of the prevailing market prices. When splitting the data over price makers and price takers, it becomes evident that slightly more companies describing themselves as price takers (85%) attach higher importance to the use of periodic profitability analysis compared with price makers (82%) but this difference is not statistically significant.

Table 7.21: Frequency of profitability analysis

	Monthly or quarterly	six months	annually	more than one year	Not routinely analysed
The frequency with which organization routinely analyses profits.	130 (86.7%)	3 (2%)	5(3.3%)	1 (0.7%)	11 (7.2%)

Table 7.22: Importance of profitability analysis

	N	Mean	% rating 1, 2	% rating 3, 4, 5	% rating 6, 7
The importance of profitability analysis in signaling the need to make key decisions relating to product/service mix or discontinuation decisions.	149	5	8	47.7	44.3

7.5.2 Cost information incorporated in profitability measures

It is apparent from section 3.4.1.3 in Chapter 3 that the potential exists for the profitability analysis to incorporate several different profitability measures and that organisations may rely on more than one measure to examine product/service profitability. The respondents were therefore asked to specify the extent of usage of a list of profitability measures that may be used for attention directing device. The respondents were also given the opportunity to incorporate other chosen measures if they did not conform to the measures in the list. It can be seen from Table 7.23 that organisations use several profitability measures for attention-directing purposes. The highest percentage of respondents ranked sales less direct or variable costs (contribution) as the most important measure, the mean score was 5.0 with 51% scoring 6 or 7 (to a considerable extent) and 14.5% scoring 1 or 2 (i.e. not at all). The responses to row (b) show a mean score of (4.186) for the use of sales revenues less direct variable and direct fixed costs with 26% scoring 6 or 7 and 19.3% scoring 1 or 2, which suggests that this measure is considered

to be the second most important measure. Thus, some form of direct costing appears to be used to a greater extent than the profitability measures that rely on some form of absorption costing. The mean score was (3.365) for the measure in row (c) with 16.5% scoring 6 or 7 and 37.2% scoring 1 or 2, which indicates that a low percentage of the responding organisations followed the approach suggested by Kaplan and Cooper and assigned direct costs and only those indirect costs where cause-and-effect allocation bases can be established. For the incorporation of indirect costs using arbitrary allocation bases (row d) the findings also show a mean score of (2.91) below mid point with only 7.6% scoring 6 or 7 and 46.9% scoring 1 or 2, which would appear to suggest that respondents are not relying on a profitability measure that incorporates arbitrary cost allocations, and are following the approaches prescribed in the literature (see Chapter 3 section 3.4.1.3.2) in not using arbitrary allocations to assign indirect costs. However, the mean score for using the bottom line net profit, that must incorporate arbitrary apportionments to products/services, was (3.296) with 19.3% scoring 6 or 7 and 43.5% scoring 1 or 2.

Table 7.23: Profits contribution measures

	N	Mean	% rating 1, 2	% rating 3, 4, 5	% rating 6, 7
(a) Sales revenues less direct variable costs (i.e. excluding fixed costs and the assignment of any indirect costs).	145	5	14.5	33.7	51.7
(b) Sales revenues less direct variable and direct fixed costs (i.e. excluding the assignment of any indirect costs).	145	4.186	19.3	54.5	26.2
(c) Row (b) above less only those indirect costs that are assigned to products or services using cause-and-effect allocations (i.e. where the allocation base is a significant determinant influencing the variation of the costs in the long-term).	145	3.365	37.2	46.2	16.5
(d) Row (c) above plus a further deduction for those indirect costs involving arbitrary allocation bases (where the allocation bases may not be the significant determinants of the indirect costs).	145	2.91	46.9	45.5	7.6
(e) An attempt to generate a profit measure that approximates bottom line profits (i.e. sales less most costs either before or after taxes)	145	3.296	43.5	37.2	19.3

To provide greater insights to the responses to question B3 (summarised in Table 7.23) the responses with the highest score for a direct costing method (rows a and b) and those

for a full absorption costing method (rows d and e) were extracted using the same approach as that described earlier in respect of Table 7.20. The results were as follows:

Table 7.24: The use of direct/cause-and-effect allocations/full costing in profitability analysis

	Mean	% rating 1,2	% rating 6,7
Direct costing profitability measure (highest score for B3a or B3b)	5.41	7.4	61.4
Direct costing plus cause-and-effect profitability measure	3.365	37.2	16.5
Full absorption costing profitability (highest score for B3d or B3e)	3.69	34	23.9

As with determining a cost base for cost-plus-pricing the above table indicates that direct costing is the most widely used cost base for profitability analysis. The Wilcoxon matched pairs test indicated that a direct costing profitability measure was used to a significantly greater extent than a full absorption costing measure ($p=.000$) and that direct costing plus only cause-and-effect allocations were used to a significantly less extent when compared with a direct costing measure ($p=.000$). However, unlike the responses for the cost base used for cost-plus pricing (see section 7.4.3) an examination of all of the individual responses indicated that there was a tendency to use more than one profitability measure for attention-directing purposes. For example, many respondents used both direct costing based and absorption costing based profitability measures but as indicated in Table 7.24 generally greater weighting was given to direct costing based profitability measures.

The responses to questions B3 and C5 (summarised in Tables 7.19 and 7.23) were compared relating to the extent that different cost information was used for profitability analysis and pricing decisions for the 109 respondents that used cost information for both purposes. The Wilcoxon matched pairs test indicated that each of the cost bases (items (a) – (d) for both tables) was used to a significantly greater extent for profitability analysis compared with their uses for cost-plus pricing. The Wilcoxon matched pairs test was also applied to the highest score variables using the three fold classification (direct costing, cause-and-effect allocations and full absorption costing). The findings indicated that (1) direct costing and (2) direct costing plus cause and effect allocations were used to a significantly greater extent ($p <.01$) for profitability analysis compared with their usage

for pricing decisions. However, there were no significant differences in respect of the extent of usage for full absorption costing.

These findings provide some evidence to indicate that cost information is used more intensively for profitability analysis compared with their usage as an input to cost-plus pricing. Both profitability analysis and cost-plus pricing make significantly greater use of direct costing measures compared with absorption costing measures, but the greater intensity of their use for profitability analysis may be due to the fact that monitoring the profitability of products at periodic intervals is considered to be a vitally importance task with emphasis being given to direct costing approaches. In contrast, although cost information may be important for pricing decisions they also rely more extensively on the other marketing factors specified in chapter 3 section 3.3.1. With regard to the usage of full costing methods they are not used as extensively as direct costing measures and the lower reliance placed on the former measures may explain why there are no significant differences in their usage for both purposes. The above findings also do not support the view that different cost information is used for different purposes (i.e. cost information for pricing decisions and cost information for other decisions based on using profitability analysis) since the three fold classification described above yielded the same rankings for both purposes

7.6 Summary

The survey was carried out for the purpose of analysing cost accounting practices and corresponding use of cost information for pricing decisions and profitability analysis of 152 UK manufacturing and service firms. Despite the very different nature of these two industries, the survey found that the cost practices and the use of cost information for decision making to be fairly similar across these sectors. The followings are the major findings:

- Direct costs are the dominant costs representing on average approximately 70% of total costs.
- The evidence suggested that most of the companies use fairly unsophisticated costing systems involving less than 20 cost pools and less than 4 different types of cost drivers with the direct labour cost driver being the predominant. Approximately slightly more

than two thirds of the respondents allocated indirect costs for decision making. Furthermore, the majority of firms described their costing systems to be fairly simplistic and considered that their costing system did not accurately assign costs to products/services. However, there was a tendency for the respondents to be satisfied with the level of sophistication of their costing systems possibly suggesting that they considered that the costing systems were sufficiently accurate for their purpose and after taking into account cost versus benefits considerations.

- The analysis provided evidence to suggest that price makers tend to employ more sophisticated costing systems than price takers.
- The analysis also provided evidence to suggest that non-manufacturing organizations tend to employ more sophisticated costing systems than manufacturing organizations.
- A large majority of firms consider both cost and market information in price setting. However, the evidence suggested that a large majority of firms consider market information to be a more important determinant in price setting than a cost orientation. Although cost-plus pricing appears to be widely perceived as important, and used by approximately 70% of the respondents, it appears that there are a substantial number of companies that use cost-plus pricing only for a small subset of their products and services.
- The findings suggested that those firms that regard cost information to be more important than market information when setting selling prices had significantly higher levels of cost system sophistication.
- Profitability analysis was extensively used with over 90% of the organisations routinely analysing profits by products/services at frequent intervals.
- Direct costing was the most widely used cost base for both profitability analysis and cost-plus pricing.
- The results were analysed by the extent to which different cost bases were used for cost-plus pricing and profitability analysis. Identical rankings applied with both methods. In terms of the extent of use the rankings were as follows – (1) a direct costing base, (2) a full absorption costing base, and (3) a direct costing base plus

cause-and-effect allocations. The findings did not support the view that different cost information was used for different purposes (i.e. cost-plus pricing and profitability analysis).

Although the above summary of the findings reveal that the majority of the UK companies are using unsophisticated cost systems, there are variations in the level of sophistication maintained in practice. Therefore, there is a need to seek to explain these variations. In the next chapter the relationships between the contextual factors, cost system sophistication and cost plus pricing will be formally tested.

Chapter 8

Data analysis

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8.5 Summary

8.1 Introduction

Frequency distributions and descriptive statistics were used to examine the characteristics of the research sample and to achieve some of the research objectives that were presented in Chapter 7. This chapter presents the data analysis and findings that result from testing the research model hypothesised in Chapter 5 using analytical statistics. This Chapter therefore, begins with a description of the statistical methods utilised by this research, particularly, structural equation modelling (SEM) and other related issues. The related issues include a description of the advantages of SEM over other multivariate statistical techniques, the assumptions of SEM, structural model goodness-of-fit measures, the decision rules for accepting or rejecting the hypotheses, the computer program used for undertaking SEM, an explanation of how outliers and missing data have been dealt with and a discussion of the sample size requirements. Section 8.3 presents the outputs of the factor analysis and confirmatory factor analysis for the dimensions of most of the research constructs and concludes with a description of the model variables included in this research. Section 8.4 presents the findings relating to the hypotheses tests and the chapter summary is presented in section 8.5.

8.2 Structural equation modelling (SEM)

Structural equation modelling (SEM) (which is also known by a variety of several names such as covariance structure analysis, latent variable modelling, or causal modelling - Crowley and Fan, 1997) is a comprehensive statistical approach for testing hypotheses about relations among observed and latent variables (Hoyle, 1995).¹ Hair et al. (1998) noted that the structural equation modelling approach had a number of advantages not found in other multivariate techniques. The next section discusses the advantages offered by SEM.

8.2.1 Justifications for the use of SEM

According to Hoyle (1995) the SEM approach is a more comprehensive and flexible approach to research design and data analysis than any other single statistical model in standard use. The SEM approach shares several similarities with other multivariate data analysis approaches (e.g. correlation, multiple regression and ANOVA). The followings are the main similarities noted by Hoyle:

¹ For an explanation of SEM see Chapter 6 sub-section 6.9.4.

- Both approaches are based on linear statistical models.
- Both approaches do not offer statistical tests of causality.
- Statistical tests associated for both approaches are valid if certain assumptions about the observed data are met (e.g. multivariate normality).

However, SEM offers important advantages compared other standard multivariate data analysis approaches such as multiple regression, path analysis (Chau, 1997; Hair et al., 1998; Cheng, 2001; Mackenzie, 2001; Smith and Langfield-Smith, 2004). First, SEM places relatively few limits on what types of relations can be specified for the simultaneous estimation of the relationships among a set of substantive variables. Although there are research hypotheses that can be efficiently and completely tested by standard methods, the SEM approach provides a means of testing more complex and specific hypotheses that cannot be tested by those methods. Smith and Langfield-Smith (2004) noted that SEM allows a range of relations between variables to be recognised in the analysis compared to multiple regression analysis. Hair et al. (1998, p. 575) stated:

Multiple regression, factor analysis, multivariate analysis of variance, discriminant analysis.... All provide the research with a powerful tool for addressing a wide range of managerial and theoretical questions. But they all share one common limitation: each technique can examine only a single relationship at a time. Even the techniques allowing for multiple dependent variables, such as a multivariate analysis of variance and canonical analysis, still represents only a single relationship between the dependent and independent variable.

Second, SEM has the ability to directly incorporate measurement error² in the estimation process. Perhaps the most compelling characteristic of SEM is the capacity to estimate and test relations between latent variables. In all multivariate techniques the assumption is made that there is no error in measuring the variables. However, based on both practical and theoretical perspectives a concept cannot be perfectly measured and there is always some degree of measurement error. For example, multiple regression analyses the relations between a single dependent variable and several independent variables within a single regression equation. The variables used in the equation might be composite measures (that is, combining a series of individual items or indicators forms the variables), or scores from single questions. In the case where there are composite measures, the reliability measures (such as Cronbach's alpha) are reported in multiple regression analysis to indicate the degree of reliability

² Measurement error is the degree to which the variables we can measure (the manifest variables) do not perfectly describe the latent construct(s) of interest (Hair et al., 1998).

of a construct, but they are not formally accounted for in the statistical analysis. According to Pedhazur and Schmelkin (1991) not incorporating the reliability of the measures in the analysis has important implications for multiple regression analysis and path analysis because it will result in bias in the estimate of the regression coefficient for the variables. SEM accounts for measurement error because as well as providing a structural model³ it provides a measurement model. The purpose of the measurement model analysis is to show how well the observed indicators measure the latent variable under investigation (Garver and Mentzer, 1999). With latent variables, represented by a series of observed indicators, the Cronbach alpha measures indicate the extent that the observed indicators do not perfectly represent the latent variables and SEM allows the error variance to be incorporated into the estimates of the error terms in the structural model (Smith and Langfield-Smith, 2004). Hoyle (1995. p.14) also stated:

The isolation of concepts from uniqueness and unreliability of their indicators increases the probability of detecting association and obtaining estimates of free parameters close to their population values.

Third, with regression analysis only one statistical test can be used to assess the “strength” of a model’s predictions. In contrast, with SEM several fit indices can be used simultaneously to assess the goodness-of-fit of the entire structural model. The researchers, depending on which perspective of fit is best suited for the analysis, will choose from this range of measures. These measures assess fit from three perspectives: overall fit (absolute fit), comparative fit compared to a baseline model (incremental fit) and model parsimony, which adjusts the fit for the number of variables in the model⁴ (Marsh et al., 1988; Tanaka, 1993; Gerbing and Anderson, 1993; Hu and Bentler, 1995; Hair et al., 1998).

Furthermore, researchers (e.g. Shields, 1997; Shields and Shields, 1998; Smith and Langfield-Smith, 2004) emphasised the importance of SEM in overcoming some of the limitations of the traditional statistical techniques management accounting has used, and have called on management accounting researchers to make greater use of structural equation modelling in management accounting research. Smith and Langfield-Smith (2004) stated that:

³ The structural model is a set of one or more dependence relationships linking the hypothesised model’s constructs (Hair et al., 1998).

⁴ The measures of fit will be presented later in the chapter.

SEM has several characteristics which allow the results of SEM modelling to be more informative for management accounting theoreticians, compared to the more traditionally applied multiple regression and path analysis techniques.

In a similar vein, Ittner and Larcker (2001) reviewed existing empirical research in management accounting and concluded that the key to improving managerial accounting research is better model specification that explicitly articulates the linkages derived from the theory being tested.

In addition, several studies have called for greater use of SEM in business in different fields including marketing, operations management and accounting (e.g. Crowley and Fan, 1997; Smith and Langfield-Smith, 2004). Recent papers in leading management accounting journals (e.g. Hartmann and Moers, 1999; Smith and Langfield –Smith, 2002; Ittner and Larcker, 2001; Chenhall, 2003) have also paid attention towards using SEM in management accounting research to control for measurement error since measurement error depresses statistical power for hypothesis testing and threatens the validity of the research.

Based on the above-mentioned advantages it was decided that SEM would be the most appropriate statistical technique to utilise in this research.

8.2.2 Assumptions of SEM

SEM shares three assumptions with other multivariate methods: independent observations, random sampling of respondents, and the linearity of all relationships (Hair et al., 1998). West et al. (1995) noted that problems in estimation of structural equation models may arise when the distribution of the observed variables departs substantially from multivariate normality. Normality refers to the degree to which the distribution of the sample data corresponds to a normal distribution.

A strong departure of multivariate normality can increase the value of the Chi-square (χ^2) and create a great deal of bias in critical values for determining the coefficient significance (Hu et al., 1992; Byrne, 1994). Therefore, researchers should perform the diagnostic tests on the data before they are used in the estimation procedure (Hair et al., 1998). Where the normality has been checked the maximum likelihood estimation (MLE) method is often used for evaluating the model goodness-of-fit. As shown in sub-section 8.3.13, all the research variables based on the values of skewness and

kurtosis are within the acceptable range. Thus, the maximum likelihood estimation (MLE) method is used in this research for estimating the structural model parameters (see Chapter 6, sub-section 6.9.4 for an explanation of MLE). However, alternative remedial strategies have been developed in response to a violation of normality assumption. West et al. (1995) and Byrne (1995) have suggested two remedies for dealing with the problem of non-normality. One approach is the development and use of asymptotic (large-sample) distribution-free estimation method (ADF). The second approach is to use an estimation method that assumes the data are normally distributed, but when evaluating the model goodness-of-fit the researchers should base their evaluation on a statistic test called the SCALED X^2 and robust standard error.

8.2.3 Structural model goodness-of-fit measures

It is recommended that multiple fit indices or measures be used since there is no single index or measure considered to be adequate or sufficient for model fit evaluation (Hair et al., 1998; Chau, 1997). Before evaluating the structural or measurement models, researchers must assess the overall fit of the model to ensure that it is an adequate representation of the entire set of causal relationships (Hair et al., 1998).

According to Hair et al. (1998), goodness-of-fit indices measure the degree to which the actual or observed input (covariance or correlation) matrix is predicted by the proposed model. However, poor goodness-of-fit requires procedures in SEM applications (i.e. model modification), which include adding, deleting, or modifying the paths in the model. The various measures of model goodness-of-fit and their recommended values listed in Table 8.1 are used in this research.

Table 8.1: Recommended values of goodness-of-fit measures

Goodness-of-fit measures	Recommended values
Chi-square	$P \geq .05$
Goodness-of-fit index (GFI)	≥ 0.90
Adjusted goodness-of-fit index (AGFI)	≥ 0.80
Normed fit index (NFI)	≥ 0.90
Comparative fit index (CFI)	≥ 0.90
Non-normed fit index (NNFI)	≥ 0.90
Root mean square error of approximation (RMSEA)	< 0.10

Adapted from Chau (1997, p. 318)

8.2.4 Statistical significance of the parameter estimates

According to Hair et al. (1998), the most obvious examination of the structural model involves the significance of estimated coefficients. It is the basis for accepting or rejecting the proposed relationships between exogenous and endogenous constructs (Hair et al., 1998) (see Chapter 6 section 6.9.4 for an explanation of exogenous and endogenous variables). In other words, standardised estimation coefficients (betas) are a means for testing the hypothesised relationship between independent and dependent variables (Field, 2000). In addition, the overall coefficient of determination (R^2) which is similar to that found in multiple regressions is a measure of the entire structural equation. This coefficient determines the predictive power of the structural equation and represents the variance explained in the dependent variable.

Another approach for testing the hypotheses is the critical value approach in which the critical t-value is estimated based on a level of significance (α). This research adopts the traditional level of significance ($\alpha= 0.05$). According to Berenson and Levine (1999) the critical values can be expressed based on whether the type of test is a one-tailed or two-tailed test. If a positive or negative relationship is hypothesised, then a one-tailed test of significance can be employed. However, if the researcher cannot pre-specify the direction of the relationship, then a two-tailed significance test must be used (Hair et al., 1998). For the 0.05 significance level, the critical t-values are above 1.645 for a one-tailed test and above 1.96 for a two-tailed test.

Directional relationships are hypothesised in this research to address the effect of the contingent variables on the level of cost system sophistication and on the importance of cost-plus pricing. For these variables, one-tailed tests of significance will be used. Considering the requirements of one-tailed tests, the decision rule can be formulated as follows:

1. *Accept the hypothesised relationship if: Calculated t-value ≥ 1.64 or:*
2. *Reject the hypothesised relationship if: Calculated t-value < 1.64*

8.2.5 Computer program

A number of SEM software programs exist. Examples include EQS, LISREL, AMOS and PROC CALL. This study utilises EQS 5.7 as the software to be used for data analysis. EQS is highly recommended for a number of reasons. EQS provides several goodness-of-fit indices that address the statistical and practical fit. Byrne (1995) pointed out that EQS enables users to use robust statistics with the most selected estimation methods when the assumptions of multivariate normality are violated. Furthermore, it is unique in its ability to identify multivariate outliers (Byrne, 1995).

8.2.6 Dealing with outliers and missing data

Outliers are extreme data that may affect the results of structural equation modelling. Outliers can occur because of errors in responding by subjects or data recording errors, or because a few respondents may represent a different population from the target population under study (West et al., 1995). West et al. (1995) and Schumacker and Lomax (1996) pointed out that outliers have dramatic effects on the indices of model fit, parameter estimates and standard errors. However, possible corrective actions for outliers depending on the apparent source of outliers include the checking and correction of the data for extreme cases, dropping extreme cases, redefinition of the population of interest or respecification of the model (West et al., 1995). The EQS programme utilised in this research is able to identify outliers. The program in each run prints out the five cases contributing most to multivariate kurtosis (Schumacker and Lomax, 1996). The program identification of an outlier is based on the estimate presented for one case relative to those for the other cases. If the results show that one of these cases have large estimates relative to the others, then the outlier should probably be deleted. In this research only two cases were identified as outliers and thus were deleted as recommended by West et al. (1995).

Missing data is a common problem that often faces researchers in multivariate analysis. Missing data can have a profound effect on calculating the input data matrix and its ability to be used in the estimation process (Hair et al., 1998). A number of remedial approaches can be used to deal with the problem of missing data. One simple remedy for missing data is to delete the case(s) and/or variable(s) that have missing data. This procedure, however, may seriously reduce the sample size (Hair et al., 1999). Mean substitution is another remedial approach for solving the problem of

missing values. Mean substitution replaces the missing values for a variable with the mean value of that variable based on all valid responses. It is one of the more widely used methods according to Hair et al. (1998) because the mean is the best single replacement value. Very few cases in this research have missing data. Precisely six cases were identified with missing data which came from part C of the questionnaire. The mean substitution method was adopted to deal with the missing values in order to avoid the deletion of cases with missing values and the reduction of the sample size, which is a critical issue in terms of meeting SEM requirements.

8.2.7 Sample size and model complexity

The sample size plays an important role in the estimation and interpretation of SEM results. The critical question in SEM involves how large a sample is needed. There is no single criterion that dictates the necessary sample size (Hair et al., 1998). According to Hair et al. (1998), there are a number of factors that may impact the sample size requirements including: (1) model misspecification; (2) model size and its complexity; (3) the departure from normality; and (4) the estimation procedure adopted.

Model misspecification refers to the specification error that results from omission of relevant variables from the specified model. All structure equation models suffer from specification error to some extent because every potential construct and indicator cannot be included. Considering the model size, the definite minimum sample size must be at least greater than the number of covariances in the input matrix. However, Hair et al. (1998) suggested at least five respondents for each estimated parameter may be considered to be appropriate. This ratio would increase as the model complexity increases.

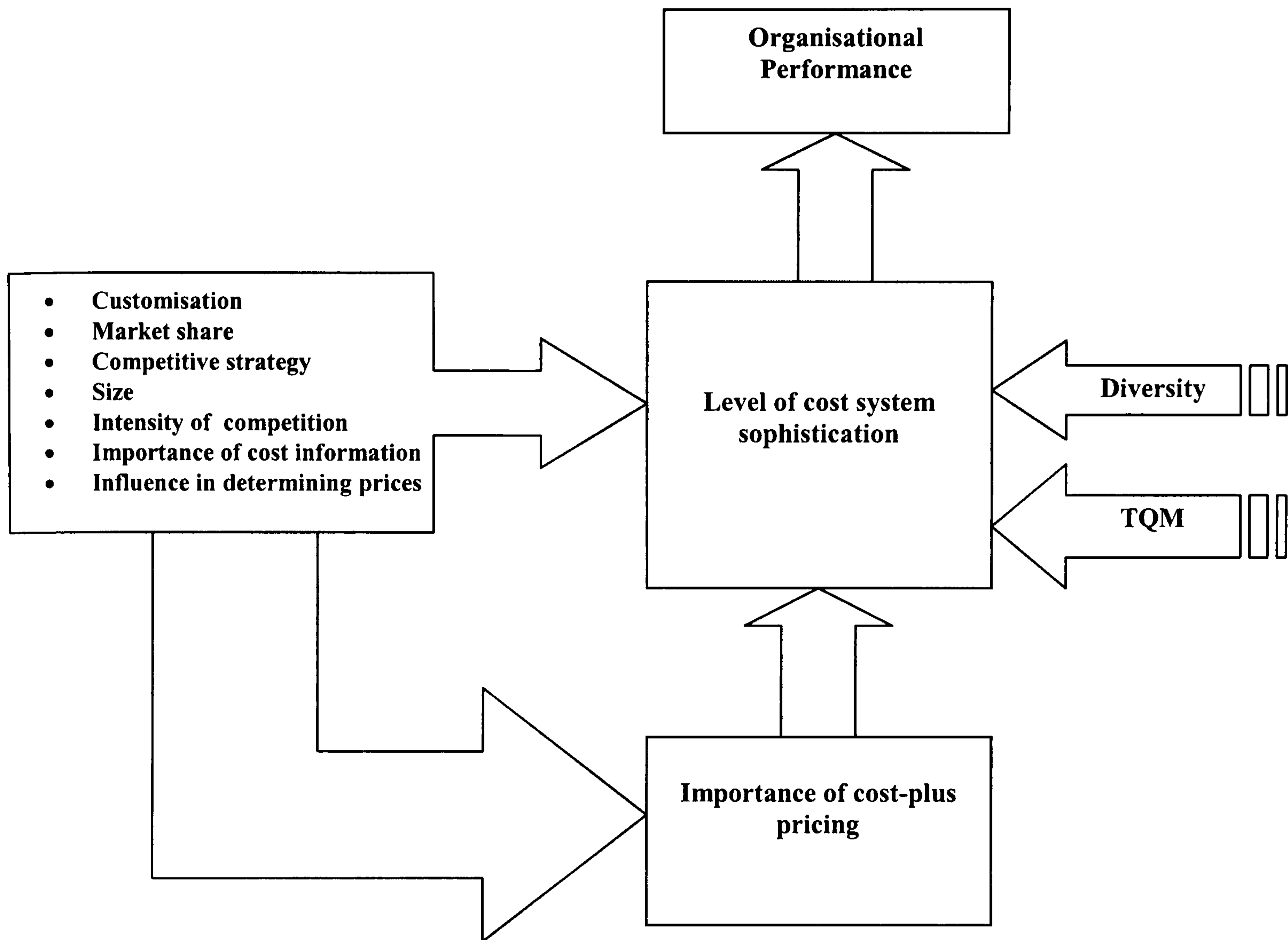
As for the departure from normality, increasing sample size is always encouraged, but there are a number of estimation procedures designed to deal with non-normal distributions. Some estimation procedures can provide valid estimates with a very low sample size (Hair et. al., 1998, p. 605).

Maximum likelihood estimation (MLE), the most common estimation procedure, has been found to provide valid results with sample sizes as small as 50, but a sample this small is not recommended.

However, it is generally accepted that the minimum sample size to ensure appropriate use of MLE is 100 to 150. Therefore, MLE was adopted in this research to estimate the model relationships.

Due to the model complexity, the limitations of the sample size and the requirement of at least a minimum of five observations for each estimated parameter (Hair et al., 1998) the structural test shown in Figure 8.1 is divided into 3 models. In the first model (see Figure 8.1) the hypothesised independent variables are tested in a single model, based on the hypothesised relationship between the independent and the dependent variable cost system sophistication (SOPHIST). The second model tests the relationship between the independent variables and the dependent variable the importance of cost-plus pricing (CPLUS), the relationship between (CPLUS) and (SOPHIST) is also tested. The third stage of the structural analysis tests the fit or internal consistency between the independent variables and the cost system sophistication on organisational performance. The overall structural model is presented in Figure 8.1. Also, due to the limited number of responses of the food industry it was decided not to test the hypothesised models specifically in relation to the food industry.

Figure 8.1: The overall structural research model



The next section (8.3) explains how the research variables specified in Figure 8.1 are measured, and the procedures undertaken to establish the construct validity using both exploratory and confirmatory factor analysis. Sub-sections 8.4.1 and 8.4.2 test respectively the first and second models referred to above and sub-section 8.4.3 reports on the third stage of the structural analysis relating to the fit between the independent variables and the cost system sophistication on organisational performance.

8.3 Measurement analysis of research constructs

In Chapter 6 it was indicated that multiple-item questions (based on 7-point scales) were extensively used in this research to measure the contingent variables used in this research. These types of questions require a statistical method that can be used to aggregate the multiple-item question responses in order to determine an overall measure for the variable. The measurement model in SEM specifies the measures (indicators) for each construct and assesses the validity and reliability of the constructs for estimating the structural model. In addition, it has been recommended

that explanatory factor analysis provides a useful first step in anticipating the measurement model in confirmatory factor analysis (Maruyama, 1998; Hair et al., 1998). Thus, both factor analysis techniques will be utilised in this research. First, exploratory factor analysis (EFA) is utilised to identify the pattern of relationships between measured variables or indicators and the construct or factor. Then confirmatory factor analysis (CFA) will be utilised to refine or confirm the unidimensionality of measurement instruments.

Exploratory factor analysis (EFA) is performed to operationalise the variables using principal component analysis as the extraction method, included as part of the statistical applications provided by the “Statistical Package for Social Sciences” (SPSS) software package version 11. To assess the exploratory factor analysis (EFA), five commonly used assumptions were followed (Hair et al., 1998; Field, 2000). They are: sampling adequacy based on the Kaiser-Meyer-Olkin measure of greater than 0.5; minimum eigen values for each factor of one; factor loadings of .45 for retaining items within each factor (as advised by Hair et al., 1998 for a sample size of 150); the determinants for the correlation matrix exceeding 0.00001; varimax rotation since it is considered to be a good general approach that simplifies the interpretations of the factors (Field, 2000).

Moreover, confirmatory factor analysis (CFA) was also utilised to further confirm and validate the findings that emerged from EFA. The measurement model in CFA relates the observed variables or measures to their latent variable or construct. A range of fit measures for evaluating the measurement model fit are used in this research to rule out measuring biases inherent in each measure (Hoyle, 1995). Table 8.1 presented in section 8.2.3 lists the various measures of model fit used in this research and their recommended values.

Finally, the Internal Consistency Reliability Test (Cronbach’s alpha) is employed in order to assess the reliability of each resulting dimension / scale, using Cronbach’s alpha coefficient.

A detailed discussion of the results of the factor analysis and the reliability of the variables used in this research is presented in the following sub-sections.

8.3.1 Business strategy

It was pointed out in Chapter 6 that business strategy has been measured by asking the respondents to position their business units relative to their leading competitors based on six dimensions relating to their business strategies. Also, it was indicated in Chapter 5 that this research adopts Porter's approach for operationalising business strategy (i.e. measuring business strategy in terms of differentiation and low cost strategies). The items used in this research to measure both dimensions were developed by Govindarajan (1988). Items (D3a and D3b) measure low cost strategy, and the last four items (D3c-D3g) measure differentiation strategy. Reverse scores for items (D3a, D3b) were used to measure low cost strategy based on Lee and Miller's (1996) approach of measuring low cost strategy.

The items measuring the "Business strategy" construct were subjected to Exploratory Factor Analysis (EFA). The results of the EFA identified three factors for business strategy that explained 70% of variability of business strategy with eigen values greater than one. These factors were labelled as "low cost strategy" (LOWCOST), "Product Differentiation" (PRODDIFF) and "Innovative differentiation" (INNDIFF). All loadings were greater than .45, ranging from 0.65 to 0.90. The Bartlett's test of sphericity (245, $P < 0.001$), the Kaiser-Meyer-Olkin measure of sampling adequacy 0.69 and the determinant of the correlation matrix 0.18 indicated that conducting the Exploratory Factor Analysis (EFA) was appropriate and that it satisfied the conditions for using such a statistical technique (Field, 2000). In addition, the Cronbach's alpha for PRODDIFF, INNDIFF and LOWCOST were 0.71, 0.73 and 0.49 respectively, indicating acceptable levels of reliability for PRODDIFF and INNDIFF (Hair et al., 1998), whereas for LOWCOST the level of reliability was unacceptable, since the recommended minimum acceptable level for Cronbach's alpha measuring reliability is 0.60, as advised by Hair et al. (1998). Therefore, it was decided to exclude the items D3a, D3b representing LOWCOST dimension from the analysis. Table 8.2 presents the dimensions of business strategy that emerged from the factor analysis.

Table 8.2: Exploratory factor analysis for business strategy

Items and Measures Description	PRODDIFF	INNDIFF	LOW COST
D3e Product quality	0.847		
D3g Product features	0.780		
D3f Brand image	0.708		
D3d Percent of sales spent on marketing expenses		0.874	
D3c Percent of sales spent on research and development		0.858	
D3b Manufacturing costs			0.901
D3a Product selling prices			0.659

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalisation

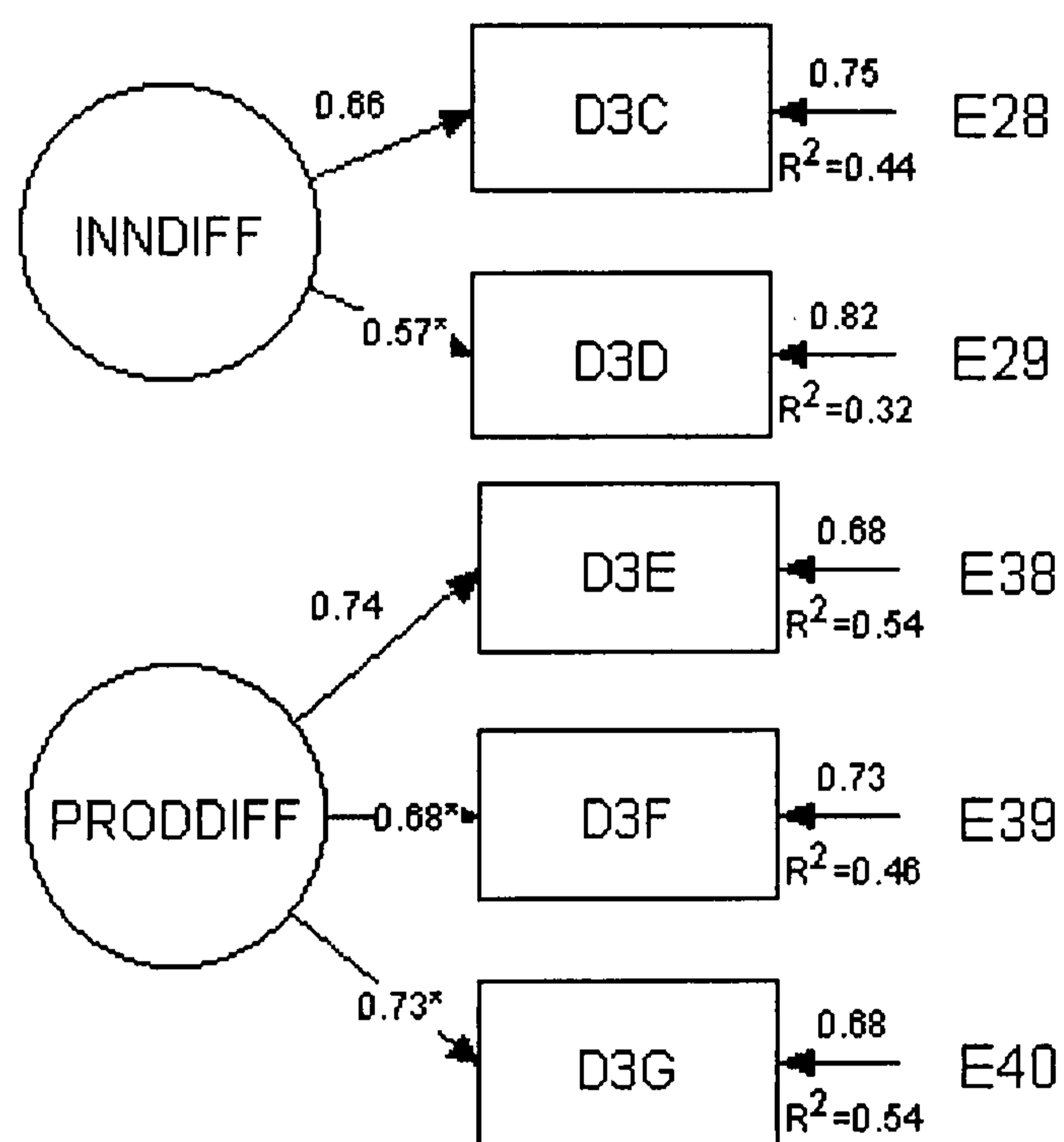
a. Rotation converged in 4 iterations.

To confirm and validate the findings that emerged from using (EFA), business strategy was evaluated by (CFA) using EQS 5.7 software (Bentler, 1995). The measurement model of the (CFA) relates the observed variables to their latent variable. Figure 8.2 depicts the measurement model of the business strategy construct and provides a summary of the model fit measures observed for the model. In the schematic presentation of the structural equation models, measured variables are shown in boxes and unmeasured variables in ellipses (circles). Thus in reviewing the model depicted in Figure 8.2 it can be seen that there are two latent variables (INNDIFF and PRODDIFF) and five observed variables (D3C, D3D, D3F, D3E, D3G) which function as indicators of their respective underlying latent factors. Associated with each observed variable is an error term (for example E28, E29). One way arrows represent structural regression coefficients and thus indicate the impact of one variable on another. In the figure the two unidirectional one way arrows leading from the factor INNDIFF to each of the two observed (D3C, D3D), suggest that scores on the latter are caused by INNDIFF. Therefore the one way arrows leading from the ellipses to the boxes indicate which observed variables are valid measurements of the factor in question. The single headed arrows shown on the right hand side of the diagram pointing from the Es indicate the impact of measurement error on the observed variables. R^2 is a measure of how much of the variability in the outcome is accounted for by the predictors.

As shown in Figure 8.2, all measures of fit surpassed the acceptable levels (see Table 8.1 for the criteria used). The model goodness of fit was reached after deleting items D3a, D3b for low level of reliability. This is consistent with the recommendations to

delete measures or indicators from the measurement model that have low internal consistency or measure more than one construct (Cheng, 2001). In addition, the path loadings were significant (*) (ranging from 0.57 to 0.74, t-values 4.548 to 5.603; $P < 0.001$). It should be noted from Figure 8.2 that two loadings were not significant; this is due to the measurement model identification⁴. The results from (CFA) support the findings that emerged from (EFA). These results indicate that the measurement model uniquely represents business strategy as a multidimensional construct and demonstrates its construct validity. Thus, business strategy is represented in this study by two dimensions, INNDIFF measured by items (D3c, D3d) and PRODDIFF measured by items (D3e, D3f, and D3g).

Figure 8.2: Confirmatory factor analysis for business strategy



Model goodness of fit:

Chi-Square 14.70; $P=0.39$
 GFI 0.96; AGFI 0.93; NFI 0.91; NNFI 0.99;
 CFI 0.99; RMSEA 0.02

⁴ The parameters without (*) in Figure 8.1 are specified as starting values "specified as fixed". A starting value is needed for each of the parameters' constructs to be estimated because the fitting algorithm involves iterative estimation, starting from a suitable approximation to the required results and proceeding to their 'optimum' values (Dunn et al., 1994).

8.3.2 Intensity of competition

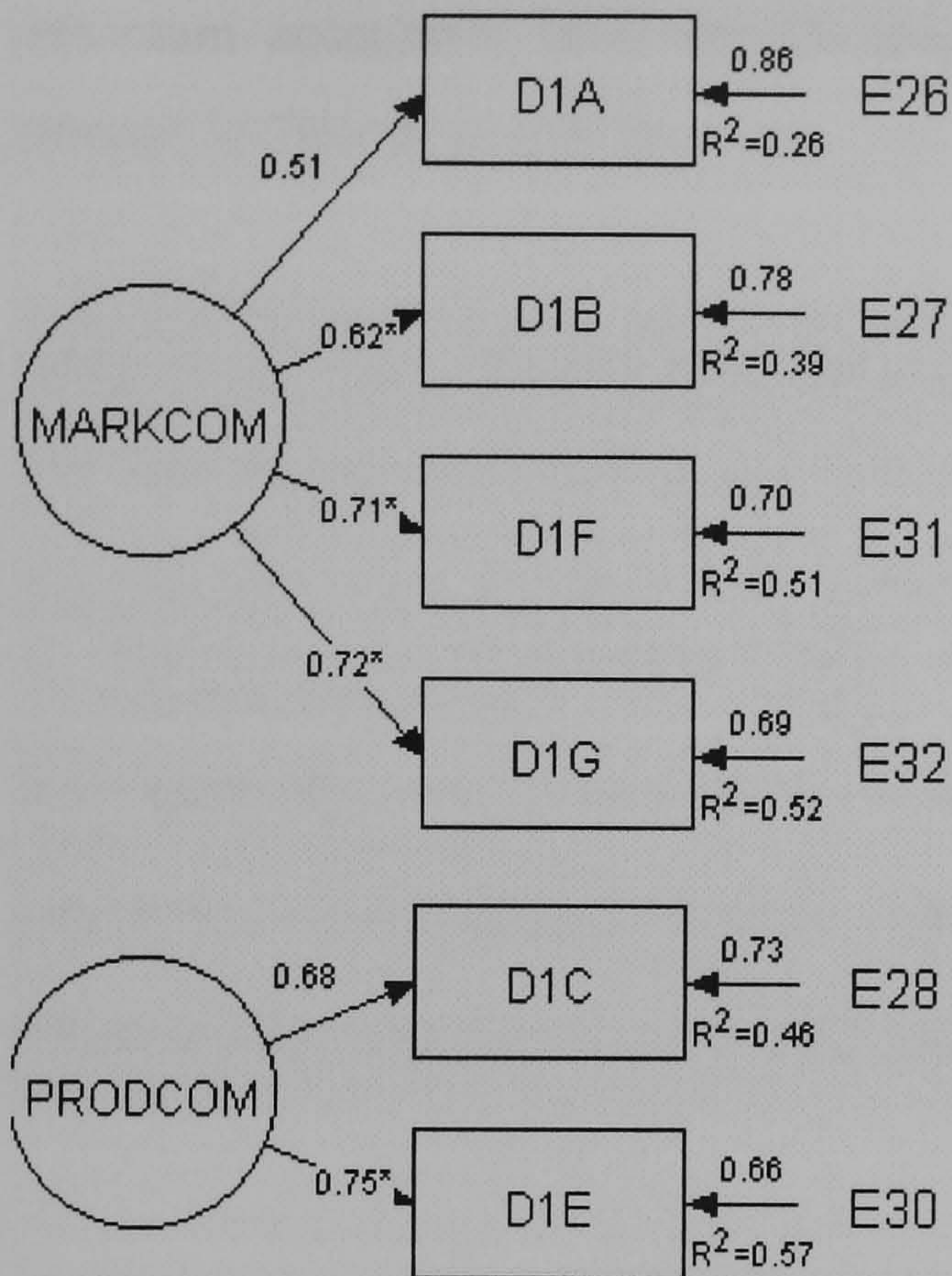
Intensity of competition was measured in this study as price, product, marketing and competitors' actions. These dimensions were measured with seven items (D1a-D1g). The results presented in Table 8.3 indicated that two factors emerged from this analysis. The total cumulative variance explained by both of these factors was 59%, and both factors had an eigen value greater than 1. However, item D1d cross-loaded on both factors, therefore it was decided to delete the item as recommended by Cheng (2001). These factors were labelled as "Market Competition" (MARKCOM) and "Product Competition" (PRODCOM). All loadings were greater than .45, ranging from 0.64 to 0.85. The Bartlett's test of sphericity (272, $P < 0.001$), the Kaiser-Meyer-Olkin measure of sampling adequacy 0.80 and the determinant of the correlation matrix 0.156 indicated that (EFA) was appropriate and within the acceptable levels (Field, 2000). In addition, the Cronbach's alpha for MARKCOM and PRODCOM were 0.73 and 0.68 respectively, indicating acceptable levels of reliability for both factors (Hair et al., 1998).

Table 8.3: Exploratory factor analysis for intensity of competition

Items and measures description	Market competition	Product competition
D1a Price competition	.745	
D1b Competition for selling and distribution	.739	
D1f Number of competitors in your market segment	.715	
D1g Competitors' actions	.644	
D1e Competition relating to customer service		.855
D1c Competition for quality and variety of products		.809
D1d Percent of sales spent on marketing expenses	.459	.522

To confirm and validate the findings that emerged from (EFA), intensity of competition was evaluated by (CFA). Figure 8.3 shows the measurement model of intensity of competition and a summary of the model goodness of fit. As shown in the figure all measures of fit were met. In addition, the path loadings were significant (ranging from 0.51 to 0.75, t-values 4.345 to 6.793; $P < 0.001$). Thus, intensity of competition is represented in this research by two dimensions, MARKCOM measured by five items (D1a, D1b, D1f, and D1g) and PRODCOM measured by two items (D1e, D1c).

Figure 8.3: Confirmatory factor analysis for intensity of competition



Model goodness of fit:

Chi-Square 11.126; $P=0.267$
 GFI 0.97; AGFI 0.93; NFI 0.93; NNFI 0.97;
 CFI 0.98; RMSEA 0.04

8.3.3 Total quality management

This study opted to measure the extent of implementation of total quality management (TQM) based on questions relating to the extent to which various quality initiatives were adopted (items D4a-D4e). The results presented in Table 8.4 confirmed the unidimensionality of this construct, in that all items loaded significantly on only one factor, and none of these had a loading that was less than 0.45. The loadings for the five items making up this construct ranged from 0.70 to 0.84. The total cumulative variance explained by the one factor representing this construct was 62%, and it had an eigen value greater than 1. The Bartlett's Test of Sphericity (308, $P < 0.001$) and Kaiser-Meyer-Olkin Measure of Sampling Adequacy 0.84 and the determinant of the correlation matrix 0.123 indicated that conducting the Exploratory Factor Analysis (EFA) was appropriate and that it satisfied the conditions for using such a statistical technique. The construct was labelled "Total Quality Management" (TQM) and consisted of items (D1a-D1e). The internal consistency reliability coefficient measure (Cronbach's alpha) for the resulting unidimensional construct (TQM) was 0.84,

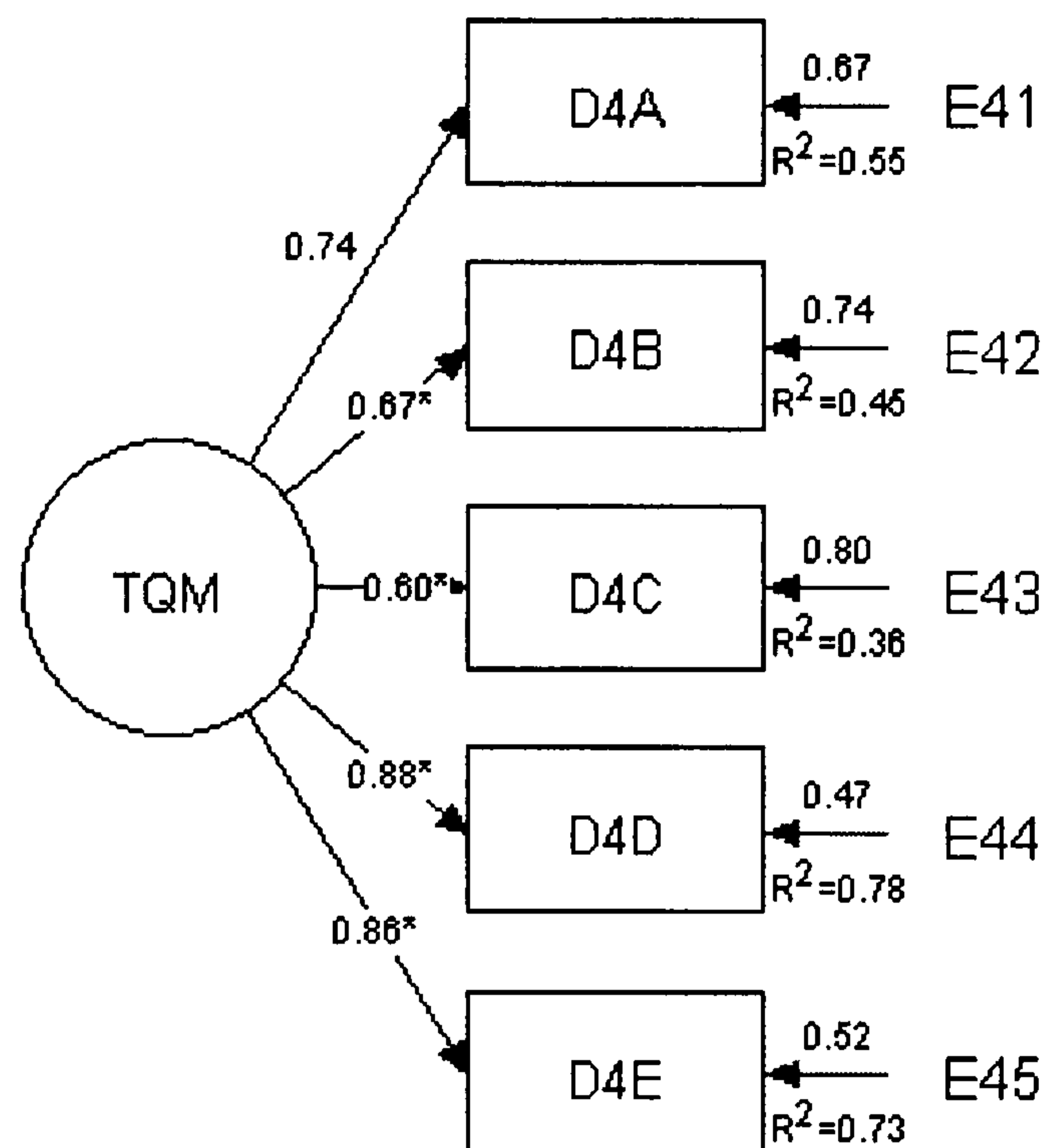
indicating an excellent level of reliability for this construct, since the recommended minimum acceptable level for Cronbach's alpha measuring reliability is 0.60, as advised by Hair et al. (1998).

**Table 8.4: Exploratory factor analysis for total quality management
Items and Measures Description**

Items and Measures Description	TQM
D4d Management actively supports your quality programme	.848
D4e Total quality management, whereby most business functions are involved in a process of continuous quality improvement, is an extremely high priority	.839
D4b Experiments to improve the quality of processes are frequently conducted	.786
D4a Quality-related training is provided for all employees	.783
D4c Quality benchmarking with other companies or business units is tracked	.703

To further confirm the findings that emerged from (EFA), TQM was evaluated by (CFA). Figure 8.4 shows the measurement model of TQM and a summary of the model goodness of fit. As shown in the figure, all measures of fit exceeded the acceptable levels. In addition, the path loading were significant (ranging from 0.60 to 0.88 t-values 6.205 to 9.153 to; $P < 0.001$). These results support the findings that emerged from (EFA). Thus, TQM is represented in this research by one dimension (items D4a-D4e).

Figure 8.4: Confirmatory factor analysis for total quality management (TQM)



Model goodness of fit:

Chi-Square 5.499; $P=0.23$

GFI 0.98; AGFI 0.93; NFI 0.98; NNFI 0.98;

CFI 0.99; RMSEA 0.05

8.3.4 Importance of cost information

Questions A6a- A6f sought to measure the importance of cost information (the scores on A6f were reverse coded to be consistent with the other questions). The results of the EFA presented in Table 8.5 show the emergence of two factors with eigen values greater than one. These factors explain 60% of variability of decision usefulness. Based on decision rules (Nunnally, 1978)⁵ for conducting (EFA) relating to dropping single items it was decided to exclude factor 2 because it had a single item loading (item A6f). All remaining items loaded significantly and strongly on the other factor. The factor was labelled as “Importance of cost information” (DECISNUSE). All loadings were greater than .45, ranging from 0.64 to 0.77. The Bartlett’s test of sphericity (184, $P < 0.001$), the Kaiser-Meyer-Olkin measure of sampling adequacy 0.70 and the determinant of the correlation matrix 0.28 indicated that EFA was appropriate and within the acceptable levels. In addition, the Cronbach’s alpha for Decision usefulness was .74 indicating good level of reliability (Hair et al., 1998).

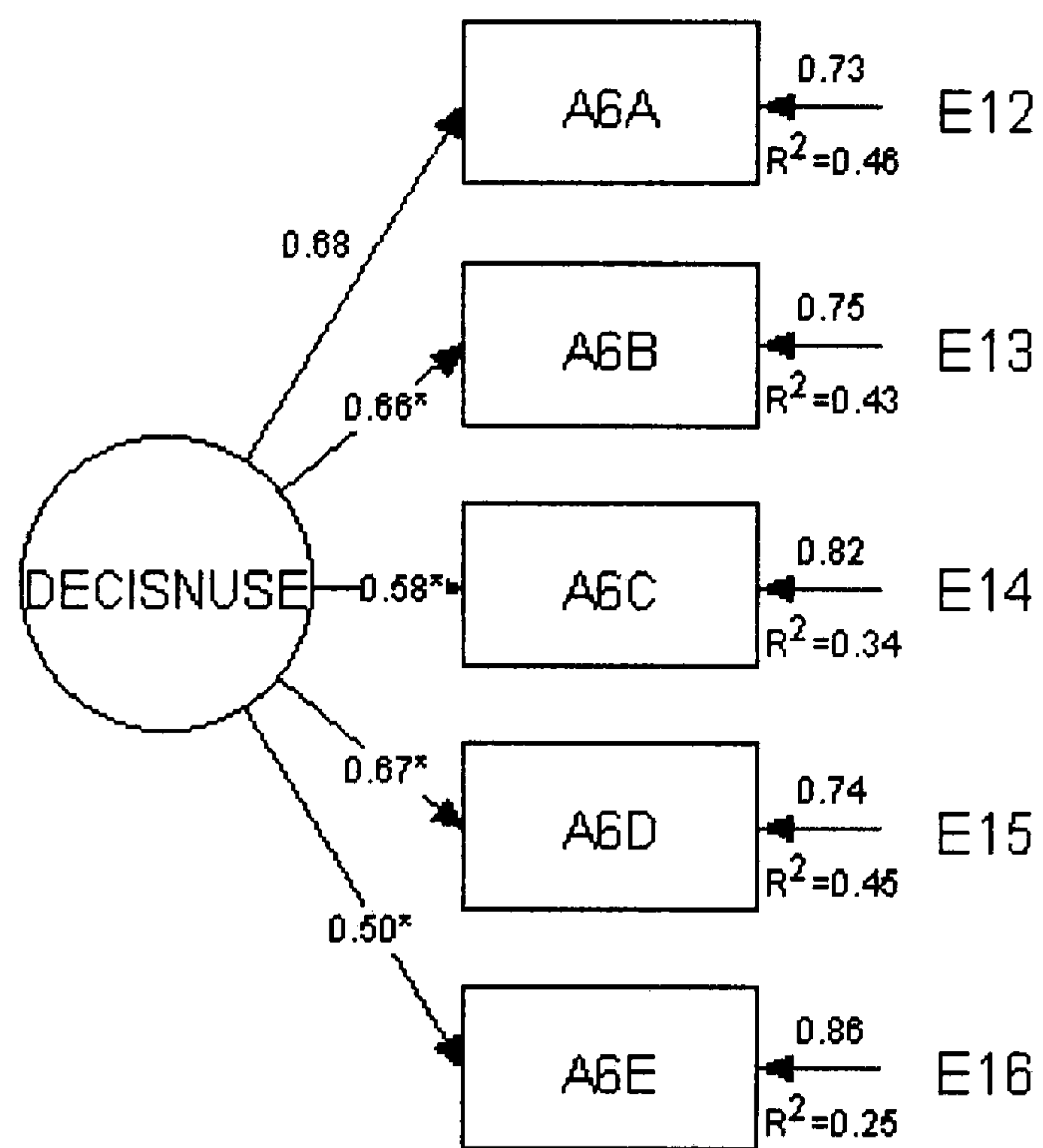
⁵ Single item and/or unreliable factors are discarded since retaining them is neither appropriate nor parsimonious (Nunnally, 1978).

Table 8.5: Exploratory factor analysis for importance of cost

Items and measures description		Factor1	Factor2
A6a	The cost of products or services must be accurate to compete in our markets.	.771	
A6c	Cost data are an extremely important factor when making pricing decisions.	.758	
A6d	Cost data are extremely important when making product mix or discontinuation decisions.	.702	
A6b	Cost data are extremely important because of cost reduction efforts.	.679	
A6e	The business unit performs many special cost studies	.642	
A6f	The decisions specified in (d) above tend to be based more on 'strategic reasons' rather than cost issues.		.922

To further confirm the findings that emerged from EFA, the importance of cost information was evaluated by (CFA). Figure 8.5 shows the measurement model and a summary of the model goodness of fit. As shown in the figure, all measures of fit exceeded the acceptable levels. In addition, the path loading were significant (ranging from 0.50 to 0.68 t-values 4.195 to 6.082 ; $P < 0.001$). These results support the findings that emerged from EFA. Thus, importance of cost information is represented in this research by one dimension DECISNUSE (items A6a-A6e).

Figure 8.5: Confirmatory factor analysis for importance of costs



Model goodness of fit:

Chi-Square 6.133; $P=0.18$

GFI 0.98; AGFI 0.92; NFI 0.95; NNFI 0.96;

CFI 0.98; RMSEA 0.06

8.3.5 Manufacturing/service diversity

In Chapter 2 (sub-section 2.4.3) it was pointed out that product diversity occurs when products consume the activity resources in different proportions whilst volume diversity refers to the situation when products are manufactured in different batch sizes. This research sought to measure product diversity by items (D5a, D5b, and D5d). Items D5c, D5e, and D5f focused on measuring volume diversity. High scores for D5a, D5d, D5e, and D5f indicate high product/volume diversity but for d5b and d5d high scores indicate low diversity. Therefore, the scores for D5b, D5d have been reverse coded. The results of the EFA presented in Table 8.6 show the emergence of two factors for diversity as expected explaining 53% of the variability of manufacturing/service diversity. Based on the criteria established earlier in this chapter for conducting (EFA), it was decided to exclude product diversity from further analysis. Product diversity (items D5a, D5b, D5d) was excluded because after dropping item D5a (because of its high loading on two factors) the Cronbach's alpha reliability measure for (D5b, D5d) was 0.161, thus being below the acceptable level suggested by Hair et al. (1998).

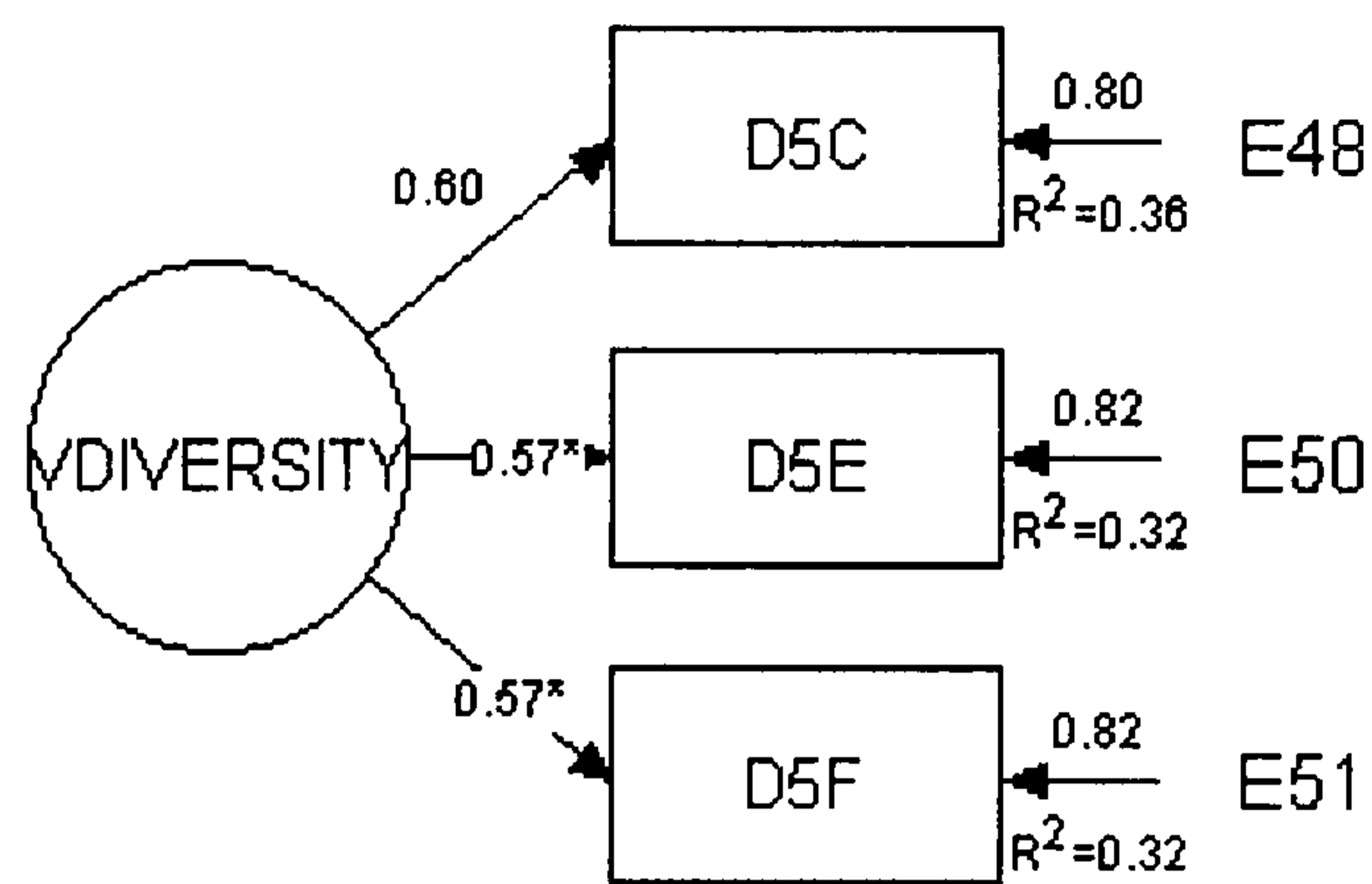
The other factor was retained for further analysis, and was labelled as “Volume Diversity” (VDIVRSITY). All items loaded highly on their factor and were greater than 0.45, ranging from 0.71 to 0.77. The Bartlett’s test of sphericity (102, $P < 0.001$), the Kaiser-Meyer-Olkin measure of sampling adequacy 0.65 and the determinant of the correlation matrix 0.49 indicated that (EFA) was appropriate and within the acceptable levels. In addition, the Cronbach’s alpha for volume diversity was .62 indicating acceptable level of reliability (Hair et al., 1998).

Table 8.6: Exploratory factor analysis for volume diversity

Items and measures description	Volume diversity	Product diversity
D5c There are major deviations in the provision of product/service volumes	.779	
D5e There are major differences in the batch sizes manufactured /provided by products/services	.716	
D5f Over time, there are major changes in volumes of products/service	.710	
D5a The products/services marketed by the organisation are quite diverse	.588	.456
D5b Within product or service lines/groupings products/services require similar processes to design, manufacture/provide and distribute		.795
D5d Support departments resources consumed by each product/service are about the same		.513

To further confirm the findings that emerged from (EFA), Volume diversity was evaluated by (CFA). Figure 8.6 shows the measurement model of volume diversity and a summary of the model goodness of fit. As shown in the figure, all measures of fit well exceeded the acceptable levels showing perfect model fit. In addition, the path loadings were significant (ranging from 0.57 to 0.60 t-values 3.082 to 3.082; $P < 0.001$). These results support the findings that emerged from EFA. Thus, manufacturing/service diversity is represented in this research by one dimension volume diversity VDIVRSITY (items D5c, D5e, D5f).

Figure 8.6: Confirmatory factor analysis for volume diversity



Model goodness of fit:

Chi-Square.00; $P=0.000$

GF11; AGFI 1; NFI 1; NNFI 1;

CFI 1; RMSEA 0.00

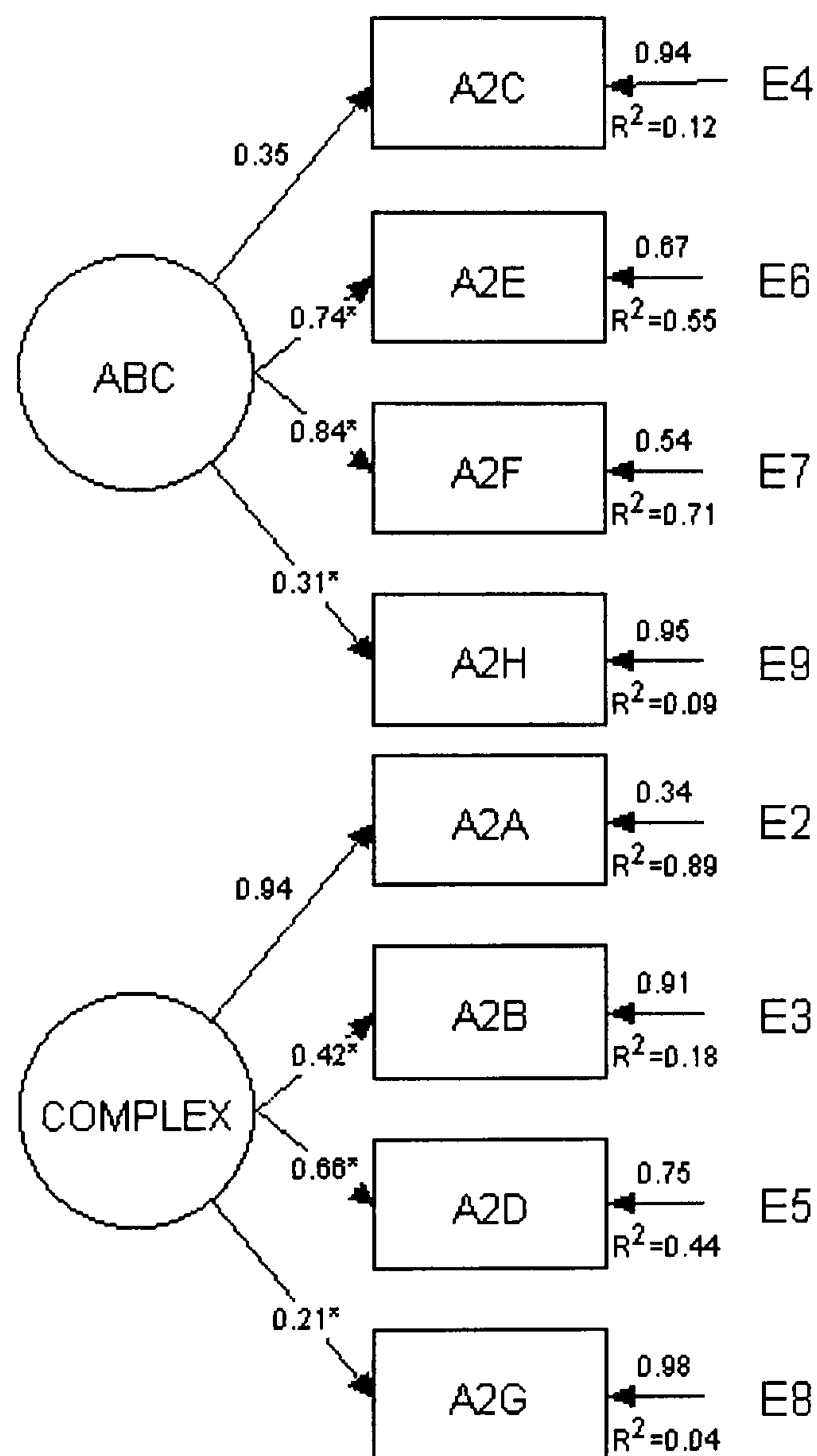
8.3.6 Cost system sophistication

Based on the discussion in section 2.5 Chapter 2 items A2a-A2h were developed in order to measure the “level of cost system sophistication” construct. To assess construct unidimensionality, the measures relating to cost system sophistication (A2a-a2h) were initially factor analysed. The results presented in Chapter 7 sub-section 7.3.3 indicated that two factors, rather than one factor as conceptualised for cost system sophistication, emerged from this analysis. These two factors were labelled as “the extent to which the costing system resembles an ABC system” (ABC) and “the extent to which the costing system resembles a complex costing system” (COMPLEX). All loadings were greater than .45, ranging from 0.45 to 0.86. The Bartlett’s test of sphericity (207, $P < 0.001$), the Kaiser-Meyer-Olkin measure of sampling adequacy (0.71) and the determinant of the correlation matrix 0.14 indicated that (EFA) was appropriate and within the acceptable levels (Field, 2000). In addition, it was noted in Chapter 7 that the Cronbach’s alpha for both dimensions indicated acceptable levels of reliability.

To confirm and validate the findings that emerged from (EFA) the level of cost system sophistication was evaluated by CFA. Figure 8.7 shows the measurement model of level of cost system sophistication and a summary of the model goodness of fit. As shown in the figure all measures of fit were met. In addition, the path loading

were significant (ranging from 0.21 to 0.94, t-values 2.052 to 5.394; $P < 0.001$). Thus, level of cost system sophistication is represented in this research by two dimensions, (ABC) measured by four items (A2c, A2e, A2f, and A2h) and (COMPLEX) measured by four items (A2a, A2b, A2d, and A2g) .

Figure 8.7: Confirmatory factor analysis for level of cost system sophistication



Model goodness of fit:

Chi-Square 20.12; $P=0.325$
 GFI 0.95; AGFI 0.91; NFI 0.91; NNFI 0.98;
 CFI 0.98; RMSEA 0.03

8.3.7 Organisational performance

It was pointed out in Chapter 4 (section 4.4) that there is no ideal measure for organisational performance. However, organisational performance was measured using a two-stage scale approach following Govindarajan (1984). This approach has been used in several management control contingency studies (e.g., Chong and Chong, 1997; Govindarajan and Fisher, 1990; Govindarajan, 1988; Chenhall and Langfield-Smith, 1998). First, respondents were asked to rate the importance of eight performance measures to their organisations (items D6ia-D6ih in the questionnaire). A percentage weighting for each importance scale is then calculated by dividing the item score by the total of all importance scores for each respondent. Second, respondents were asked to rate how they perceived their organisations actually performed along each of the eight performance measures (items D6iia-D6iih in the questionnaire). Overall organisational performance was then calculated for each respondent as the sum of the resulting importance weighting and actual performance.

Since it was not possible to conduct the same procedures discussed earlier in this chapter to assess reliability and validity of this construct (due to the use of a two stage rating scale and the multiplicity of measures used) validity was assessed as a correlation coefficient to provide some assurance of the reliability and validity of this construct. Oppenheim (1992) noted that this method of establishing validity requires correlating the scores with other measures of the construct at the same time. High and significant correlation between the two measures indicates validity is present. Thus, for this purpose the respondents were asked in a separate item (D6i) to indicate the overall performance of their business units compared to their competitors over the last three years. The correlation coefficient evidenced that this item correlated highly and significantly with the calculated performance score (0.670, $P < 0.01$; 2-tailed). As a result, the instrument used to measure organisational performance can be assumed to be valid. Thus the measure of organisational performance (the sum of products of importance weighting and actual performance) can be assumed to be reliable and valid and is therefore incorporated in the analysis.

8.3.8 The importance of cost plus pricing

To recall from Chapter 6 (sub-section 6.6.2) two measures of importance of cost-plus pricing were utilised in this study. The first item relates to the relative importance of a

cost-plus pricing (Question C1a) and the second (Question C4) to the proportion of the organisation's external sales that use a cost-plus approach in price setting. The scores on these two measures were highly correlated at the 0.01% level (0.381, $P < 0.01$, 2-tailed). Thus, the importance of cost-plus pricing has been measured by the average score of the two items. The Cronbach's alpha for this measure was 0.741 indicating acceptable level of reliability (Hair et al., 1998). It was labelled "the importance of cost-plus pricing" (CPLUS). Since it was not possible to conduct the same procedures discussed earlier in this chapter to assess reliability and validity of this construct (this measure consisted of the summated scale of only two items and therefore it was not subject to explanatory and confirmatory factor analysis) validity was assessed as a correlation coefficient. However, in order to provide a check for the validity of the measure of (CPLUS) item C7c that indicated the usage of cost-plus pricing was incorporated in the questionnaire. The scores for this question were highly correlated with the importance of cost-plus pricing measure CPLUS (0.559, $P < 0.01$, 2-tailed).

8.3.9 Organisation size

Size (SIZE) was measured by the annual sales turnover for the responding companies in the past year. However, the annual sales turnover was transformed to logarithms in order to adjust for both skewness and kurtosis. An additional measure for size was included in the questionnaire (number of full time equivalents employees in the companies). The two measures for organisational size were significantly correlated (0.181, $P < 0.05$, 2-tailed) indicating that annual size turnover was an acceptable and reliable measure for size.

8.3.10 Influence in determining prices

The influence in determining prices was measured by the summated scale of two items C2a, C2b (the scores for item C2b are reversed). The Cronbach's alpha for this measure was 0.77 indicating an acceptable level of reliability (Hair et al., 1998). Also to confirm that this was a good measure questions C7a, C7b (reversed scored) were included in the questionnaire. The scores for these questions were significantly correlated with the aforementioned summated score measure thus indicating that it was an acceptable and reliable measure for the influence in determining selling prices. It is labelled "the influence in determining selling prices" (PPOWER).

8.3.11 Market share

As indicated in Chapter 6 section 6.6.2 market share construct was measured by a single item Question C6. This measure was labelled “market share” (MSHARE).

8.3.12 Degree of customisation

It was pointed out in Chapter 6 that the degree of customisation was measured by Question D2. This measure was labelled “degree of customisation” (CUSTOM).

8.3.13 The variables used in testing the hypotheses

It was indicated in sub-section 8.2.7 that normality tests should be performed on the data before they are used in the estimation procedure. Kurtosis¹ and skewness² values were used to examine and check the normality of each variable included in the research. According to Hair et al. (2003) skewness values of larger than +1 or smaller than -1 indicate a substantially skewed distribution. On the other hand, a curve is too peaked when the kurtosis exceeds +3 and is too flat when it is below -3. Thus, skewness values within the range of -1 to +1 and kurtosis values within the range of -3 to +3 indicate an acceptable range while values falling outside the range of -1 to +1 for the skewness values, or outside the range of -3 to +3 for the kurtosis values indicate a substantial departure from normal distribution which require taking remedial actions prior to evaluating the structural equation model. The values of skewness and kurtosis for each variable are shown in Table 8.7. Thus, the table shows that skewness and kurtosis values for all variables fall within the acceptable range.

¹ Kurtosis indicates the extent to which the height of the curve (probability density) differs from that of the normal curve. Positive kurtosis is associated with distributions with long, thin tails, whereas negative kurtosis is associated with shorter, fatter tails relative to the normal curve (West et al., 1995). In other words, Kurtosis is a measure of a distribution's peakedness (or flatness). Distributions where responses cluster heavily in the centre are peaked. Distributions with scores more widely distributed and tails further apart are considered flat (Hair et al., 2003).

² Skewness is a measure of symmetry of a distribution. A positively skewed distribution has relatively few large values and tails off to the right, and negatively skewed distribution has relatively few small values and tails off to the left. Skewness values falling outside the range of -1 to +1 indicate a substantially skewed distribution (Hair et al., 1998).

Table 8.7: Skewness and Kurtosis values of the research variables

Research variables	Skewness	Kurtosis
Market share (MSHARE)	-0.246	-0.939
Product differentiation (PRODDIFF)	0.129	-0.729
Innovative differentiation (INNDIFF)	0.126	-0.433
Importance of cost (DECISNUSE)	-0.818	0.123
Influence in determining prices (PPOWER)	0.088	-1.128
Degree of customisation (CUSTOM)	-0.261	-1.002
volume diversity (VDIVERST)	-0.616	0.350
Market competition (MARKCOM)	-0.465	1.124
Product competition (PRODCOM)	-0.878	1.101
Organisation size (SIZE)	1.00	1.727
Total quality management (TQM)	-0.444	-0.406
Importance of cost-plus pricing (CPLUS)	0.418	-1.025
The extent to which the costing system resembles an ABC system (ABC)	0.100	-0.587
The extent to which the costing system resembles a complex costing system (COMPLEX)	0.309	-0.520

The data was also screened for multicollinearity⁶. To check for multicollinearity, EQS 5.7 programme automatically detects if singularity between variables is present by generating error message and aborting analysis. Thus, multicollinearity and singularity did not appear to be present in the data. Furthermore, it should be noted that two cases were identified by the programme as multivariate outliers and were thus deleted. This is consistent with the recommendation by West et al. (1995) to drop extreme cases (i.e. outliers). Having screened the data for distribution, outliers, missing values, multicollinearity and singularity, it was deemed appropriate to proceed with testing the structural models. Thus, the following are the constructs used in testing the three sets of hypotheses:

- Business strategy construct consists of two dimensions (PRODDIFF) and (INNDIFF).

⁶ Multicollinearity is the “extent to which a variable can be explained by the other variables in the analysis. As multicollinearity increases, it complicates the interpretation of the variate as its more difficult to ascertain the effect of any single variable, owing to their interrelationships” (Hair et al., 1998).

- Intensity of competition consists of market competition (MARKCOM) and product competition (PRODCOM).
- Total quality management construct (TQM).
- Importance of cost information (DECISNUSE)
- Manufacturing/services diversity by one dimension volume diversity (VDIVRSTY)
- Organisation size construct (SIZE).
- Market share construct (MSHARE)
- Degree of customisation construct (CUSTOM)
- Influence in determining prices construct (PPOWER)
- Importance of cost-plus pricing construct (CPLUS)
- Level of cost system sophistication construct (SOPHIST) by two dimensions (ABC) and (COMPLEX)
- Organisational performance construct (PERFORMANCE)

8.4 Testing the research hypotheses

8.4.1 Testing the hypotheses relating to factors influencing the level of cost system sophistication

The hypotheses of this section seek to investigate the relationships between the independent variables (MSHARE, CUSTOM, VDIVRSTY, TQM, INNDIFF, PRODDIFF, MARKCOM, PRODCOM, DECISNUSE, SIZE, and PPOWER) and the level of cost system sophistication (SOPHIST). Thus, the general hypothesised model shown in Chapter 5 Figure 5.1 was tested based on the hypothesised relationships between the independent and dependent variables using EQS 5.7 (Bentler, 1995). The structural equation model was examined with eleven paths (see Figure 8.8).

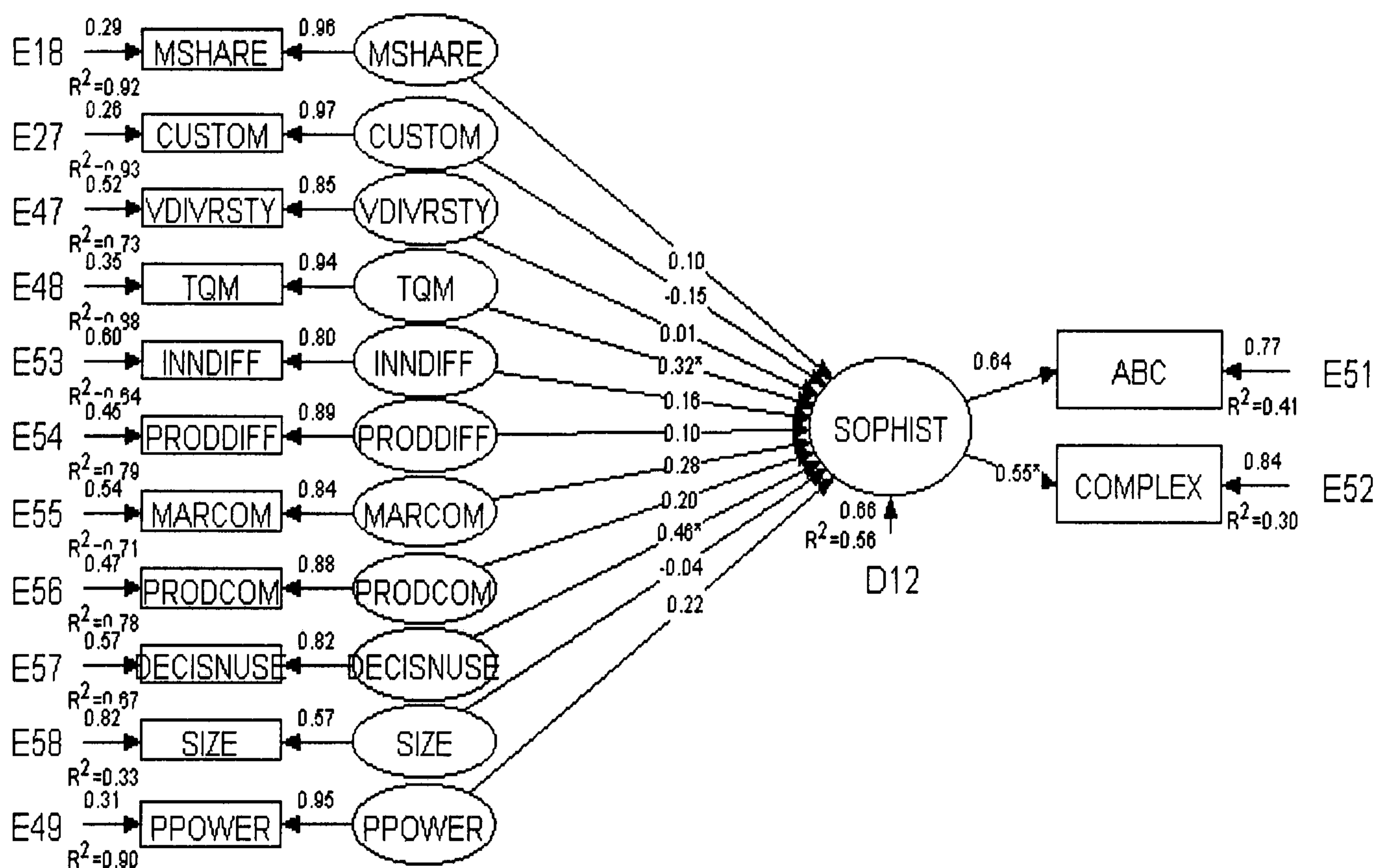
It should be noted at this stage that there are two methods for incorporating the independent and dependent variables in structural equation modelling (Ruyter and Wetzels, 1999). The first is to use a latent variable model with all indicators (i.e. all items that represent the variable) in the structural model. The second method is to use an aggregate model where composite measurement scales of all indicators for each variable are constructed for each construct. It has been argued (e.g. Bentler and Chou, 1987; Bagozzi and Heatherton, 1994; Baumgartner and Homburg, 1996) that model complexity in terms of the number of constructs and/or indicators using a latent

variable model (the first method) with multiple indicators might prevent the researcher from finding a model fitting to the data. In addition, the two methods yield the same results (Ruyter and Wetzels, 1999). Thus, the composite scales method (second method) was used to reduce the complexity of the model. This method requires multi-item measures for each variable being summed and the total being used as a single-item indicator for the variable (Hair et al., 1998). In addition, the composite score for the two dimensions of sophistications was used to produce an overall sophistication measure. Measurement error variances can however be estimated from reliability estimates and therefore incorporated into the structural model whereby the measurement error variance of each summated scale¹⁴ for each variable is fixed at 1 minus the value of reliability coefficient (Ruyter and Wetzels 1999; Steenkamp and Baumgartner, 2000). In this context, Hair et al. (1998) argue that researchers may incorporate the reliability into the statistical estimation to improve the model. In addition, for variables with only one indicator, the researcher should specify the reliability because the estimation of reliability is not possible unless the variable has two or more indicators (Hair et al., 1998). In this study, measurement error terms for single-item variables (e.g. market share, organisation size, and organisational performance) were set at 0.20. In this context, Singhapakdi et al. (1999, p. 27) state that:

The implied reliability value of 0.80 is a more conservative arbitrary value than the 0.85 value recommended by Joreskog and Sorbom (1982) for estimating measurement error in single-item measures.

¹⁴ Method of combining several variables that measure the same concept into a single variable in an attempt to increase the reliability of the measurement through multivariate measurement. In most instances, the separate

Figure 8.8: The tested model of contingent variables on costing system sophistication



The path TQM → SOPHIST is used to provide a portrayal of the model in order to indicate how its various components relate to each other. The TQM in the box is the observed measurement of total quality management variable. Associated with each observed variable is an error term in this case E48. Each of these has a variance parameter associated with it. The single-headed arrow leading from the ellipse of TQM to the box of TQM represents the proposed regression of item scores on the factor. One-way arrows represent structural regression coefficients and thus indicate the impact of one variable on another. Therefore in the Figure 8.8 the unidirectional arrow leading from TQM to the SOPHIST implies that TQM impacts SOPHIST. The SOPHIST is a latent variable and ABC and COMPLEX are observed variables and function as indicators of their respective underlying latent factor (SOPHIST). A residual term (disturbance term D12) is associated with the factor being predicted

variables are summed and then their total or average score is used in the analysis (Hair et al., 1998).

(SOPHIST). Residual terms are indicative of less than perfect prediction of the unobserved factor. Each error term also has a variance parameter.

The analysis procedures to test the hypotheses of this section require evaluating the model goodness-of-fit to check if the hypothesised model is similar to the observed data. Thus, similar to the procedures followed for assessing the measurement model goodness-of fit discussed earlier in Sections 8.2.3 and 8.3, several fit indices will be used for assessing the structural model goodness-of fit including Chi-square, CFI, NNFI, RMSEA, GFI and AGFI.

The review of goodness-of-fit values exceeded the recommended values suggested by Chau (1997). These values are presented in Table 8.8. Furthermore, the coefficient of determination R^2 of the regression paths is 0.56. This means that 56% of the total variance in cost system sophistication was accounted for by the eleven independent variables. In addition, the significance of the parameter estimates was evaluated based on the beta coefficients (i.e. the calculated t-values for each coefficient described in sub-section 8.2.4).

Table 8.8: Recommended values of goodness-of-fit measures and values of the model's in figure 8.8

Goodness-of-fit measures	Recommended values	Actual values
Chi-square	$P \geq .05$	0.69
Goodness-of-fit index (GFI)	≥ 0.90	0.95
Adjusted goodness-of-fit index (AGFI)	≥ 0.80	0.90
Normed fit index (NFI)	≥ 0.90	0.90
Comparative fit index (CFI)	≥ 0.90	1.00
Non-normed fit index (NNFI)	≥ 0.90	1.00
Root mean square error of approximation (RMSEA)	< 0.10	0.000

Thus, the results of SEM analysis and the discussion are now presented.

H1: *The higher the market share the higher the level of cost system sophistication.*

Reviewing the hypothesised model revealed a beta = 0.10 (t-value = 0.791) resulting in the completely standardised coefficient of MSHARE→SOPHIST regression path being not significant. Thus, H1 is rejected at the 0.05 significance level since the calculated t-value is less than the critical t-value of 1.645.

The indirect effect is one of the most important attributes of SEM, which shows the effect of an independent variable on a dependent variable through one or more intervening or mediating variables (Hoyle, 1995). With regard to the indirect effect, the results of SEM confirmed the direct relationship (i.e. MSHARE→SOPHIST), as

the direct effect of market share on sophistication is a combination of the indirect effect of market share on both dimensions of sophistication (ABC and COMPLEX). Therefore the indirect effect of market share on sophistication through the effect on each ABC and COMPLEX was investigated. No significant relationships were found between MSHARE and each of ABC and COMPLEX with a standard coefficient (beta) of 0.04 for both paths and (t-values of 0.671, and 0.788) respectively.

It was hypothesised that achieving and maintaining high market share require more elaborate cost system that provide reasonably accurate cost information so that a meaningful competitive strategy can be established. However, the findings based on the data collected from this survey do not support this hypothesis.

H2: *The lower the degree of customisation the higher level of cost system sophistication*

The review of the hypothesised model revealed a beta = -0.15 (t -value = -1.204) of the completely standardised coefficient of CUSTOM→SOPHIST. Thus the regression path is not significant. Thus, **H2** was rejected at the 0.05 significance level.

The results of SEM indicated an indirect and insignificant relationships between the degree of customisation and two dimensions of sophistication with a (standard coefficient beta = -0.06, and -0.05; t-values =-.982, and -1.194) respectively.

The extent of customisation being not significant is consistent with the results of Malmi (1999). However, the sign of customisation was negative as expected which is consistent with Bjornenak's (1997) findings that non-ABC adopters made significantly more customised products than adopters. Krumwiede (1998) also reported that firms with continuing manufacturing processes rather than operating in a job shop environment were more likely to consider ABC adoption⁷. Bjornenak concluded that a customised production may increase the cost of developing a more sophisticated costing system.

Drury and Tayles (2005) reported that this variable was significant at the 5% level in terms of influencing the level of costing system complexity. However, the finding in this research indicates a negative but non significant relationship between level of customisation and the level of cost system sophistication. An interpretation of this

⁷The three studies used different measures for customisation (see Chapter 4 section 4.2.3.2).

finding could be that different measures for cost system attributes were used by this study compared with the abovementioned ones (see Chapter 4 section 4.2.3.2).

H3: *The greater the level of manufacturing/service diversity the higher the level of cost system sophistication*

The review of the hypothesised model revealed a beta = 0.01 (t-value = 0.082) of the completely standardised coefficient of VDIVRSTY→SOPHIST. Therefore, the regression path is not significant. Thus **H3** was rejected at 0.05 significance level.

With regard to the indirect effect, the results of SEM confirmed the results of the direct relationship (i.e. VDIVRSTY →SOPHIST), in which non significant relationships were found between VDIVRSTY and each of ABC and COMPLEX with a standard coefficient (beta) ranging from 0.008, 0.007 (t-values ranging from 0.005 to 0.082).

Although it has been argued in the literature that manufacturing diversity may lead to the reporting of distorted products costs by traditional costing systems the results of the study showed no significant relationship between the level of diversity measured by volume diversity⁸ and the level of cost system sophistication. However, manufacturing diversity includes support, process as well as volume diversity. In terms of product diversity, manufacturing diversity was found not to be significant in the studies undertaken by Bjornenak (1997) and Clarke et al. (1999). However, Malmi (1999) reported that product diversity was significant ($p < 0.1$). Krumwiede (1998) also found a significant relationship between the degree of potential for cost distortion (measured by a composite score derived from various measures of product and volume diversity) and ABC adoption.

H4: *The extent of the use of total quality management has a positive impact on the level of sophistication of the costing system.*

Reviewing the hypothesised model also revealed that beta = 0.32 (t-value = 2.402) of the completely standardised coefficient of TQM→SOPHIST. Therefore, the regression path is significant. Thus, this result supported **H4** at 0.05 significance level since the calculated t-value is more than the critical t-value = 1.645.

⁸ Volume diversity has emerged as a measure for diversity while product diversity was excluded because of unacceptable level of reliability (see sub-section 8.3.5).

With regard to the indirect effect, the results of SEM confirmed the results of the direct relationship (i.e. TQM→SOPHIST), in which significant relationships were found between TQM and each of ABC and COMPLEX with a standard coefficient (beta) ranging from 0.22, 0.197 (t-values ranging from 2.304 to 2.325).

It has been argued in Chapter 2 (sub-section 2.3.2.2) that traditional costing systems are not appropriate in total quality management settings. In addition, the management accounting literature has supported the idea that organisations implementing total quality management initiatives are associated with a greater use of ABC systems. The literature on the product costing supports the above result in which the use of total quality management has a positive impact on the level of cost system sophistication. It has been argued that today's manufacturing environment can be characterised by intensified competition, market changes and high customer demand. These conditions require a manufacturing company to concentrate more on continuously improving quality and the aspects of total quality management (Johnson and Kaplan, 1987). Thus simple costing systems do not portray the overhead cost behaviour of modern manufacturing facilities. The cost of these resources should be therefore, allocated according to Kaplan (1985) and Cooper and Kaplan (1987) using cause-effect relationships between the activities needed to produce the products or services and the consumption of the activity resources by products. Thus, the finding supports that companies that pursue TQM are more likely to use sophisticated costing systems. Empirical work by Krumwiede (1998) however, did not support the proposition that one of the important initiatives that encourage the adoption of activity-based costing is the use of total quality management.

H5: *A differentiation strategy has a positive impact on the level of cost system sophistication.*

The review of the hypothesised model for the differentiation strategy dimensions (i.e. INNDIFF and PRODDIFF) revealed a beta of 0.16 and 0.10 (t-value = 1.048 and 0.734) for the two completely standardised coefficients of INNDIFF→SOPHIST and PRODDIFF→SOPHIST. Thus the regression paths for differentiation strategy dimensions are not significant. Thus, **H5** was rejected at the 0.05 significance level.

The results of SEM indicated indirect and insignificant relationships between the differentiation strategy and the two dimensions of sophistication with a standard

coefficient beta = 0.16, and 0.145 (t-values = 0.964 and 1.041) for INNDIFF and ABC, COMPLEX respectively), and beta = 0.07, and 0.06 (t-values = 0.347 and 0.732) for PRODDIFF and ABC, COMPLEX respectively.

The findings of the structural model imply that differentiation strategy has no significant impact on the level of cost system sophistication. It was argued in the literature (Malmi 1999 building on Porter, 1980, 1985) that companies competing in cost leadership need more sophisticated product costs than companies competing in product differentiation. Therefore, it can be concluded that adopting a differentiation strategy may not be related to the extent of sophistication of product costing systems in the UK companies. According to Chenhall and Langfield-Smith (1998), Porter contended that a firm should choose between competing on either product differentiation or low cost. However, because of the difficulty experienced in this research in term of finding a suitable measure for low cost strategy the model did not test the impact of this strategy on the extent of sophisticated costing systems usage⁹.

Business strategy was also found to be not significant empirically by the study of Malmi (1999). Gosslin (1997), however, reported business strategy to be a significant factor in the adoption of ABC systems. Possible explanation for these contradictory results may relate to the different measures of business strategy used. While the former used cost leadership versus product differentiation measure and found no relationship between low cost leadership strategy and ABC, the latter used prospectors versus defenders and reported companies following a prospector strategy were more likely to adopt the activity management approach than companies following other approaches.

H6: *The intensity of competition has a positive impact on the level of cost system sophistication.*

To recall from the discussion in sub-section 8.3.2, intensity of competition was measured in this research by two dimensions, MARKCOM and PRODCOM. Therefore, the structural model analysis was estimated with two paths MARKCOM→SOHIST and PRODCOM→SOHIST (see Figure 8.8). Reviewing the hypothesised model for the two paths revealed betas of .28 and 0.20, (t-values = 1.878 and 1.402), thus, indicating a non-direct significant effect of product competition on

⁹ The measure for low cost strategy showed low level of reliability, therefore, it was excluded.

the level of cost system sophistication, and a direct significant effect of market competition on the level of cost system sophistication.

The indirect results also show a non significant relationship between PRODCOM and the two dimensions of cost system sophistications (i.e. ABC and COMPLEX) with a standard coefficient (beta) ranging from 0.13 to 0.12 (t-values ranging from 1.202 to 1.385). The indirect results show a significant relationship between MARKCOM and the two dimensions of cost system sophistications (i.e. ABC and COMPLEX) with a standard coefficient (beta) ranging from 0.25 to 0.22 (t-values ranging from 1.677 to 1.840). Therefore it can be concluded that only one dimension of competition (MARCOM) affects costing system sophistication.

This result (the significant effect of market competition on both dimensions of cost system sophistication) is consistent with the results of several studies that suggested that companies facing intensely competitive market environments tend to rely on relatively more sophisticated management accounting systems.

The literature on costing systems support the above direct results in which the extent of usage of elaborate costing systems, such as ABC, is necessary for coping with the intensity of competition. However, empirically this result is inconsistent with the findings of Drury and Tayles (2005) that found that the competitive environment was not a significant variable. Malmi (1999) reported a positive impact of market competition on the adoption of ABC systems ($p < 0.5$). However, Bjornenak (1997) found that non ABC adopters face higher levels of market competition ($p < 0.1$)¹⁰. Therefore, the findings relating to the significant effect of market competition on both dimensions of cost system sophistication is consistent with the results of Malmi and others (Libby and Waterhouse, 1996; Simons, 1990) that suggested that companies facing intensely competitive market environments tend to rely on relatively more sophisticated management accounting systems.

H7: The higher the importance of costs the higher the level of cost system sophistication

The hypothesised model resulted in a beta of 0.46 (t-value =2.937) for the completely standardised coefficient of DECISNUSE→SOPHIST. Therefore, the regression path is

¹⁰ Contradictory results were found by these two studies although both studies have used the same measure for competition which is the percentage of sales exported.

significant. Thus, this result supported **H7** at 0.05 significance level since the calculated t-value is more than the critical t-value = 1.645.

With regard to the indirect effect, the results of SEM confirmed the results of the direct relationship (i.e. DECISNUSE → SOPHIST), in which significant relationships were found between DECISNUSE and each of ABC and COMPLEX with a standard coefficient beta = 0.31 and 0.411 (t-value = 2.611 and 2.799 respectively).

This result is not consistent with the study by Krumwiede (1998) who reported a non-significant relationship between the need for cost data for strategic decisions and cost reduction and the adoption of ABC.

H8: *Organisation size has a positive impact on the level of cost system sophistication*

The structural model analysis aimed to test **H8** was estimated with one path SIZE → SOPHIST (see Figure 8.7). The review of the hypothesised model revealed a beta = -0.04 (t-value = -0.154) of the completely standardised coefficient of SIZE → SOPHIST. Thus the regression path is not significant. Thus, **H8** was rejected at the 0.05 significance level.

The results of SEM indicated an indirect and insignificant relationships between organisation size and the two dimensions of sophistication with a standard coefficient beta = -0.08, and -0.07 (t-values = -0.121, and -1.153) respectively.

This result is surprising taking into consideration the results of other studies, who found that size to be a significant factor influencing ABC adoption (Clarke et al., 1999; Krumwiede, 1998).

H9: *The higher the influence in determining selling prices the higher the level of cost system sophistication*

The structural model analysis aimed to test **H9** was estimated with one path PPOWER → SOPHIST (see Figure 8.7). The review of the hypothesised model revealed a beta 0.22 = (t-value = 1.740) of the completely standardised coefficient of PPOWER → SOPHIST. Thus the regression path is significant. Thus, **H9** was accepted at the 0.05 significance level.

The results of the SEM indicated an indirect and significant relationship between the influence in determining selling prices and the second dimension of sophistication (COMPLEX) with a standard coefficient beta = 0.1 (t-value = 1.709) and an

insignificant relationship with the first dimension (ABC) with a standard coefficient $\beta = 0.11$, and (t -values=1.15).

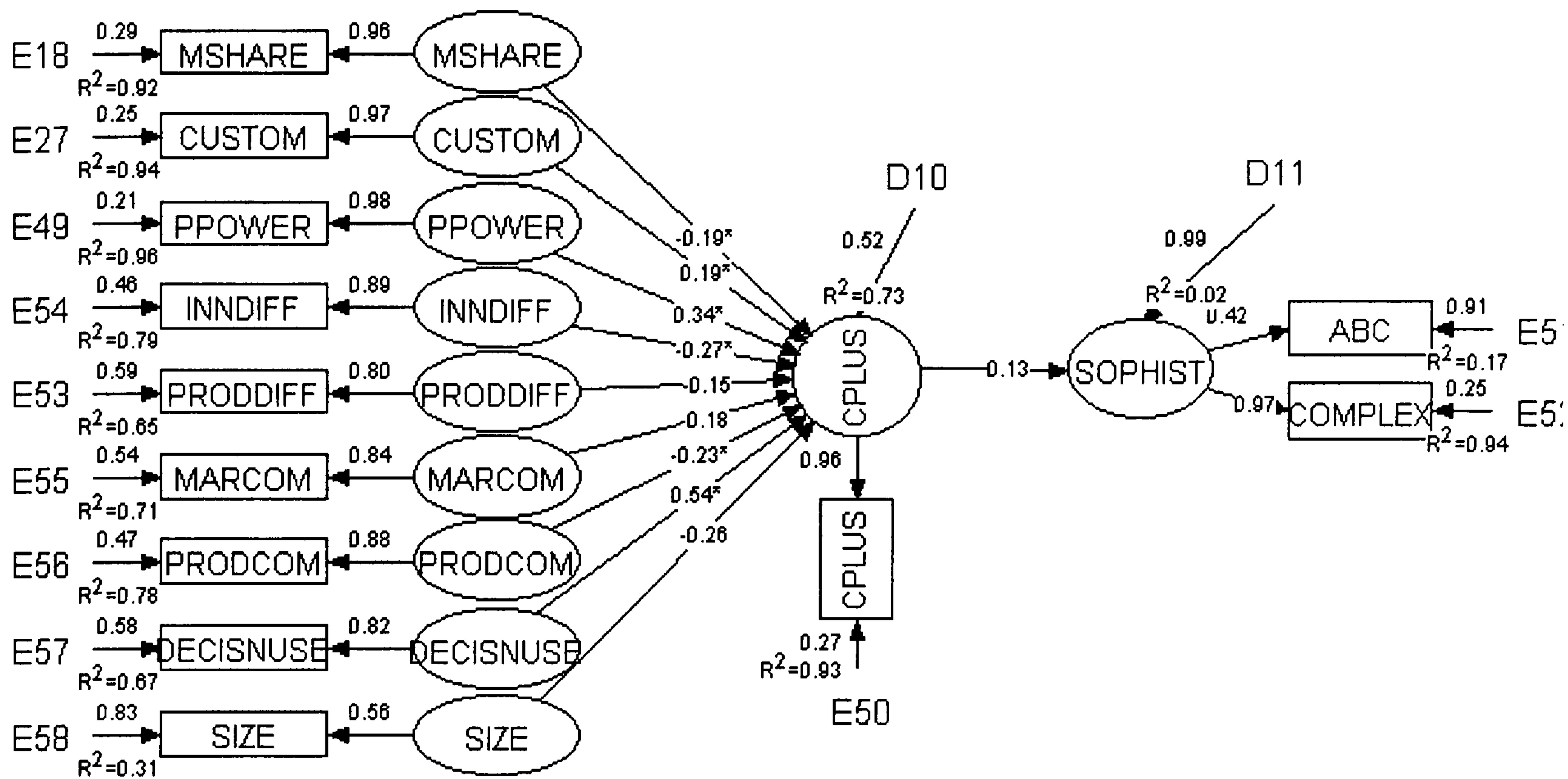
This finding that the more influence in determining selling prices the more sophisticated costing system was as hypothesised based on the arguments made in most cost accounting leading texts that a price maker firm should have an elaborate costing system that reports accurate product costs to make pricing decisions (see Chapter 3 section 3.4.2.2.1).

Overall, the model had nine hypotheses, three of which (H4, H7, and H9) were supported by the tests, and one was partially supported (H6).

8.4.2 Testing the hypotheses relating to factors influencing the importance of cost-plus pricing and the relationships between cost-plus pricing and the cost system sophistication

The structural model in SEM tests the hypothesised relationships among variables simultaneously. The model in this section comprised of eleven hypotheses. The hypotheses focus on investigating the relationships between the independent variables (MSHARE, CUSTOM, PPOWER, INNDIFF, PRODDIFF, MARKCOM, PRODCOM, DECISNUSE, and SIZE) and the importance of cost-plus pricing (CPLUS). Also the research investigates the relationship between the importance of cost-plus pricing (CPLUS) and the level of cost system sophistication (SOPHIST) in the presence of these variables (i.e. it tests the indirect effects of these independent variables on cost system sophistication through the importance attached to cost-plus pricing as the intervening variable). Thus, the hypothesised model was tested based on the hypothesised relationships using EQS 5.7 (Bentler, 1995). Figure 8.9 reports the results of testing.

Figure 8.9: The tested model of cost-plus pricing and level of cost system sophistication



The analysis procedures to test the hypotheses of this section require evaluating the model goodness-of-fit to check if the hypothesised model is similar to the observed data. The review of goodness-of-fit values exceeded the recommended values suggested by Chau (1997). These values are presented in Table 8.9. Furthermore, it should be noted that two cases were identified as multivariate outliers and were thus deleted. The coefficient of determination R^2 of the regression paths is 73%. This means that 73% of the total variance was accounted for by the independent variables. In addition, the significance of the parameter estimates was evaluated through beta coefficients, the calculated t-values for each coefficient and the coefficient of determination.

Table 8.9: Recommended values of goodness-of-fit measures and values of the model's in figure 8.9

Goodness-of-fit measures	Recommended values	Actual values
Chi-square	$P \geq .05$	0.08
Goodness-of-fit index (GFI)	≥ 0.90	0.93
Adjusted goodness-of-fit index (AGFI)	≥ 0.80	0.94
Normed fit index (NFI)	≥ 0.90	0.90
Comparative fit index (CFI)	≥ 0.90	0.92
Non-normed fit index (NNFI)	≥ 0.90	0.91
Root mean square error of approximation (RMSEA)	< 0.10	0.05

Thus, the results of SEM analysis and the discussion are now presented.

H1: *Market share negatively influences the importance attached to cost-plus pricing*

The hypothesised model resulted in a beta of -0.19 (t-value = -1.996) for the completely standardised coefficient of MSHARE→CPLUS. Therefore, the regression path is significant. Thus, this result supported **H1** at 0.05 significance level since the calculated t-values are more than the critical t-value = 1.645.

The finding suggested that firms with lower market shares attach greater importance to cost-plus pricing. Firms with lower market shares tend to operate in smaller market niches where products may tend to be more customised and there is no established price. Hence they may attach more importance to cost plus pricing. Therefore the lower market share the more influence that is attached to cost-plus pricing so the finding fully supports the hypothesis.

H2: *The degree of customisation is positively related to the importance attached to cost-plus pricing*

The structural model analysis for testing **H2** was estimated with one path CUSTOM→CPLUS (see Figure 8.9). The review of the hypothesised model revealed a beta = 0.19 (t-value 2.116) of the completely standardised coefficient of CUSTOM→CPLUS. Thus the regression path is significant. Thus, **H9** is supported at the 0.05 significance level.

This finding conflicts with the findings of Skinner (1970) but is consistent with a more recent study by Gordon et al. (1981), which found cost-plus pricing was more dominant for customised products, as opposed to standardised products.

H3: *The degree of influence in determining selling prices is positively related to the importance attached to cost-plus pricing*

The structural model analysis tested **H3** was estimated using the path PPOWER→CPLUS. The model revealed a beta =0.34 (t-value =3.471) of the completely standardised coefficient of PPOWER→CPLUS. Thus the regression path is significant and **H3** is supported at the 0.05 significance level.

The view expressed in the accounting normative literature that a relative price making orientation provides a considerable appeal for the use of cost plus-pricing is supported by the findings. This is consistent with Gordon et al. (1981) who reported that market pricing dominates over cost based pricing for products where a price-following policy has been carried out. Gotez (1985), however reported that although the majority of respondents were price makers market leadership had no effect on the preference for a cost-plus pricing strategy.

H4: *A differentiation strategy has a positive impact on the importance attached to cost-plus pricing*

The differentiation strategy dimensions (i.e. INNDIFF and PRODDIFF) revealed betas of -0.27 and -0.15 (t-values = -2.675 and -1.341) for the two completely standardised coefficient of INNDIFF→CPLUS and PRODDIFF→CPLUS. Thus the regression path for the differentiation strategy dimensions is significant for the first dimension INNDIFF, resulting in **H4** being accepted for the first dimension but for the opposite direction, and rejected for the second dimension at the 0.05 significance level.

It was argued in the literature that companies pursuing low cost strategy usually set lower prices. Therefore, the firm's costs are usually lower than those of the competitors, thus implying that more importance is attached to the cost information in price setting. It was hypothesised that companies following a differentiation strategy generally deal with customised products/services which are of unique value to the customers and therefore, may attach high importance to cost-plus pricing. However, the finding indicates a significant but negative relationship between differentiation and the importance attached to cost-plus pricing. An interpretation of this finding could be that it may be the case that for differentiators a higher importance is attached to competition considerations and hence, lower importance is attached to cost-plus pricing. In other words consideration is given to the price and value of a given product or service against those of a comparable product or service rather than its costs, and therefore, cost information is not as important in price setting.

H5: *The intensity of competition has a negative impact on the importance attached to cost plus pricing.*

The structural model analysis was estimated with two paths MARKCOM→CPLUS and PRODCOM→CPLUS (see Figure 8.9). The hypothesised model for the two paths

revealed betas of -.18 and -0.23, (t-values = -1.716 and -2.267), thus, indicating a direct negative significant effect of PRODCOM on CPLUS and a negative significant effect of MARCOM on CPLUS. Therefore **H5** is accepted at the 0.05% significance level since the calculated t-values are more than the critical t-value = 1.645. This indicates that intensity of competition has a negative impact on the importance of cost plus-pricing.

This is inconsistent with the finding of Gordon et al. (1981) who reported that companies that vigorously competed on the basis of product quality also tended to rely more heavily on costs. Also the result is inconsistent with Guilding et al. (2005) who found that competition intensity was positively related to the importance of cost-plus pricing. An interpretation of this finding may be that the higher the intensity of competition the greater the importance that is attached to competitive pricing rather than cost-plus pricing.

H6: *The importance of cost information is positively related to the importance attached to cost-plus pricing*

The output from the model revealed betas of 0.54 (t-value =3.669) of the completely standardised coefficient of DECISNUSE→CPLUS. Therefore, the regression path is significant. Thus, this result supports **H6** at the 0.05 significance level since the calculated t-values are more than the critical t-value = 1.645.

It was hypothesised that when cost information is being highly utilised for decision making a greater reliance would be on cost-plus pricing. The findings support this argument. This finding is also consistent with Gotez (1985) that the firms that set prices based on market factors deemed cost data to be less important.

H7: *Organisation size has a positive impact on the importance attached to cost-plus pricing*

The structural model to test **H7** was based on the path SIZE→CPLUS. The review of the hypothesised model revealed a beta = -0.26 (t -value = -1.504) of the completely standardised coefficient of SIZE →CPLUS. Thus the regression path is not significant. Thus, **H7** was rejected at the 0.05 significance level.

This is consistent with the findings of Shim (1993) who reported that size was not found to have an effect on using cost-based pricing and Guilding et al. (2005) who reported that there was not a statistically significant positive relationship between

company size and cost-plus pricing. Guilding et al. (2005) attributed the failure to uncover a relationship between size and cost-plus pricing to the fact that many large firms can be expected to have a wide range of products or services and each might have a limited market share.

H8: *The importance attached to cost-plus pricing has a positive impact on the level of cost system sophistication*

Reviewing the hypothesised model revealed a beta of 0.13 (t-value =0.645) of the direct completely standardised coefficient of CPLUS→SOPHIST. Therefore, the regression path is not significant. Thus, this result rejected **H8** at the 0.05 significance level since the calculated t-values is less than the critical t-value = 1.645. Therefore the findings indicate that there is no direct relationship between the importance attached to cost-plus pricing and the level of cost system sophistication.

H9: *The association between the importance attached to cost-plus pricing and the level of cost system sophistication is impacted by specific enabling variables which are: market share, degree of customisation, the degree of influence in determining selling prices, differentiation strategy, competition intensity, the importance of cost information, and size.*

The results of SEM indicated that there was no indirect relationship between CPLUS and SOPHIST, in which non significant relationships were found between the enabling variables MSHARE, CUSTOM, PPOWER, INNDIFF, PRODDIFF, MARCOM, PROCOM, DECISNUSE, SIZE through the intervening variable (the importance of cost-plus pricing – i.e. CPLUS) and the level of cost system sophistication dimensions ABC and COMPLEX¹¹.

Overall, the tests results of this section indicate that the importance attached to cost-plus pricing is influenced by market share, differentiation based on the first dimension of (Innovative differentiation), intensity of competition, influence in determining selling prices and the importance of cost information. However, no direct significant relationship was found between the importance attached to cost-plus pricing and cost systems sophistication, also no indirect effects were found on level of cost system

¹¹ The standard coefficient betas were respectively -0.008, 0.007, 0.014, -0.016, -0.013, -0.014, -0.013, 0.047, -0.055 (t-values of -0.613, 0.617, 0.632, -0.626, -0.581, -0.603, -0.620, 0.638, -0.591) for ABC and -0.18, 0.016, 0.032, -0.037, -0.30, -0.32, -0.031, 0.107, -0.125 (t-values of -1.015, 1.029, 1.113, -1.076, 0.881, -0.972, -1.048, 1.134, -0.903) for COMPLEX

sophistication through the importance of cost-plus pricing. One possible explanation may be that majority of cost-plus respondents indicated the use of direct costs as the base for pricing (see Chapter 7) and therefore, may not attach high importance to higher level of cost system sophistication in terms of assigning indirect costs to products/services.

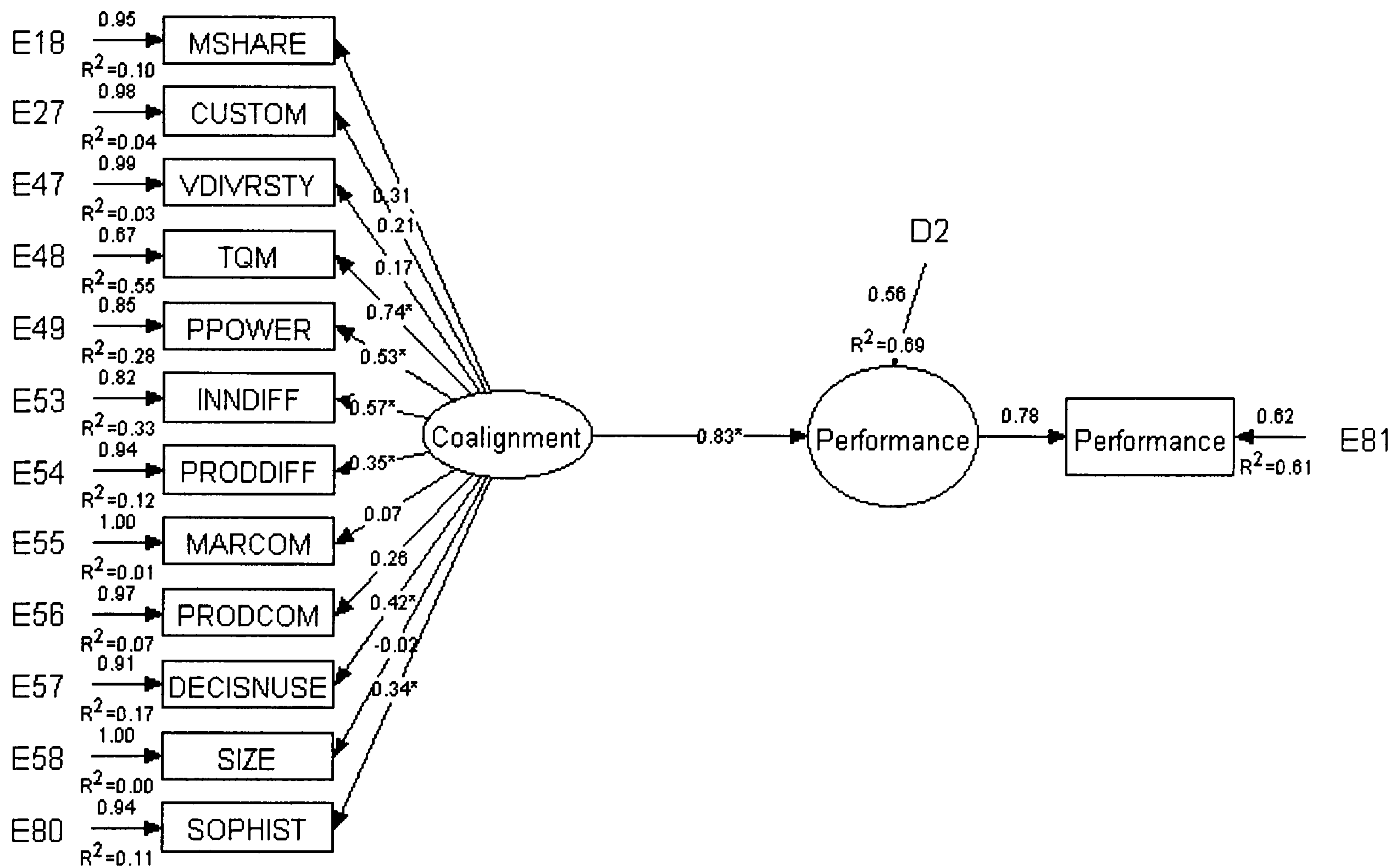
8.4.3 Testing the hypotheses relating to the effectiveness of level of cost system sophistication

The third stage of analysis aims to achieve the final objective of this study, which is concerned with investigating the effect of the coalignment (also termed internal consistency, contingency, congruency or more popularly, fit) between the contextual factors and cost system sophistication on organisational performance.

Thus, the analysis procedures for testing for coalignment requires evaluating the model goodness-of-fit and the significance of the parameter estimates. The statistical significance of the loading of first order factors (i.e. the contingent variables and the level of cost system sophistication) on the coalignment and, thus the magnitude and significance of path coefficient between coalignment and organisational performance, show the effect of this coalignment 'fit'. The hypothesis of this section is aimed at investigating the effect of coalignment 'fit' between the independent variables (MSHARE, CUSTOM, V DIVERSITY, TQM, PPOWER, INNDIFF, PRODDIFF, MARKCOM, PRODCOM, SIZE, and, DECISNUSE) and the level of cost system sophistication (SOPHIST) on organisational performance (Performance). The following hypothesis was formulated to test the coalignment effect of the independent variables and the dependent variable on organisational performance.

H1: *The fit or coalignment among the level of cost system sophistication, market share, customisation, manufacturing diversity, total quality management, influence in determining selling prices, business strategy, intensity of competition, size and the importance of costs has a positive impact on organisational performance.*

Figure 8.10: Coalignment model of contingent variables and cost system sophistication on performance



The structural model analysis that tested **H1** was estimated with the models fit (see Figure 8.10). The review of goodness-of-fit measures of the model well exceeded the recommended cut-off values (Chi-square 52.69; $P = 0.37$; GFI 0.93; AGFI 0.97; NFI 0.93; CFI 0.98; NNFI 0.98; RMSEA 0.02). The loadings of the contingent variables on the coalignment, as shown in the model, indicate that TQM, PPOWER, INNDIFF, PRODDIFF, DECISUSE and SOPHIST have significant loadings (*) with path coefficients of 0.74, 0.53, 0.57, 0.35, 0.42, and 0.34 respectively (t-values = 2.372, 2.811, 2.737, 2.543, 2.212, and 2.129 respectively). Thus, it can be concluded that TQM, PPOWER, INNDIFF, PRODDIFF, DECISUSE and SOPHIST contribute to the coalignment in the model. Reviewing the hypothesised model also revealed a significant path coefficient between coalignment and organisational performance (beta = 0.83, t-value = 2.559 $P < 0.05$), thus confirming the positive impact of coalignment on organisational performance (PERFORMANCE). The coefficient of determination R^2 of the regression path (coalignment \rightarrow performance) is 0.69. This means that the coalignment 'fit' between TQM, PPOWER, INNDIFF, PRODDIFF,

DECISUSE and SOPHIST explains 69% of the variance in organisational performance.

The extent of costing system sophistication appears to contribute to organisational performance in organisations following a differentiation strategy with some degree of power in setting selling prices, utilising cost information for decision making and using total quality management approach. Interpreting the results that have emerged from testing the hypotheses relating to organisational performance based on comparisons with previous empirical studies is not an easy task because of the lack of consistency in measuring organisational performance, the attributes of costing systems and testing the concept of fit in the previous studies. The results of this study show that the extent of sophistication system contributes to organisational performance in organisations implementing total quality management. This finding is consistent with Cagwin and Bouwman (2002) who reported that the use of strategic business initiatives (JIT, TQM, etc.) and activity-based costing systems can be related to improved performance. The results also show that the extent of costing system sophistication contributes to organisational performance in organisations that extensively utilise cost information. This result is also consistent with the findings by Cagwin and Bouwman (2002), which indicated that the use of ABC leads to improved performance in environments where costs are relatively important. However, the results of this study show that diversity of manufacturing/ service has no effect on level of cost system sophistication (also see section 8.4.1), and also in turn no significant effect on improvement of financial performance. This result contradicts with Cagwin and Bouwman (2002) which concluded that there is a positive relationship between ABC and improvement in financial performance when implemented in complex and diverse firms. With respect to the intensity of competition, this result is consistent with the findings by Cagwin and Bouwman (2002) who reported that the use of ABC in a competitive environment may not necessarily lead to an improvement in financial performance.

8.5 Summary

This chapter has shown the procedures undertaken and the stages employed by the researcher to test the research hypotheses. To operationalise, refine and validate the research constructs that were included in the research model presented in Chapter 5 (Figure 5.1) the measurement model analysis in SEM was conducted with EQS

version 5.7 statistical software package. Both exploratory and confirmatory factor analyses were utilised to anticipate and evaluate the measurement model for most of the research constructs. Each construct under investigation was modelled as a separate measurement model and was assessed separately for dimensionality, reliability and validity. The data were also screened to check for normality, missing values and outliers.

In the second part of the chapter analytical statistics were employed using structural equation modelling (SEM) to test the research model. The first stage of analysis focused on investigating the relationships between the contingent variables and the level of cost system sophistication represented in the first research theoretical model (Figure 8.1) and discussed in Chapter 5. Structural path analyses were constructed to investigate the direct and indirect effects of the contingent variables on cost system sophistication. The second stage of analysis was concerned with testing the relationships between the contingent variables and the importance of cost-plus pricing as discussed in Chapter 5, and in turn the level of cost system sophistication. The third and final stage of analysis was concerned with investigating the fit between all the contingent variables and the costing system sophistication on organisational performance represented in Chapter 5. The results of SEM using the t-values and beta coefficient have led to accepting some of the research hypotheses and rejecting others. Based on the related literature, a thorough discussion of the findings has not been presented in this chapter. However, a summary, and a more detailed discussion of the research findings will be presented in the next chapter.

Chapter 9

Major findings, contributions, and areas for future research

9.1 Introduction

9.2 Summary of the main findings

9.2.1 The results of descriptive statistics

9.2.2 The Results arising from the hypotheses tests

9.2.2.1 The results of hypotheses tests relating to factors influencing the level of cost system sophistication

9.2.2.2 The results of hypotheses tests relating to factors influencing the importance of cost-plus pricing and the relationship between the importance of cost-plus pricing and the level of cost system sophistication

9.2.2.3 The results of the hypothesis tests relating to the effectiveness of costing systems sophistication

9.3 Contributions of research to knowledge

9.4 Limitations and directions for future research

9.1 Introduction

This research has focused on various aspects relating to product costing. Several factors provided the motivation for undertaking research relating to product costing. First, the decreasing cost of information technology and the changes in manufacturing environment and the emergence of global competitive markets have resulted in increased attention recently being given to product costing systems. The limitations of observed costing systems in providing accurate product/service cost information have been highly publicised. The calls for further research in product/service costing systems, especially on the influence of potential explanatory factors on cost system design, provided a major incentive for undertaking this research. In addition, the importance of product cost information in determining selling prices and the limited number of previous studies in this area provided a further motivation to extend the research to examine the importance, relevance and application of product cost information as an input in making pricing decisions. It was also apparent from the initial literature review that many organisations do not make pricing decisions because prices are set by the markets or by dominant leaders. For such price-taking organisations product cost information is used for product/service profitability analysis to identify loss making products/services that may require to be discontinued. The literature review indicated that there was a dearth of empirical data relating to the role, content and use of product/service cost data in profitability analysis.

It was explained in Chapter five that the main objectives of the research were essentially formulated around the above mentioned three main themes – the nature of product costing systems and the factors influencing the choice of product costing systems, the use and nature of product costs in pricing decisions and periodic profitability analysis. The research objectives were therefore formulated based on pursuing the three themes. The specific objectives seek to identify and explore:

1. The level of sophistication of management accounting systems for product costing purposes in price-taking and price-making organisations;
2. The incidence, nature and role of profitability analysis and to ascertain the information that is used/extracted from within the profitability analysis for attention-directing and decision-making purposes;

3. The relationship between hypothesised contextual/contingent variables and the importance of cost information in making pricing decisions;
4. The *direct* relationship between hypothesised contextual/contingent variables and the level of sophistication of product costing systems;
5. The *indirect* relationship between hypothesised contextual/contingent variables specified in (3) above, acting through the importance of cost information for pricing decisions, and the level of sophistication of product costing systems;
6. The relationship between the contingent variables, the level of product costing system sophistication and organisational performance.

This chapter begins with a summary of the major findings emerging from the descriptive statistics and structural model analysis. This is followed by a section discussing the major contributions of this research, then the chapter concludes with a discussion of the limitations of the research and suggestions for future research.

9.2 Summary of the main findings

The section summarises the major findings that have emerged from the analysis of the data in chapters 7 and 8.

9.2.1 The results of descriptive statistics

Descriptive statistics using means and percentages were used to meet the first two objectives of the research. The following are the major findings:

- Most companies (70%) have costing systems that enable them to distinguish between direct and indirect costs and approximately 30% attempted to distinguish between cause-and-effect and arbitrary allocations of indirect costs.
- Unsophisticated costing systems based on fewer than 16 cost pools and 4 different types of cost drivers were used by 43% of the respondents whereas the remainder (57%) used more sophisticated systems (i.e. more than 15 cost pools and 4 or more different types of cost drivers). Only 7% out of the responding organisations used more than 20 cost pools and 4 or more different types of second stage cost drivers.
- The evidence suggested that most of the companies use fairly unsophisticated costing systems that may not accurately assign indirect costs to products. The majority of respondents (82%) relied extensively on using volume based overhead

rates with direct labour-based methods (44%) being the dominant method. The average usage for activity-based overhead rates was 12%.

- ABC systems coincide with the more sophisticated systems, as defined in this study. Only 14% of the respondents reported that they used a costing system that resembled an activity-based costing system. The majority of all respondents considered that their cost systems were not particularly accurate with only 13% attributing a score of 6 or 7 in terms of the perceived level of accuracy.
- The majority of firms indicated that they were somewhere in between price-setters and price followers. This suggests that they have some market power, but do not consider themselves to be market leaders. The findings suggested that price makers generally tend to have more sophisticated costing systems than followers.
- Non-manufacturing organizations tended to employ more sophisticated costing systems than manufacturing organizations.
- Respondents considered cost and market factors when determining the selling prices implying that managers are looking inward and outward to set their prices. However, cost information was considered to be an extremely important factor when making pricing decisions but in general firms were more market than cost oriented in pricing decisions. It is possible that respondents perceived that the cost information provided by the costing system might not be accurate. The findings indicated that firms with higher levels of cost system sophistication regarded cost information to be more important than market information when setting prices.
- Cost-plus pricing was used by 50% of the responding firms. Although respondents regarded cost-plus pricing as important, it appears that a fairly large proportion of companies used cost-plus pricing for a small sub-set of their total sales with approximately 60% of the respondents using it for less than 30% of their organisations' sales. This may imply that for those products, which represent a small percentage of total revenue and profit contribution, the pricing of such products may receive relatively less managerial attention compared with those products that represent a much larger percentages of the company's revenue or profits. Cost-plus pricing may be the easiest to follow under such circumstances.
- A direct costing measure was the most widely used measure for determining the cost base for using cost-plus pricing. A relatively low usage rate was reported in

respect of the use of cost bases that incorporate indirect cost allocations. The Wilcoxon matched pairs test indicated that direct cost-based pricing was used to a significantly greater extent than a full absorption cost pricing and that direct costing plus cause-and-effect allocations were used to a significantly less extent compared with direct costing or full absorption cost-based pricing.

- Most organisations routinely analysed profits of products and services on a monthly or quarterly basis. Only 7% of the respondents did not routinely analyse profits by products/services categories. It is apparent that routine profitability analysis is the norm. In addition, there was no significant difference between price makers and price takers in terms of the importance attached to profitability analysis. Both groups (not only price taker firms, as was argued in Chapter 3 section 3.4.1) considered profitability analysis to be very important to guide management in the selection of a profitable product mix and in the determination of how much cost can be incurred without sacrificing profit. It may be that in price maker firms where the cost-plus approach is not used in pricing that profitability analysis still plays a major role in distinguishing between profitable and unprofitable products in order to ensure that only profitable products are sold.
- In terms of profitability analysis direct costing was used to a greater extent than absorption costing based profitability measures. A low percentage of the responding organisations followed the approach suggested by Kaplan and Cooper and assigned direct costs and only those indirect costs where cause-and-effect allocation bases can be established. The incorporation of indirect costs relying on arbitrary allocation bases was also used to a small extent when interpreting profitability information for attention directing purposes. The Wilcoxon matched pairs test indicated that a direct costing profitability measure was used to a significantly greater extent than a full absorption costing measure and that direct costing plus only cause-and-effect allocations were used to a significantly less extent when compared with a direct costing measure.
- For the respondents that used cost information for both purposes (profitability analysis and pricing decisions) the Wilcoxon matched pairs test indicated that (1) direct costing and (2) direct costing plus cause and effect allocations were used to a significantly greater extent for profitability analysis compared with their usage

for pricing decisions. However, there were no significant differences in respect of the extent of usage for full absorption costing.

The nature of the costing system employed was compared for the manufacturing and service sectors. In addition, the food industry was compared with the manufacturing sector. No differences were found apart from those reported in Table 9.1. These findings support for the decision made in Chapter 8 regarding it being inappropriate to focus on examining the hypothesised models specifically in relation to the food industry¹.

Table 9.1: Significant differences between industries

Theme	Significant differences between manufacturing and non-manufacturing, food and other manufacturers
<i>Cost system sophistication</i>	⇒ A significantly greater number of cost pools were established in respect of firms operating in the non-manufacturing sector compared with those in the manufacturing sector.
	⇒ A significantly greater proportion of firms in the non-manufacturing sector compared with the manufacturing sector employed more sophisticated costing systems when measured by the first dimension (the extent that ABC type systems were employed).
<i>The importance of cost information for pricing decisions</i>	⇒ A significantly higher usage of direct variable cost based pricing and less reliance on full costs applied in the food industry compared with other manufacturers.

9.2.2 The results arising from the hypotheses tests

Structural equation modelling was utilised to test the research hypotheses to achieve the primary objective of this research - examining the impact of contextual factors on cost system design and pricing decisions in UK companies.

9.2.2.1 The results of the hypotheses tests relating to factors influencing the level of cost system sophistication

The hypotheses focused on investigating the relationship between hypothesised contextual/contingent variables and the level of sophistication of product costing systems (i.e. the fourth objective). A summary of the first set of hypotheses relating to cost system sophistication (H1-H9) and their results is presented in Table 9.2 for the direct effects and Table 9.3 for the indirect effects². These results suggest that several

¹This decision was also based on the limited number of responses of the food industry which is below the generally accepted minimum sample size to ensure appropriate use of MLE (100 to 150).

² The indirect effect in this case is the effect of contextual factors on each of the dimensions of cost system sophistication, while the effect of contextual factors on cost system sophistication represents the direct effect.

contingent variables have different effects on the level of cost system sophistication. A detailed discussion of these results was presented in the previous chapter.

Table 9.2: Summary of the contextual factors direct effects on the level of cost system sophistication

	The level of cost system sophistication			
	Expected	Beta	t-value	Comment
Market share (H1)	+	0.10	0.791	Rejected
Customisation(H2)	-	-0.15	-1.204	Rejected
Manufacturing/service diversity (H3)	+	0.01	0.082	Rejected
Total quality management (H4)	+	0.32	2.402	Accepted
Business strategy				
• Product Differentiation (H5)	+	0.16	1.048	Rejected
• Innovative differentiation (H5)		0.10	0.734	
Intensity of competition				
• Market competition (H6)	+	0.28	1.878	Partially accepted
• Product competition (H6)		0.20	1.402	
Importance of costs (H7)	+	0.46	2.937	Accepted
Organisation size (H8)	+	-0.04	-0.154	Rejected
The influence in determining selling prices (H9)	+	0.22	1.740	Accepted

Table 9.3: Summary of the contextual factors indirect effects on the level of cost system sophistication

	The level of cost system sophistication			
	The costing system resembles an ABC system(ABC)		The costing system resembles a complex costing system (COMPLEX)	
	Beta	t-value	Beta	t-value
Market share	0.04	0.671	0.04	0.788
Customisation	-0.06	-0.982	-0.05	-1.194
Manufacturing/service diversity	0.008	0.007	0.005	0.082
Total quality management	0.22	2.304*	0.197	2.325*
Business strategy				
• Product Differentiation	0.07	0.347	0.06	0.732
• Innovative differentiation	0.16	0.964	0.145	1.041
Intensity of competition				
• Market competition	0.25	1.677*	0.22	1.840*
• Product competition	0.13	1.202	0.12	1.385
Importance of costs	0.31	2.611*	0.411	2.799*
Organisation size	-0.08	-0.121	-0.07	-1.153
The influence in determining selling prices	0.11	1.15	0.1	1.709*

* = significant

All of the results reported in tables 9.2 and 9.3 were insignificant with the exception of total quality management, intensity of competition, importance of costs, and influence in determining selling prices.

The findings indicate that the use of total quality management has a positive impact on the level of cost system sophistication. It would appear that in the current competitive environment, customer preferences have become vital. Therefore, to remain competitive firms need quality activities to ensure that their products/services do meet the demands of customer satisfaction. This may result in quality costs representing a significant amount of the total cost of the product or service. Thus the need arises to have an appropriate cost system that integrates quality cost information into the management cost system. It has also been argued that strategic business initiatives such as TQM have influenced the use of more sophisticated form of costing systems such as ABC. Prior studies have found evidence that ABC firms often link ABC to their formal quality manufacturing practices. Based on the above findings, it appears that the extent of usage of TQM plays a major role in influencing the use of sophisticated costing systems.

The findings also indicate that the importance of costs has a positive impact on the level of cost system sophistication. The importance of costs is affected by the competitive environment, the firm's need for cost data in strategic decisions, and cost reduction efforts. It was argued that decision usefulness of cost information may affect ABC adoption. It can be concluded based on the findings that even if sophisticated costing systems such as ABC could substantially reduce product cost distortions they are not likely to be adopted unless firms can actually utilise better cost information in their decision-making processes.

The findings indicated a significant effect of the market dimension of competition on cost system sophistication. It would appear that as competitive pressures continue to intensify in the marketplace, companies are demanding more from their costing systems. Several studies concluded that traditional costing systems are inappropriate in today's competitive environment. Based on the findings of this study it would appear that the usage of sophisticated costing systems is a necessary step for companies to cope with the intensity of market competition.

The findings also indicated that the influence in determining selling prices had a significant direct effect on cost system sophistication. It should be noted that the Mann-Whitney test with regard to the first objective (comparing the level of cost system sophistication between price-makers and price-takers) examined the difference between both groups in terms of cost system sophistication. There was a significantly

higher level of cost system sophistication in terms of only the second dimension of sophistication (see Chapter 7 section 7.3.3) for price makers compared with price-takers. The structural equation test however, confirmed this result by indicating an indirect significant effect on the complexity dimension of sophistication (the second dimension). However, a non significant relationship was found between the influence in determining selling prices and the use of ABC type systems of sophistication (see tables 9.2, 9.3). It would appear that even when all the other variables outlined in Table 9.2 are controlled for (using structural equation testing as compared to the Mann-Whitney test) no significant relationship emerges between price making orientation and the ABC measure of sophistication. It would appear that when an alternative measure of sophistication (i.e. firms having implemented ABC systems using cause-and effect-allocations) the statistical tests failed to distinguish between price makers and price followers. In other words, the variable 'influence in determining selling prices' did not have a significant effect using the ABC measure of sophistication (first dimension) but it had a significant effect using the complexity measure of sophistication (i.e. the second dimension).

9.2.2.2 The results of hypotheses tests relating to factors influencing the importance of cost-plus pricing and the relationship between the importance of cost-plus pricing and the level of cost system sophistication

It was pointed out in Chapter 8 that testing this set of hypotheses aimed to achieve the third objective of this research (the investigation of the relationship between hypothesised contextual/contingent variables and the importance of cost information in making pricing decisions) and the fifth objective (the investigation of the *indirect* relationship between hypothesised contextual/contingent variables, acting through the importance of cost information for pricing decisions, and the level of sophistication of management accounting systems). A summary of the set of hypotheses relating to the third research objective (H1-H7) and their results is presented in Table 9.4. These results suggest that several contingent variables have different effects on the importance of cost-plus pricing. It should be noted that all the results presented in Table 9.4 were presented and discussed in Chapter 8 sub-section 8.4.2.

Table 9.4: Summary of the contextual factors effects on the importance of cost-plus pricing

	The importance of cost-plus pricing			
	Expected	Beta	t-value	Comment
Market share (H1)	-	-0.19	-1.996	Accepted
Customisation(H2)	+	0.19	2.116	Accepted
The influence in determining selling prices (H3)	+	0.34	3.471	Accepted
<u>Business strategy</u>				
• Product Differentiation (H4)	+	-0.15	-1.341	Partially accepted
• Innovative differentiation (H4)		-0.27	-2.675	
<u>Intensity of competition</u>				
• Market competition (H5)	-	-0.18	-1.716	Accepted
• Product competition (H5)		-0.23	-2.267	
Importance of costs (H6)	+	0.54	3.669	Accepted
Organisation size (H7)	+	-0.26	-1.504	Rejected

All of the results reported in Table 9.4 were significant with the exception of organisation size, and the product differentiation dimension of business strategy.

It was noted (see Chapter 3) that firms selling differentiated products or services or who are market leaders, have some discretion in setting prices and such firms can be classified as price-makers/setters. Also, it was assumed that such firms (price makers) enjoy a significant market share in their industry segment. In these circumstances, it was argued that the cost information that is accumulated and presented is therefore important for pricing decisions. The findings of this study, however, only partially support the above argument in that support was only found for those firms that are price-makers attach a higher importance to cost-plus pricing. The findings also show a negative relationship between market share, innovative differentiation, the product dimension of competition and the importance of cost-plus pricing. Furthermore, the findings indicate a positive impact of customisation and the importance of costs on the importance of cost-plus pricing.

The findings may imply that firms with higher market shares tend to rely on pricing based on market factors rather than costs. This may be due to the fact that companies having large market shares have a relatively protected market position with a great deal of knowledge of market demand. In these circumstances firms may be able to take maximum advantage of this position by basing pricing decisions mainly on marketing factors and thus allowing little scope to undertake a cost-plus pricing policy. In contrast, cost-plus pricing appears to be appropriate when companies do not have large market shares and where the customers are insensitive to price differences (i.e. the

effect of substitutes). In other words, their products may tend to be more customised to the customer needs resulting in there being no generally established price. Thus, the firms are likely to be price makers. Also, the intensity of competition is low. In these circumstances cost data may represent a relatively important information source for decision making. A possible explanation for this may be although cost-based methods have the potential to be misleading (most respondents are aware of the inaccuracy of their costing systems), managers in the above circumstances realise that costs matter but simply do not have the information to formulate pricing strategies based on marketing/demand factors. In other words, they may not have the guidelines which help lead them in their pricing decisions resulting in them resorting to a cost-plus pricing strategy. In contrast, the findings indicate that companies that follow a differentiation orientation by focusing on new products and markets may vigorously compete on the basis of product quality with the aim of increasing their market share. Therefore, they attach little importance to cost-plus pricing. Such firms are likely to be more market oriented in pricing (such as pursuing a price skimming strategy because the customers are willing to pay for the differences a firm offers) thus resulting in them being less concerned with relying on costs for price setting.

It should also be noted that the results presented and discussed in Chapter 8 relating to the fifth research objective indicated neither significant direct nor indirect effects in terms of the importance of cost-plus pricing on the level of cost system sophistication. Therefore, the evidence of this research does not support the cost accounting perspective (see Chapter 3 section 3.4.2.2) in that when the firm is a price maker more accurate cost information (i.e. a costing system that accurately measures resources consumed by each product) is essential for setting prices that cover all of the resources that are committed to each individual product or service. A possible explanation for this may be because as indicated in section 9.2.1 the majority of companies had a preference for using direct costing for pricing purposes. Therefore accuracy of assigning indirect costs is not an issue and simple costing systems suffice. Another possible explanation for this is that when firms have some discretion in setting prices they may only use direct cost based pricing methods as a starting point in the pricing decision but deviate from this as necessary to reflect market reality because they think that the full cost information generated by the costing systems may be unreliable.

9.2.2.3 The results of the hypothesis test relating to the effectiveness of costing systems sophistication

It was pointed out that this hypothesis aims to achieve the final research objective concerned with investigating the internal consistency among dimensions of business strategy, market share, customisation, manufacturing diversity, total quality management, influence in determining selling prices, intensity of competition, size and the importance of costs, the level of cost system sophistication, and organisational effectiveness/performance. The results of this analysis were presented and discussed in Chapter 8 (section 8.4.3). The major findings indicate that the fit between greater level of cost system sophistication, differentiation strategy, total quality management approach, the importance of cost information and a greater degree of influence in determining selling prices in the market is associated with higher organisational performance. This finding is discussed in the following section.

9.3 Contributions of research to knowledge

The findings of this study have made a number of contributions to knowledge. First, from a methodological point of view the results of this study based on the questions used indicated that business strategy, intensity of competition, manufacturing/service diversity and cost system sophistication constructs are multidimensional. Thus, researchers studying these constructs should not use single questions to measure these variables. Also, when composite scores derived from multiple questions to measure the constructs for these variables are used researchers should not simply conduct a reliability analysis of scale items but also they should demonstrate through factor analysis that the items load on one dimension prior to aggregating the items into a single scale. This is considered crucial in order to unravel some of the inconsistent findings found in product costing contingency studies. The present study supports and provides further evidence for this argument. For instance, the measurement model analysis of the concept business strategy indicated the multidimensionality of this concept, which consists of two dimensions (Miles and Snow, 1978; Porter, 1980) of low cost and differentiation. This is different from previous studies (e.g. Govindarajan, 1988) that have measured this concept as a simple continuum between firms following a low cost strategy and those following a differentiation strategy (Dent, 1990). Such a measure neglects the multidimensionality of strategy because a single measure (a simple continuum where high scores indicating a differentiation or

prospector strategy and low scores indicating a low cost or defender strategy) is unlikely to capture the multidimensionality of the concept as a low score on low cost strategy does not essentially indicate a high score on the differentiation strategy (Ittner and Larcker, 2001).

In addition, this study indicated that the measure used for low cost strategy by this research (and which has also been used by several other studies) does not appear to be reliable. Therefore, a further contribution of this study is that it has drawn attention to the fact that business strategy is a multidimensional concept, and that the measure developed by Lee and Miller (1996) for the low cost strategy has been shown by this research data not to be reliable. Moreover, the intensity of competition concept has been usually considered in the contingency theory research as a unidimensional concept. However, the results that emerged from the measurement model analysis conducted in this study, and discussed in Chapter 8, indicated that intensity of competition is a multidimensional concept rather than unidimensional concept. In addition, the measurement model analysis of the manufacturing/service diversity concept indicated the multidimensionality of this concept, which consists of two dimensions (i.e. product/service diversity, and volume diversity). However, product diversity dimension showed a very low reliability score. Thus, researchers should consider manufacturing diversity as a multidimensional concept. In addition, there is a need to develop a more refined measure for the product diversity dimension.

Second, apart from one other survey, the previous surveys measured the characteristics of product costing systems as being represented as either ABC or non-ABC systems. Attention has been drawn to the lack of a clear definition of what constitutes an ABC system and to evidence that suggests that respondents to previous studies have misclassified their non-ABC systems as ABC systems or vice-versa. Because previous surveys have sought to classify costing systems by two discrete alternatives, either traditional or ABC systems, they do not adequately capture the diversity of practices that exist. The distinguishing feature of this research is that it has adopted a broader perspective and sought to examine cost system design choices that vary along a continuum ranging from very simplistic to highly sophisticated costing systems. Thus, the study provides future management accounting researchers with a broader conceptualisation of costing system design through the detailed explanation of the components and contents of attributes of sophistication in

assigning indirect costs. This study, therefore, suggests that there is a need for more valid measures of what represents the level of sophistication of costing systems because there is no reliable statement that can be used to indicate that ABC has been actually implemented.

Most of the ABC previous empirical studies have ignored major theoretical assumptions of ABC (e.g. the use of cause-and effect allocations, the use of many different types of costs drivers) and have merely relied on the respondents self-rating their systems as ABC or non-ABC. It was pointed out that some respondents' claims that their organisations are operating ABC systems are questionable. Thus, this study has provided researchers with a potential measure of attributes for measuring the level of cost system sophistication incorporating the extent of ABC actual implementation that they can use and develop further in their studies. It is worth mentioning that hypotheses tests relating to the impact of contextual factors on the level of cost system sophistication were also undertaken using the extent of use of ABC systems (i.e. item A2c in Appendix A) as an alternative method of measuring cost system sophistication. The results, based on using SEM indicated that there was no significant relationship between the use of activity-based system and all of the explanatory variables except for the importance of cost information. Furthermore, the coefficient of determination R^2 of the regression paths was 0.19. This means that only 19% of the total variance in the usage of activity based costing systems was accounted for by the eleven independent variables.

The results that emerged from testing the research hypotheses for the alternative sophistication measure that focused on several dimensions of sophistication thus resulted in contradictory findings. Therefore, the results (discussed in Chapter 8 using the measure of cost system sophistication developed by the research) could not have been reached from a sole reliance on previous definitions and measurements of activity-based costing usage. The findings thus report different results from those reported based on a measure from respondents self-rating their systems as ABC or non-ABC even though the latter has been widely used in previous research. Thus, some of the confusion in the contingency costing systems findings may be attributable to the ways that costing system design has been defined and measured in previous studies.

Third, one of the most important distinguishing features of this study relates to the application of a contingency theory framework to aspects of product costing practices. It extends the research on the contingency approach used in management accounting through investigating the impact of several contingent variables on the level of cost system sophistication. In addition, this study addresses important implications relating to organisational performance. Moreover, the few ABC studies that have examined the impact of ABC on performance have used only financial measures (e.g. ROI) to measure performance (see Chapter 4 sub-section 4.2.3.3). Relying only on financial measures has been widely criticised as a proxy measure of performance because they tend to be short-term and adopt a narrow focus. Thus, this study extends previous contingency ABC performance research by using a multiplicity of dimensions to measure performance.

In terms of the pricing aspects this research makes two important contributions to the pricing literature. First, it seems clear from the evidence presented by this research that cost orientation should be integrated within a more general market orientation approach where the pricing practices of competitors are also taken into consideration. Thus a clear implication for managers responsible for pricing decisions is that they need to continuously pay attention to competitors' pricing behaviour to ensure that they stay in the market. Therefore, they need to build their assumptions about customer and competitor reaction into the margin targets or mark-up levels. This will help the company following cost-plus pricing approach to reflect more accurately the pricing requirements of its market characteristics and conditions. The fact that the majority of respondents considered competitors prices and customer behaviour along with cost information when determining the selling prices is indicative to this issue. However, it is also interesting to note that more attention is given to market information when setting prices than to the cost information especially when fairly simplistic costing systems are being used. The intensive competitive environment that the respondents faced tends to force them to price according to the market factors, and to move away from cost-plus pricing and treat pricing from a customer's point of view. It appears that the heavy criticisms by the marketing pricing literature surrounding the cost-plus methods relating to placing its emphasis merely on cost and disregarding the market conditions holds true given the findings of this research. The evidence indicates a lower usage percentage of cost-plus pricing than those reported

in previous studies. However, when cost-plus pricing is used direct costs is the dominant cost base used by the respondents. The possible conclusion is that management prefers the use of direct costing because the use of full costs may lead to costly mistakes. This confirms the observation of Shim and Sudit (1995) that there is a shift toward variable-cost pricing or market-based (competitive) pricing. Therefore, based on the above findings this study is the most comprehensive study of recent research relating to cost-plus pricing practices. The data from this research provides important benchmarking information for managers about what type of cost information other companies are using in their price settings.

The second important contribution to the pricing literature is that the research provides insights into the unique determinants for cost-plus pricing. Considerable attention has been given in the pricing literature to descriptive research and the development of normative pricing models. Few studies, however, have sought to empirically investigate the impact of several contingent variables on the importance of cost-plus pricing or the impact of the importance of cost-plus pricing on costing system design. This research has sought to remedy this deficiency. An important implication arising from the study is to caution managers against relying merely on cost-based methods for establishing prices especially based on full cost given the widespread use of fairly unsophisticated costing systems. The only competitive situation in which cost-plus pricing is justified is when a higher quality is offered to smaller niches, where the company has some control to price above or below the market's average prices and sufficiently accurate cost data representing an important source of information is available.

This research has also explored some apparent gaps in prior research. In particular, evidence was presented to indicate that companies are now placing increasing emphasis on profitability analysis and considering it to be one of the most important management accounting practices. A distinctive feature of the research is that the findings suggest that in terms of what is considered the most important measure for attention-directing the use of some form of full costs is not as widespread as that suggested by previous studies. The contribution measure proved to be the most widely used measure probably. This may be because profitability analysis is used as a signal for the need for a more detailed study in those situations where products /services

have negative contributions or provide insufficient contributions to indirect costs and profit. A further distinguishing feature of this study is that no previous study could be found in the literature review that has examined the nature, role and content of profitability analysis. The exploratory research reported in this study has sought to redress this omission.

There have also been calls for increased rigour in management accounting research and this research has therefore, implemented structural equation modelling to assess unidimensionality and validity. Therefore, it can be claimed that greater confidence should be attached to the findings of this research. The study provides researchers with detailed procedures for testing construct validity and control measurement error that should provide a greater level of confidence in respect of future research.

This research has also identified that unsophisticated product costing systems are widely used in UK companies. Nevertheless, the majority of respondents considered that their costing systems were satisfactory despite their apparent lack of sophistication. This may imply that they have not sought to improve their costing system because they are satisfied with their existing systems. It is possible that managers may consider that their unsophisticated management accounting systems pass the cost-benefit test and are therefore cautious when considering the adoption of more sophisticated costing systems because of the cost/benefit aspects of implementing such a system. The evidence of this study of superior performance of sophisticated costing systems (based on certain specific conditions applying as outlined in the discussion below) has important implications to the managers in these organisations (with unsophisticated costing systems) that their perception of financial benefit of improved costing systems may not be justified when certain circumstances prevail. This study also provides feedback for those responsible for the design of costing systems with a better understanding of the contextual factors that should be considered when designing effective management cost accounting systems.

An important contribution of this study is the synthesis of a model explaining conditions under which sophisticated costing systems is associated with improvement in organisational performance. The model is suggested based on the findings and arguments of previous research, with constructs validated with confirmatory factor analysis, and tested with structural equation modelling (SEM). It can be suggested

based on the test results that internally consistent and concurrent efforts by large UK companies to (1) enhance their strategic orientation (2) have some power in setting prices in the market (3) use total quality management (4) in environments where costs are relatively important to provide managers with relevant information have the potential to contribute to higher organisational performance. The findings provide evidence to support the statements by researchers that management accounting systems are meant to be efficient in supporting firms' operational effectiveness. Also, these findings provided evidence regarding the conditions favourable to obtaining benefit from sophisticated costing systems. These findings are of a particular interest to practising and academic accountants. Sophisticated costing systems contribute positive benefit, but not in all firm-specific circumstances. It is important to have knowledge of the appropriate conditions for maximising the efficacy of costing systems.

9.4 Limitations and directions for future research

Several limitations of this research should be noted:

- The decision was made to adopt the positivistic approach to test the research model, which limited the choice of data collection to that of a cross-sectional survey. This research encountered the common limitations of cross-sectional surveys such as it is not possible to draw any firm conclusions about the directions of causality or rule out the possibility that causality operates in the opposite direction. Despite the advantages offered by the SEM method to signify causality between independent and dependent variables, this method cannot overcome the limitations associated with non-experimental data gathered in a single session based on using cross-sectional data where variables are measured at the same point in time (Hoyle, 1995). In order to test causality there are three requirements: association between two variables, isolation of the effect, and temporal ordering (where the cause unambiguously precedes an effect). Smith and Langfield-Smith (2002) point out that causality can only be inferred in experimental designs, which allow manipulation of key variables to isolate effects on dependent variables, or time-series analysis where causes clearly precede effects in time. Therefore, the findings of this research must be treated with caution relating to the cross-sectional nature of this research.

- As with any mail questionnaire survey this research also encountered the common problems inherent in such data collection methods. For example, it was not possible to clarify all of the questionnaire responses or to obtain more details on the responses. This limitation may have been reduced by conducting post-questionnaire interviews. Unfortunately, it was not possible to undertake post questionnaire interviews, because of the PhD time constraint and the fact that respondents were located in widely dispersed geographical areas.
- The research attempted to control for the differences between industries by comparing the food companies with other manufacturing companies in the sample. It was concluded that generally there were no significant differences in respect of the issues pursued by this research. This research was, however, unable to test the hypothesised models for only the respondents from the food industry. In other words, this research did not seek to validate the findings in one industry due to the limited responses obtained from the food industry. Further research is encouraged based on obtaining a larger number of responses that examines the hypothesised relationships between the contextual factors, importance of cost-plus pricing, cost system sophistication and organisational performance within one specific industry.
- Although considerable care was taken to ensure the validity of the data in pre-tests both by mail and in person, a possible source of ambiguity may be that management accountants (the questionnaire targets) may not have been able to provide equally competent answers to all the questions in the questionnaire. Since these officials are responsible for the cost system that provides information used in pricing it was expected that they are familiar with what costs are typically used in pricing decisions. However, they may be less familiar with other issues such as the importance of other factors in pricing (such as competition, or estimates of demand), the intensity of competition. Despite the fact that the respondents were given instructions in the questionnaire to omit those questions where they did not know the answer the possibility remains that some respondents may have completed parts of the questionnaire relating to those areas that they are not fully competent to provide responses.
- This research has sought to measure characteristics of product costing systems, in terms of their technical level of sophistication, using a different approach from that

used in previous studies. Thus, future research adopting a contingency approach should consider validating and improving the measure adopted in this study. There is also the potential for sophistication to be viewed differently from the approach adopted in this study. For example, instead of focusing on technical sophistication the concept of cost system sophistication could incorporate characteristics such as flexibility and responsiveness to meet the different needs of users.

- The research has drawn attention to the difficulty in measuring two of the independent variables – low cost strategy and product diversity due to their low reliability measures. Even though these measures have been used in previous research the same measures proved not to be reliable with this research. Future research should seek to develop better measures of these variables.
- Besides attempting to improve the methods of measuring the above mentioned variables future research should consider incorporating other important variables that have been omitted from this research but which may have an influence. Although this research has adopted a wider research model than previous contingency studies by incorporating multiple contextual variables, multiple dimensions of costing system design and organisational effectiveness this research has not taken into consideration the potential effect of the other variables (e.g. top management support, JIT and cost structure) on the level of cost system sophistication. Also, variables relating to environmental uncertainties or knowledge of more sophisticated pricing techniques were not incorporated in examination of the contextual factors influencing the importance of cost-plus pricing due to the limited sample size. The level of variance explained by the contextual variables in this study suggests the presence of other contextual variables that may have implications and contribute to the interpretation of the findings. Thus, a larger sample size is needed for undertaking multivariate statistical analysis that incorporates additional variables that explores effects on the dependent variable.
- Cross-sectional studies are carried out once and at one point in time (Cooper and Schinder, 2001). Thus, to obtain a more complete picture, attention should be focused on using case study research drawing on a wider range of theoretical frameworks to provide a greater understanding relating to how the costing systems are actually used and how their relationships with specific contingent variables

developed, what motivated organisations to use cost information for pricing, and why they choose one type of cost information rather than another. Case study research may be a more appropriate research method for examining how contextual factors influence cost system design. For example, providing greater insights into how the contextual variables such as product diversity affect the level of cost system sophistication. However, designing questions for a mail survey that captures the complex aspects of product diversity that are understandable by respondents is likely to prove difficult. Case studies could be undertaken in different firms that have varying levels of sophistication. Such studies should describe and assess the levels of sophistication drawing off the approach described in this research and seek to explain the factors determining the differences in the observed levels of sophistication. Case study research thus has the potential to provide a richer insight into explaining why, and under what circumstances, some organisations adopt simplistic systems and others do not.

There is also a need for future case study research to address the costs and benefits from investing in increments of increasing levels of costing system sophistication. Such research should focus on examining the specific costs and benefits associated with alternative choices in cost system design. In addition, it was evident that most organisations used profitability analysis as an important attention-directing device. Therefore, another fruitful area for future research is to focus on the content of the information that is incorporated within the special studies. In particular, how accounting information is used and whether or not the weaknesses of the reported information by unsophisticated costing systems are taken into account and compensated for within the special studies. Postal questionnaire surveys are generally an unsuitable mechanism for examining the content of special studies. Therefore, more in-depth case studies are required.

- The contingency design of this study has abstracted variables at the corporate level such as intensity of competition. It was highlighted in Chapter 7 that a high incidence of companies are using cost-plus pricing for some, but not all, products/services. This may be due to the fact that, many organisations face a diversity of environments in respect of some of the identified contingent variables for their products/services. Although this research has concentrated on the major products/services respondents may have missed this point and responded with

respect of multiple products. Future research should seek to isolate a single product and focus on the pricing decision for it. In other words, future research should consider conducting case study analysis on the importance of cost-plus pricing of a particular product/service.

- Because the profitability analysis incorporated a hierarchy of several different profitability measures the research sought to ascertain which profitability measure was mostly used for attention-direction/decision-making. Also, this research sought to investigate the nature and different forms that cost-plus pricing may assume. However, no attempt was made to develop hypotheses that aimed to explain the differences in some of the observed practices. For example, it was indicated in Chapter 8 (section 8.4.2) that pricing based on direct costs was used to a significantly greater extent in those organisations with lower levels of cost system sophistication. The level of cost system sophistication provides only a partial explanation of why some firms focus on direct costs for decision making and others focus on cost information that relies on full costs. Cost structure, intensity of competition, and size may have an influence. Rather than speculating on potential explanations, there is a need for future empirical research that provides further insights into explaining why some firms choose to focus on particular cost information such as direct costs for price setting/ profitability analysis purposes and others do not. Previous surveys have clearly shown a preference for firms to engage in full-cost pricing but the results of this research suggest that the majority of respondents used a direct costing. An interesting route for future research would also be to link contextual factors to the pricing policy that firms adopt in order to explain why some firms set prices on the basis of direct costs and others prefer to use full cost bases. More research is needed to better understand firms' preferences for specific cost information to be used in pricing given the fast changing market conditions that exist today. In particular, there is a need to understand how firms combine the cost information with the need for a flexible market-based pricing policy so that they can adjust quickly to changing market conditions.

Despite the above limitations, this study is one of the first to examine empirically the relations between several contextual factors and cost system sophistication simultaneously, and to examine their fit or coalignment impact on organisational

performance. Also, this study is one of the first to examine the impact of several contingent variables on the importance of cost-plus pricing. It has therefore added to the limited body of knowledge in these areas and has managed to fill some of the gaps in the existing product costing and cost-plus pricing literature. This study has also contributed to the body of knowledge by providing some guidance for future product costing contingency researchers to apply the SEM method given its great potential for testing theories, controlling measurement error and validating research constructs. It is hoped that this research will motivate researchers to undertake further rigorous systematic studies in the areas suggested in the above discussion.

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Appendices

Appendix A: Research questionnaire.....	A1
Appendix B: Questionnaire covering letter.....	B1
Appendix C: Questionnaire first reminder letter.....	C1
Appendix D: Questionnaire second reminder letter.....	D1

Appendix A: Final Questionnaire



University of **HUDDERSFIELD**

PRODUCT COSTING SYSTEMS AND PROFITABILITY ANALYSIS QUESTIONNAIRE

This survey seeks to examine what affects product costing systems and profitability analysis. Throughout the questionnaire the general terms 'products' and 'services' are used with the former intended to refer to manufacturing and the latter to the equivalent to products in service organisations. If these terms do not exactly match your organisation please answer the questionnaire relating to the equivalent of these terms in your organisation. Please note that 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.

The questionnaire should be completed 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 divisionalised company, a non-divisionalised company, etc.). Also please feel free to omit any questions where you do not know the answer to or where the information is too time-consuming to obtain. **In return for participating, we shall be pleased to provide you with a copy of our research findings.**

When you have completed the questionnaire would you please return it in the enclosed addressed postage-paid envelope.

Thank you for your co-operation.

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SECTION A: QUESTIONS RELATING TO THE COSTING SYSTEM IN YOUR BUSINESS UNIT

A1. Please tick one of the boxes below to indicate which of the following best describes which indirect costs (also known as overheads) are assigned to products or services for decision-making:

- (a) Indirect costs are not assigned to products or services (i.e. a direct or marginal costing system is operated). []
- (b) Only those indirect costs are assigned to products or services that can be assigned using allocation bases that are the cause of the indirect costs varying in the long-term. []
- (c) Besides the assignments specified in (b) above indirect costs are also allocated using arbitrary allocation bases that may not be the significant determinants of the indirect costs. []

(If you have ticked item (a) in question A1 please continue with question A6).

A2. The following statements are concerned with the characteristics of your costing system in terms of assigning indirect costs to products or services. Please indicate from the following scale the extent to which you agree or disagree with the statements by circling the appropriate number for each statement

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

- (a) The costing system is highly sophisticated and resembles a 'state of the art' system. 1 2 3 4 5 6 7
- (b) Significant changes have been made to the costing system within the last 10 years in terms of the methods used for assigning indirect costs to products or services. 1 2 3 4 5 6 7
- (c) The costing system can be described as resembling an activity-based costing system. 1 2 3 4 5 6 7
- (d) The costing system can be described as being fairly simplistic. 1 2 3 4 5 6 7
- (e) We are satisfied with the costing methods used for assigning indirect costs to products or services for decision-making purposes. 1 2 3 4 5 6 7
- (f) The costing system accurately assigns indirect cost to products or services for decision-making. 1 2 3 4 5 6 7
- (g) Significant use is made of arbitrary cost apportionments to allocate costs to cost centres when computing overhead recovery rates *(please refer to note 1 below for guidance)*. 1 2 3 4 5 6 7
- (h) Significant use is made of cause-and-effect allocations or direct charging to allocate costs to cost centres when computing the overhead recovery rates *(please refer to note 1 for guidance)*. 1 2 3 4 5 6 7

Note 1

The typical procedure for assigning indirect costs to products or services involves a two-stage process. In the first stage costs are assigned to cost centres (also known as cost pools or departments). In the second stage a separate overhead recovery rate (also known as a cost driver) is established for each cost centre and these rates are assigned to products or services based on their cost driver usage in each cost centre. Costs are assigned to cost centres during the first stage using either direct charging (costs are specifically attributable to the cost centre), cause-and-effect allocation bases (where the allocation base is a significant determinant influencing the variation of the costs in the long-term) and arbitrary allocations (where the allocation bases are unlikely to be the significant determinants of the indirect costs).

A3. Please refer to **Note 1** above and indicate below approximately how many separate cost centres, each with a separate overhead recovery rate (cost driver), are used by your cost system to assign indirect costs to products or services [For example, if your organisation has 6 cost centres all using a single type of overhead rate (e.g. direct labour hours) or two different types (e.g. direct labour hours and machine hours) you should record a response of 6 by ticking the second box below].

Number of cost centres that have their own separate overhead recovery rates for assigning to products or services

Less than 5	6-10	11-15	16-20	21-25	26-30	Over 30
[]	[]	[]	[]	[]	[]	[]

SECTION A: QUESTIONS RELATING TO THE COSTING SYSTEM IN YOUR BUSINESS UNIT

A1. Please tick **one** of the boxes below to indicate which of the following best describes which indirect costs (also known as overheads) are assigned to products or services for decision-making:

- (a) Indirect costs are not assigned to products or services (i.e. a direct or marginal costing system is operated). []
- (b) Only those indirect costs are assigned to products or services that can be assigned using allocation bases that are the cause of the indirect costs varying in the long-term. []
- (c) Besides the assignments specified in (b) above indirect costs are also allocated using arbitrary allocation bases that may not be the significant determinants of the indirect costs. []

(If you have ticked item (a) in question A1 please continue with question A6).

A2. The following statements are concerned with the characteristics of your costing system in terms of assigning indirect costs to products or services. Please indicate from the following scale the extent to which you agree or disagree with the statements by circling the appropriate number for each statement

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

- (a) The costing system is highly sophisticated and resembles a 'state of the art' system. 1 2 3 4 5 6 7
- (b) Significant changes have been made to the costing system within the last 10 years in terms of the methods used for assigning indirect costs to products or services. 1 2 3 4 5 6 7
- (c) The costing system can be described as resembling an activity-based costing system. 1 2 3 4 5 6 7
- (d) The costing system can be described as being fairly simplistic. 1 2 3 4 5 6 7
- (e) We are satisfied with the costing methods used for assigning indirect costs to products or services for decision-making purposes. 1 2 3 4 5 6 7
- (f) The costing system accurately assigns indirect cost to products or services for decision-making. 1 2 3 4 5 6 7
- (g) Significant use is made of arbitrary cost apportionments to allocate costs to cost centres when computing overhead recovery rates *(please refer to note 1 below for guidance)*. 1 2 3 4 5 6 7
- (h) Significant use is made of cause-and-effect allocations or direct charging to allocate costs to cost centres when computing the overhead recovery rates *(please refer to note 1 for guidance)*. 1 2 3 4 5 6 7

Note 1

The typical procedure for assigning indirect costs to products or services involves a two-stage process. In the first stage costs are assigned to cost centres (also known as cost pools or departments). In the second stage a separate overhead recovery rate (also known as a cost driver) is established for each cost centre and these rates are assigned to products or services based on their cost driver usage in each cost centre. Costs are assigned to cost centres during the first stage using either direct charging (costs are specifically attributable to the cost centre), cause-and-effect allocation bases (where the allocation base is a significant determinant influencing the variation of the costs in the long-term) and arbitrary allocations (where the allocation bases are unlikely to be the significant determinants of the indirect costs).

A3. Please refer to **Note 1** above and indicate below approximately how many separate cost centres, each with a separate overhead recovery rate (cost driver), are used by your cost system to assign indirect costs to products or services [For example, if your organisation has 6 cost centres all using a single type of overhead rate (e.g. direct labour hours) or two different types (e.g. direct labour hours and machine hours) you should record a response of 6 by ticking the second box below].

Number of cost centres that have their own separate overhead recovery rates for assigning to products or services

Less than 5	6-10	11-15	16-20	21-25	26-30	Over 30
[]	[]	[]	[]	[]	[]	[]

A4. Please refer to Note 1 on the previous page and indicate below approximately how many **different methods** of overhead recovery (cost drivers) are used by your costing system in the second stage to assign indirect costs to products or services. For example, if your business unit has 6 separate cost centres all using direct labour hours as the overhead recovery method, then please tick the first box to indicate that a single method is used. Alternatively, if your business unit has 6 cost centres and uses two methods of overhead recovery allocation bases (such as direct labour hours and machine hours) you should tick 2 in the box below.

Number of different overhead recovery methods (cost drivers) used

1	2	3	4	5	6	7 or more
[]	[]	[]	[]	[]	[]	[]

A5. For the second stage of the two-stage allocation procedure described in Question A4 and Note 1 please indicate the relative percentage usage of the following overhead recovery rates (cost drivers) 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 rate	
(b) Machine hour based rate	
(c) Material cost based rate	
(d) Units produced based rate	
(e) Production or cell time based rate	
(f) Activity based cost driver rates	
(g) Other (please specify)	
Total	%100

A6. The following statements are concerned with the **importance of cost data** within your business unit. Please indicate from the following scale the extent to which you agree or disagree with the statements by circling the appropriate number for each statement.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

- | | | | | | | | |
|--|---|---|---|---|---|---|---|
| (a) The cost of products or services must be accurate to compete in our markets. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (b) Cost data are extremely important because of cost reduction efforts. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (c) Cost data are an extremely important factor when making pricing decisions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (d) Cost data are extremely important when making product mix or discontinuation decisions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (e) The business unit performs many special cost studies. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (f) The decisions specified in (d) above tend to be based more on 'strategic reasons' rather than cost issues. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

SECTION B: QUESTIONS RELATING TO PERIODIC PROFITABILITY ANALYSIS BY PRODUCTS/SERVICES

B1. Please indicate below how frequently your organisation routinely analyses profits by products or services:

Monthly or quarterly	Six monthly	Annually	More than one year	Not routinely analysed
[]	[]	[]	[]	[]

B2. How important is the periodic profitability analysis in signalling the need to make key decisions relating to product/service mix or discontinuation decisions.

Not at all important			Moderately important			Vitally Important
1	2	3	4	5	6	7

B3. Many business units adopt a hierarchical approach for producing internal product/service profitability analysis statements. The following profit contribution measures represent generic measures that are advocated for signalling the need to make key decisions relating to product/service mix or discontinuation decisions. Some may choose to focus on more than one measure. Using the scale below, please circle for each row the appropriate response relating to the extent that each measure is used in signalling the need to consider making the mix or discontinuation decisions.

Not at all			To a moderate extent			To a considerable extent
1	2	3	4	5	6	7

- (a) Sales revenues less direct variable costs (i.e. excluding fixed costs and the assignment of any indirect costs). 1 2 3 4 5 6 7
- (b) Sales revenues less direct variable and direct fixed costs (i.e. excluding the assignment of any indirect costs). 1 2 3 4 5 6 7
- (c) Row (b) above less only those indirect costs that are assigned to products or services using cause-and-effect allocations (i.e. where the allocation base is a significant determinant influencing the variation of the costs in the long-term). 1 2 3 4 5 6 7
- (d) Row (c) above plus a further deduction for those indirect costs involving arbitrary allocation bases (where the allocation bases may not be the significant determinants of the indirect costs). 1 2 3 4 5 6 7
- (e) An attempt to generate a profit measure that approximates bottom line profits (i.e. sales less most costs either before or after taxes) 1 2 3 4 5 6 7
- (f) Other (please specify 1 2 3 4 5 6 7

SECTION C: QUESTIONS RELATING TO FACTORS INFLUENCING PRICING DECISIONS

C1. Please indicate from the following scale the extent to which you agree or disagree with the statements by circling the appropriate number for each statement.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

- (a) The costs that are assigned to products or services are the major factor to be considered in determining your product/services selling prices. 1 2 3 4 5 6 7
- (b) Competitors' prices are the major factor to be considered in determining your prices. 1 2 3 4 5 6 7
- (c) Customers' ability and willingness to pay are the major factor to be considered. 1 2 3 4 5 6 7
- (d) Other (please specify 1 2 3 4 5 6 7

C2. Using the scale below, please circle for each statement the appropriate response relating to the extent to which you agree or disagree with the following statements that relate to the pricing of products or services in your business unit.

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly Agree
1	2	3	4	5	6	7

- (a) My business unit has significant influence in determining the selling prices of most products or services, arising from factors such as it being the market leader or selling products/services that are highly customised or differentiated. 1 2 3 4 5 6 7
- (b) Prices tend to be set by external market and business factors, or by dominant firms, and my business unit has little influence in determining selling prices (i.e. the business unit is a price-follower for most of the products or services). 1 2 3 4 5 6 7

C3. Using the scale below, please indicate the extent to which your organisation uses estimates of demand for different possible selling prices when determining target selling prices for its major products.

Not at all			To a moderate extent			To a considerable extent
1	2	3	4	5	6	7

C4. Approximately what percentage of total sales revenue of your organisation is accounted for by sales of those products /services that are derived from using **cost-plus pricing (whereby a percentage profit margin is added to the costs of providing the product or service to assist in setting selling prices)**.

0-10%	11-20%	21-30%	31-40%	41-50%	51-60%	Over 70%
[]	[]	[]	[]	[]	[]	[]

C5. Different cost bases may be used for deriving the cost for adding the margin to determine the cost-plus selling price. Using the scale below, please circle for each row the appropriate response relating to the extent that each cost base is used to determine the cost-plus selling price. **(Please omit this question if your organisation does not use cost-plus pricing.)**

Not at all			To a moderate extent			To a considerable extent
1	2	3	4	5	6	7

- (a) A profit margin is added to direct variable costs (i.e. excluding fixed costs and the assignment of any indirect costs) 1 2 3 4 5 6 7
- (b) A profit margin is added to a cost comprising of direct variable and direct fixed costs (i.e. excluding the assignment of any indirect costs) 1 2 3 4 5 6 7
- (c) A profit margin is added to a cost comprising of row (b) above plus only those indirect costs that are assigned to products or services using cause-and-effect allocations (i.e. where the allocation base significantly influences the variation of costs in the long-term) 1 2 3 4 5 6 7
- (d) A profit margin is added to a cost comprising of row (c) above plus a further addition for those indirect costs that have been assigned using arbitrary allocation bases (i.e. the bases are unlikely to be the significant determinants of the indirect costs). 1 2 3 4 5 6 7
- (e) A profit margin is added to a cost base that attempts to assign a fair share of all organisational costs (i.e. a full cost is used) 1 2 3 4 5 6 7
- (f) Other (please specify)..... 1 2 3 4 5 6 7

C6. Using the scale below, please indicate your estimate of the **market share** of your organisation's major products relative to its leading competitors.

Significantly lower	Lower	Slightly lower	About the same	Slightly higher	Higher	Significantly higher
1	2	3	4	5	6	7

C7. Using the scale below, please indicate the extent that the following pricing strategies are used for determining the selling prices for the major products or services marketed by your organisation.

Not at all			To a moderate extent			To a considerable extent
1	2	3	4	5	6	7

- (a) **Price leader:** A price change is initiated and other firms are expected to follow. 1 2 3 4 5 6 7
- (b) **Parity pricing:** The price is set to match the overall market or the price leader. 1 2 3 4 5 6 7
- (c) **Cost-plus pricing:** A price is set at a point that seeks to provide a specified percentage profit margin over our costs. 1 2 3 4 5 6 7

C8. For the purpose of this survey **target costing** is defined as a method that involves estimating a target cost derived from deducting a desired profit margin from a target selling price that is determined by market factors. 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			Sometimes used			Extensively used
1	2	3	4	5	6	7

SECTION D: THE CONTEXT/ENVIRONMENT IN WHICH YOUR BUSINESS UNIT OPERATES

D1. The following statements relate to the level of competition in the market place. Using the scale below, please circle for each statement the appropriate response relating to **the intensity of your business unit's market competition**.

Of negligible intensity			Moderately intense			Extremely intense
1	2	3	4	5	6	7

- (a) Price competition 1 2 3 4 5 6 7
- (b) Competition for selling and distribution 1 2 3 4 5 6 7
- (c) Competition for quality and variety of products 1 2 3 4 5 6 7
- (d) Competition for market share 1 2 3 4 5 6 7
- (e) Competition relating to customer service 1 2 3 4 5 6 7
- (f) Number of competitors in your market segment 1 2 3 4 5 6 7
- (g) Competitors' actions 1 2 3 4 5 6 7

D2. Using the scale below, please indicate the most appropriate response that best describes the whole range of products or services marketed by your organisation.

Highly standardised			Neutral			Totally customised
1	2	3	4	5	6	7

D3. Using the scale below, please indicate for each item your estimate of the position of your business unit relative to its leading competitors in the following areas (please circle one number for each statement).

Significantly lower 1	Lower 2	Slightly lower 3	About the same 4	Slightly higher 5	Higher 6	Significantly higher 7
--------------------------	------------	---------------------	---------------------	----------------------	-------------	---------------------------

- | | | | | | | | |
|--|---|---|---|---|---|---|---|
| (a) Product selling prices | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (b) Manufacturing costs | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (c) Percent of sales spent on research and development | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (d) Percent of sales spent on marketing expenses | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (e) Product quality | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (f) Brand image | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (g) Product features | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

D4. On the scale below, please circle for each statement 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 1	Disagree 2	Slightly disagree 3	Neutral 4	Slightly agree 5	Agree 6	Strongly agree 7
------------------------	---------------	------------------------	--------------	---------------------	------------	---------------------

- | | | | | | | | |
|--|---|---|---|---|---|---|---|
| (a) Quality-related training is provided for all employees | 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) Management actively supports your quality programme | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (e) 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 |

D5. On the scale below, please circle for each statement one of the numbers to indicate the extent to which you agree or disagree with the following statements relating to the complexity of manufacturing (or service) provision within your business unit.

Strongly disagree 1	Disagree 2	Slightly disagree 3	Neutral 4	Slightly agree 5	Agree 6	Strongly agree 7
------------------------	---------------	------------------------	--------------	---------------------	------------	---------------------

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| (a) The products/services marketed by the organisation are quite diverse | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (b) Within product or service lines/groupings products/services require similar processes to design, manufacture/provide and distribute | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (c) There are major deviations in the provision of product/service volumes | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (d) Support departments resources consumed by each product/service are about the same | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (e) There are major differences in the batch sizes manufactured/provided by products/services | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| (f) Over time, there are major changes in volumes of products/service | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

D6. The following statements help us to develop a greater understanding of your business unit performance. For each of the dimensions listed below, please indicate (i) how important you perceive each is in determining the success of your business unit as a whole and (ii) how well you perceive your business unit actually performed over the last three years relative to your competitors. Using the scales below, please circle the most appropriate responses respectively for (i) importance and (ii) performance for each of items (a) to (h).

	i) <u>Importance</u>							ii) <u>Performance</u>						
	Not Important		Uncertain			Vitaly important		Poor	Average			Outstanding		
(a) Cash flow	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(b) Market share	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(c) Return on investment	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(d) New product development	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(e) Market development	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(f) Cost reduction	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(g) Research and development	1	2	3	4	5	6	7	1	2	3	4	5	6	7
(h) Personnel development	1	2	3	4	5	6	7	1	2	3	4	5	6	7

(i) Using the right hand scale above, please indicate the **overall performance** of your business unit compared to your competitors over the last three years. 1 2 3 4 5 6 7

D7. For your business unit please provide an approximate percentage breakdown of your costs by entering the percentages in the appropriate spaces below:

	%
Costs that can be directly traced to products/services	_____
Indirect costs that cannot be directly traced products/services	_____
	<u>100</u>

D8. Please tick one box to indicate the main business of your company or organisational unit.

Manufacturing Wholesale/retail Service
 Financial and commercial Other (please specify.....)

D9. Please specify the approximate number of employees (full-time equivalents) currently employed in your business unit _____employees

D10. Please specify the approximate annual sales turnover for your business unit for the last financial year £_____million

D11. In what type of business/industry is your business unit engaged? (please be specific: e.g. steel manufacturing, textiles, food processing) _____

D12. Please insert your job title/position in the organisational structure _____

D13. Please alter the label on the front of the questionnaire if your name, job title and company name and address are not correct. Also please provide us with the following information which will only be used to contact you in exceptional circumstances to clarify any responses.

E-mail _____ Telephone number _____

D14. Please tick the box if you wish to receive a copy of the aggregated results of this study ()

Thank you for your assistance in completing this questionnaire. Please use the enclosed prepaid envelope to return the questionnaire.

Appendix B: Questionnaire covering letter

Date

Dear

We are currently undertaking research relating to product costing and profitability analysis. A major objective of the research is to describe the nature, content and use of costing systems within the present-day environment, and to examine the factors influencing the choice of costing systems and the content of profitability analysis.

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 20 minutes to complete. Please also feel free to omit any questions where you are unsure about the answer or where you consider the requested information to be confidential. A partially completed questionnaire is preferable to a non-response.

In return for your participation, we shall be pleased to provide you with a summary of the research findings. We believe that the report will provide useful information that will enable you to benchmark your responses with all of 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. The closing date for completion is 12 November 2004.

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. Huda is a university lecturer and the content of the survey forms part of the PhD that she is currently undertaking. The success of her PhD will therefore 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

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Appendix C: Questionnaire first reminder letter

Date

Dear

On 21st October, we sent you a letter requesting your participation in a research project to study cost accounting systems, and the factors that influence their effective usage in UK companies.

We realise that your busy schedule may have delayed your response to completing the questionnaire that was enclosed with the letter. However, we are writing to you again because of the significance of your participation to the successful completion of this study. Your response would also be very much appreciated since Miss Al Hussari's PhD dissertation is dependent upon a satisfactory response rate.

As mentioned in our earlier letter, we assure you that any information provided by you will be treated with utmost confidence, as only aggregate results will be reported. There will be no linking of the individual responses, or the firm's name to the published results, and we undertake to ensure the confidentiality of all information received.

Your contribution to the success of this study and the completion of the PhD dissertation is greatly appreciated. We look forward to receiving your completed questionnaire, preferably by 6th of December if possible. If by some chance you did not receive the questionnaire, or misplaced it, please call either of us and we will send you another one. Alternatively, you can obtain a printed copy from the following website:


<http://www.hud.ac.uk/hubs/doc/questionnaire.doc>

The completed questionnaire can either be mailed to us or downloaded and returned as an E-mail attachment.

Yours sincerely



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Tel. 01484 473804



Miss Huda Al Hussari BA, MBA, Ph.D Candidate
E-mail: H.Al-Hussari@hud.ac.uk
Tel. 01484 473794

Appendix D: Questionnaire second reminder letter

Date

Dear

On 21st October 2004, we sent you a letter requesting your participation in a research project to study cost accounting systems, and the factors that influence their effective usage in UK companies. We realise that your busy schedule may have delayed your response to completing the questionnaire that was enclosed with the letter. However, we are writing to you again because of the importance of your participation to the successful completion of this study. Your response would also be very much appreciated since Miss. Al Hussari's PhD dissertation is dependent upon a satisfactory response rate.

As mentioned in our earlier letter, we assure you that any information provided by you will be treated with utmost confidence, as only aggregate results will be reported. There will be no linking of the individual responses, or the firm's name to the published results, and we undertake to ensure the confidentiality of all information received.

Your contribution to the success of this study and the completion of the PhD dissertation is greatly appreciated. We look forward to receiving your completed questionnaire. If by some chance you did not receive the questionnaire, or misplaced it, please call Miss. Al Hussari's she will send you another one. Alternatively, you can obtain a printed copy from the following website:

<http://www.hud.ac.uk/hubs/doc/questionnaire.doc>

The completed questionnaire can either be mailed to us or downloaded and returned to Miss Al Hussari as an E-mail attachment. In the event of you not being prepared to complete the full questionnaire it would be most helpful if you could spend about one minute providing the information below which will assist us in testing whether non-respondents are significantly different in terms of size and industry. If you choose this latter option could you either please return this letter or E-mail the information to Miss Al Hussari.

1. Please specify the approximate number of employees (full-time equivalents) currently employed in your business unit	-----employees
2. Please specify the approximate annual sales turnover for your business unit for the last financial year	£-----million
3. In what type of business/industry is your business unit engaged? (please be specific: e.g. steel manufacturing, textiles, food processing)	-----

Yours sincerely

Colin Drury

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