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**PRODUCT / SERVICE COST SYSTEM DESIGN
IN MALAYSIAN COMPANIES**

Nagarethnam Sithambaram

A thesis submitted in partial fulfilment of the requirements of the University of
Huddersfield for the award of the PhD

The University of Huddersfield

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Abstract

Despite much publicity given to the criticisms relating to product cost measurement and the prevailing costing systems since the mid-1980s, there was a scarcity in surveys relating to this area. In the 1990s, studies on management accounting practices and product-costing, focusing on the Activity-Based Costing (ABC) increased, but mainly in Europe and the US. Therefore this research is undertaken in Malaysia, to study the product-cost system design from a broader perspective, and investigate the criticisms. The over-riding objective is to explore the influence of explanatory variables on the design of product costing systems, using the contingency theory framework explicitly, one of the major contributions for this study. Other objectives include examining the extent to which different cost information is used for different purposes; sophistication level of product-cost system maintained; prevalence of financial accounting mentality; treatment of non-manufacturing costs in manufacturing companies; extent of ABC usage; nature, content and role of profitability analysis.

A postal questionnaire survey was conducted giving a response rate of 27%. Concrete evidence on the prevalence of financial accounting mentality is not available as the overall findings indicated mixed responses. Investigation revealed that 51% of the firms use unsophisticated, 42% maintain low sophistication level and 7% maintain sophisticated systems. Only 6.5% of the firms adopted ABC. Nevertheless the respondents were satisfied and perceived their costing systems to be accurately assigning costs to products/services.

Although periodic profitability analysis is considered to be important for decision-making, the content of it is questionable as a large number of firms use full costs with arbitrary allocation bases or inappropriate cost drivers.

Only the variables 'size' (significant) and 'competitive environment' (weak significant) influence sophistication levels maintained.

Finally the limitations of this study that may affect the possibility of generalising the findings are acknowledged and suggestions for areas of future research highlighted.

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Chapter 1

INTRODUCTION

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Chapter 1

INTRODUCTION

The major aims of this chapter are to explain the reasons for having conducted this research study, to examine the motivational factors that have prompted the study and to describe the objectives of the study. In addition the theoretical framework that will be applied in this study is explained. The chapter starts with an introduction to the background of the study and continues with describing briefly the research problems. This is followed by a description of the research objectives, the alternative approaches that have been used for conducting management accounting research and a description of the theoretical framework for conducting this research. Finally, an outline of the structure of the thesis is provided.

1.1 Introduction to the background of the study

The history of management accounting as portrayed by Johnson and Kaplan in their book "Relevance Lost: The Rise and Fall of Management Accounting" has provided insights into the paradigm shift in the product costing environment and the need to examine cost system design. In addition, the enormous publicity given to the criticisms relating to product cost measurement and the prevailing product costing systems (Kaplan, 1985, 1988, 1990; Cooper and Kaplan, 1987) has also provided attention-directing information to conduct this research. The authors questioned the ability of contemporary product costing practices to produce cost information that is sufficiently accurate for making strategic and operational decisions.

The current era has seen an evolution in the product-costing environment. During the early decades of the 20th century the norm was a simple manufacturing environment in which a single or few products were produced. Labour was

considered to be an important element of cost as most of the manufacturing activities were labour-intensive. Without today's advances in information technology the costs of information accessibility and measurement was high. In addition, the level of competition was low and was mainly on a non-global basis. The later decades of the 20th century experienced a myriad of changes, which included the need for many organisations to market a wide range of products/services and the emergence of a complex manufacturing environment. 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 accessibility and measurement of cost information but also expediting and simplifying communication processes both locally and globally. This improvement in communication facilities engendered increased local and global competition. To have a competitive edge firms were forced to look into satisfying the needs of customers, and hence a quality culture emerged.

These numerous changes created the need to have appropriate product costing systems for computing accurate product costs. The critics of product costing systems have reiterated the danger of computing distorted product costs leading to wrong decision-making and hence resulting in losing out to competitors. The main highly publicised criticisms are:

- Product costs computed for financial accounting stock valuation are also used for decision-making;
- The use of over-simplistic indirect cost assignment methods that are likely to result in the reporting of inaccurate product/service costs and increase the probability of senior managers making wrong decisions;
- Importance given to labour-based overhead rates despite the decline in labour cost as a result of the changing manufacturing environment.

The above criticisms were based on studies from a small number of companies and also mainly from observations of companies in the USA. Anthony (1989, p 18) has stated that "Information about management accounting practices is abysmally poor" and that "Almost all information is anecdotal". He has stressed the need for survey information that provided statistical evidence relating to the use of management accounting techniques. Holzer and Norreklit (1991) too have reinforced this view that "Cost accounting practices in industry are difficult to verify since no reliable survey data is available". However, recently there has been a growing interest among academicians and practitioners in survey-based research of management accounting practices. Possible reasons for this include the highly publicised criticisms of management accounting practices and the lack of prior empirical studies.

With regard to product costing, publications by Cooper and Kaplan in the late 1980's and early 1990's provided the impetus to examine the nature and content of product costing systems. Most of the empirical research has focused on activity-based costing (ABC) systems. Little research has, however, been conducted on product costing apart from ABC. Notable exceptions are Ask and Ax (1992) in Sweden; Drury *et al* (1993) and Drury and Tayles (2000) in the UK; Lukka and Granlund (1996) in Finland; Emore and Ness (1991) and Green and Amenkhienan (1992) in the USA; Joye and Blayney (1990,1991) in Australia and Yoshikawa *et al* (1989) in Japan. To date product costing research has tended to be descriptive and there has been little attempt to explain how potential explanatory variables influence differences in observed practices. Conventional management accounting wisdom has also pointed to the need for using different cost information for the different purposes for which the product cost information is used (i.e. stock valuation for external reporting, strategic decision making, and profitability analysis). However, apart from a recent survey by Drury and Tayles (2000) the literature review indicated that previous research has not distinguished between the different purposes for which product cost information

is required. Addressing these issues provided a major motivation for undertaking this study.

It is also observed that most of the surveys were conducted in Europe and the USA. There is a scarcity of empirical management accounting research that has been undertaken in the South East Asian region. This motivated the researcher to conduct research relating to product costing within her home country of Malaysia. Furthermore, apart from Drury and Tayles (2000) and Bjornenak (1997 a) previous research has given little attention to examining the influence of the potential explanatory variables on the cost system design.

1.2 Summary of the research problem and research objectives

The conventional wisdom of management accounting has explained the need to have different types of costs at different levels of accuracy for the different purposes for which product cost information is required. External financial reporting regulations require that all manufacturing costs, including the facility sustaining costs, should be assigned to products for profit measurement and inventory valuation. According to Kaplan and Atkinson (1989) it may not be necessary to measure individual product costs accurately for stock valuation purposes. The reason for this is that the focus is on the cost of goods sold and inventories at the aggregate level. Therefore the aim of external reporting is to ensure that costs are reasonably accurate at the aggregate level. Inaccurate individual product costs may suffice for external reporting.

In contrast, accurate product costs are required for decision-making. Also, for profitability analysis and decision-making purposes, it is necessary to include only the relevant incremental costs. With distorted product costs there is a risk of accepting unprofitable products/services and dropping profitable products/services. Hence, there is a need to design a costing system that meets different requirements for different purposes. The need to have different types of costs for different purposes indicates that different cost systems should be

maintained for the different requirements. Kaplan (1988) has mentioned the necessity to develop separate customised cost systems to obtain cost information for the different requirements. On the other hand, Bruns *et al* (1996) have stated that a single cost database can be used for the different purposes provided that the data is selected, analysed, aggregated and reported according to the needs of the information. This suggests that the number of databases maintained or the type of cost information extracted from a single cost database will indicate whether different types of costs are used for the different purposes.

Johnson and Kaplan (1987) have stated that distorted product costs not relevant for management accounting decision-making or profitability analysis are used in many firms due to the existence of the financial accounting mentality in these firms. Inaccurate aggregate level product cost information is sufficient for financial accounting stock valuation purposes. Hence, organisations with a financial accounting mentality may consider such stock valuation product costs to be suitable for management accounting purposes, resulting in making wrong decisions due to using distorted product cost information.

Furthermore, for financial accounting purposes only manufacturing costs are assigned to products as required by generally accepted accounting principles in most countries. The non-manufacturing costs are treated as period costs. For management accounting purposes, non-manufacturing costs are relevant for decision-making and thus need to be incorporated into the product costs.

The product costing literature has also identified the influence that certain potential explanatory variables have on the choice of cost system design, especially on the sophistication level maintained. Sophistication levels are related to the number of cost pools and number and types of second stage cost drivers used. Cooper (1989) has stated that to capture product/service costs more accurately it is necessary to have many cost pools and different types of cost drivers.

Kaplan and Cooper (1998) have also claimed that even a relatively simple activity-based costing (ABC) system should have 30-50 activity cost pools and many different types of activity cost drivers. The strong publicity given to the writings of Kaplan and Cooper since the late 1980s and early 1990s on the use of ABC system to compute accurate product costs have also provided the motivation to identify the extent of usage of ABC systems in the Malaysian organisations.

Cooper (1997) has stressed that one of the major roles of ABC is the resource usage model to develop profitability maps (profitability analysis of cost objects) to focus managerial attention on profit improving projects or highlighting loss-making activities. The recognition of the ABC system as an attention-focussing device has highlighted the importance of profitability analysis. The research study by Chenhall and Langfield-Smith (1998) in Australia has also identified profitability analysis to be of particular significance for companies. Although much has been said about profitability analysis, few empirical studies have been undertaken on the nature, content and role of the profitability analysis.

Based on the above discussion the research aims to achieve a number of objectives. The over-riding objective is to explore the influence of potential explanatory variables on the design of product costing systems in Malaysian companies, particularly on the level of sophistication maintained. In addition the research also has the following objectives:

1. To examine the extent to which firms use a single database from which different costs are extracted for different purposes or whether separate databases are used for obtaining different cost information.
2. To explore the extent to which different cost information is used for different purposes.

3. To investigate the level of sophistication of the cost system design maintained by Malaysian companies;
4. To investigate if a financial accounting mentality is prevalent in the Malaysian companies;
5. To investigate the treatment of non-manufacturing costs in manufacturing companies;
6. To examine the extent of usage of ABC systems in the Malaysian companies;
7. To examine the nature, content and role of product/service profitability analysis in the Malaysian companies.

1.3 Alternative management accounting research approaches

In order to clarify how the different research objectives outlined in the previous section and the literature review relate to the diversity of management accounting research approaches that have been applied over the years it is appropriate at this stage to describe and categorise management accounting research. 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 should be regarded as broad general categories whereby some research may clearly be classified within one of the categories and other research having the potential to be classified within more than one of the categories.

1.3.1 Traditional (economic-based) management accounting research

Scapens (1984) indicates that prior to the 1970s, research tended to be normative in nature and based primarily on neoclassical economics. The normative neoclassical economic framework was based on the assumptions of certainty and costless information, whereby the decision-maker had the availability to all information without any cost (Scapens and Arnold, 1986). It was also assumed that individual decision-makers could be isolated from other decision-makers within the organisation and group decision-making was not considered. In the 1960's and 1970's researchers began refining the normative models to incorporate uncertainty but information was still assumed to be costless. During the 1970's researchers incorporated information economics into the models which became known as the 'costly truth' approach. This approach implies that truth varies from one situation to another, according to the cost and benefits of the information. The view emerged that truth can be obtained (that is, a preferred accounting system does exist) depending on the situation (Ryan *et al*, 2002, p 74). Thus, simplistic costing systems can be appropriate when costs and benefits of information are considered.

The recognition of the 'costly truth' approach partially explains why researchers began to take an increasing interest in seeking to explain observed management accounting practices. Also during the early 1980's anecdotal evidence suggested that there was a wide gap between the theory and practice of management accounting (Scapens, 1984). This led to a change of emphasis and researchers became increasingly interested in positive theories. The positive accounting research approach '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). Positive theories were grounded in empirical data and were concerned with explanation and prediction. Agency theory emerged as a mechanism for explaining observed accounting practices. This approach separates the decision-maker from the

owner. 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 both normative and positive forms. Nevertheless the theory had limitations inherent in the neoclassical economic approach.

Dissatisfaction with research based entirely on a neoclassical economics underpinning resulted in some researchers drawing off behavioural science and psychology (behavioural research) and others off organisational theory to explain management accounting practices.

1.3.2 Behavioural accounting research

Behavioural accounting research is mainly concerned with accounting systems, especially techniques of budgetary control, and how they influence individual behaviour and organisational performance. This research attempts to identify variables that can be manipulated in the design of budget systems, such as budget participation and management use of budget information, so as to improve organisational performance. By understanding the impact of the variables on behaviour it was considered that budgets could be designed to enhance performance. The behavioural accounting research considered people as an important element in influencing the operations of a budget system in organisations. Ryan *et al*, (2002, p 81), point out that this interest in the effect on organisations, led to the focus on organisational theory, and especially the contingency theory, for ideas to conduct management accounting research.

1.3.3 Research drawing off organisational theory

During the 1970's researchers began to explore the organisational dimensions of management accounting using organisation theory to direct their research. In reviewing the literature Otley (1984) pointed out that different elements of organisational theory (such as, the contingency theory, systems theory, and

organisational and behavioural decision theory) had been used by management accounting researchers to attempt to explain management accounting practices. However, Otley (1984, p 138) argues that much of the work was “armchair theorizing”, that is, theorising based on concepts derived from a reading of the organisation theory literature, rather than being more directly grounded in 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 advocates that there is no one 'best' design for a management accounting information system, 'it all depends' upon the situational factors (Drury, 2000, p 648). Most of the research adopting a contingency theory framework has focused on different aspects of management accounting control systems and it has rarely been applied to explaining product costing practices. Contingency theory research has mainly sought to explain how management accounting control systems are influenced by contingent factors such as 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).

Typically contingency theory research has involved the use of cross-sectional studies using data derived from questionnaire surveys. The studies have sought to derive statistical relationships between aspects of management accounting control systems and the identified contingent factors. Given that the main objective of this study is to apply a contingency theory theoretical framework, contingency theory will be examined in greater depth in section 1.5

1.3.4 Research drawing off social theory

An influential paper by Burchell *et al.*, (1980) urged accounting researchers to incorporate insights from the social sciences, in particular the work of critical social theorists into their research. The above development led to the emergence in the 1980s of management accounting research drawing off the work of social theorists. This research can be divided into two main strands - interpretive and critical research.

Interpretive research aims at understanding the social world and the social nature of accounting practices. This research seeks 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.

According to Ryan *et al* (2002) 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. Various researchers have used Foucault's methods to re-interpret accounting history.

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.

1.3.5 Practice-oriented research

Most of the research described in the above sections draws off a particular theoretical framework to explain management accounting practice. Since the late 1980's a considerable amount of research has been undertaken that seeks to describe management accounting practice without attempting to develop or test any existing theory. Research within this category is classified as practice-oriented research. A major feature is that it tends to be more practitioner-oriented. Much of this research consists of descriptive cross-sectional studies to determine the nature and form of management accounting practices and extent of use of new techniques. It initially emerged because of the identification of a perceived gap between theory and practice of management accounting. This perception of a gap was based on anecdotal evidence and led to the need for reliable survey evidence that described the nature of management accounting in practice. Practice-oriented research was therefore deemed necessary to obtain a general picture of management accounting practice.

The enormous amount of publicity given to Johnson and Kaplan's (1987) criticisms of management accounting practice provided a further impetus for practice-oriented research. Given that Johnson and Kaplan did not provide any empirical evidence to support their criticisms research involving questionnaire surveys and interviews has attempted 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 advocates that this should be extended to action innovation research whereby the researcher becomes involved in refining the practices for more general use and developing

new theories that should be the subject of later refinement and testing by other researchers. Closely aligned to this research has been a strand that involves describing the problems and issues associated with introducing new management accounting techniques such as ABC, the balanced scorecard and strategic management accounting techniques.

1.4 Relationship between the objectives of this study and the alternative research approaches

In section 1.2 it was indicated that the overriding objective of this study is to explore the influence of potential explanatory variables on the design of product costing systems in Malaysian companies, particularly on the level of sophistication maintained. To achieve this objective a contingency theory framework is applied. The remaining objectives can be classified as practice-oriented research within the classifications identified in the previous section. Objective 4 (investigating if a financial accounting mentality is prevalent in the Malaysian companies) relates to the practice-oriented research to assess the validity of Johnson and Kaplan's criticisms. Objective 6 (the extent of ABC usage) is concerned with ascertaining the extent to which one of the major accounting innovations over the past two decades is used in the South Eastern Asian region, a region where there is presently little knowledge of management accounting practices. The remaining objectives focus on providing information on various aspects of product costing where little or no documented knowledge exists of current practice. Based on the literature review the researcher could not find any evidence to indicate that these aspects had been investigated by previous studies. All of the objectives rely on the use of a cross-sectional study of Malaysian companies.

1.5 Contingency theory framework

The use of a contingency theory framework to explain accounting information systems design emerged in the mid-1970's. According to Drury (2000, p 648) the contingency theory approach advocates that there is no one 'best' design for a

management accounting information system, but that 'it all depends' upon the situational factors. The situational factors represent the contingent factors or contingent variables. Prior to the emergence of contingency theory a universalistic approach was more or less assumed based on the assumption that an optimal accounting system design is applicable to some degree in all firms.

The application of the contingency theory framework to accounting drew off the organisational theory literature of the early 1960's relating to contingency theories of organisational structure. In its simplest form, structural contingency theory suggests that all organisational structures are contingent upon contextual factors (Pugh *et al.*, 1969). A more rigorous form suggests that organisations that achieve a fit between their structures and contexts are in some way more effective (Lawrence and Lorsch, 1969). Contextual factors that have been identified as being primary determinants of organisational structure include technology (Woodward, 1965; Perrow, 1967), dimensions of the environment (Burns and Stalker, 1961; Lawrence and Lorsch, 1969) and size (Pugh *et al.*, 1969). Dimensions of organization structure that have been studied include the degree of formalisation, specialisation, differentiation, integration and centralisation. Where the more rigorous form of contingency theory has been tested financial and qualitative measures of effectiveness have been used.

In applying contingent theories to management accounting researchers have focused mainly on aspects of management accounting control systems. In particular, they have sought to discover direct relationships between various contextual (contingent) factors and aspects of accounting control systems. Figure 1.1 derived from Fisher (1995) lists the major contingent factors that have been examined in prior studies. Aspects of management control systems that have been examined include:

- budget use (Bruns and Waterhouse, 1975);
- budget evaluation style (Govindarajan, 1988);

- budget pressure (Merchant, 1985); budget tightness (Simons, 1990); performance appraisal system (Govindarajan and Gupta, 1985), and
- scope (extent to which external, non-financial and future-oriented information is used), timeliness and aggregation attributes (Chenhall and Morris, 1986; Gul, 1991; Chong and Chong, 1997).

Figure 1.1

Contingent factors grouped by major categories

1. *The external environment*

Uncertain and certain
 Static and dynamic
 Simple and complex
 Turbulent and calm

2. *Competitive strategy and strategic mission*

Low cost and differentiation
 Defender and prospector
 Product life cycle (build, hold, harvest and divest)

3. *Technology*

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

4. *Business unit, firm and industry variables*

Firm size
 Firm diversification (single product, related diversified and unrelated diversified)
 Organisational structure
 Industry variables

5. *Knowledge and observability factors*

Knowledge of the transformation process
 Outcome (output) observability
 Behaviour (effort) observability

Source: Drury, 2002, p 649, Management and Cost Accounting, 5th edition
 (Adapted from Fisher, 1995)

1.5.1 A brief overview of contingency theory empirical studies relating to characteristics of management accounting control systems

Drawing off the framework presented in Figure 1.1 this section provides a brief review of the findings from the empirical studies relating to characteristics of accounting control systems adopting a contingency theory framework. The aim is to provide an indication of how the framework has been applied rather than to provide a literature review or draw conclusions from the findings.

The first category in listed in Figure 1.1 is the external environment. Studies by Khandwalla (1972) concluded that the sophistication of accounting control systems was influenced by the intensity of competition firms faced. In terms of the certainty/uncertainty contingent factors a USA study by Govindarajan (1984) reported that business units facing higher environmental uncertainty use a more subjective performance appraisal approach whereas firms facing lower environmental uncertainty use a more formula-based performance evaluation approach.

Within the second category, competitive strategy and strategic mission studies by Merchant (1998), Simons (1987), Itner *et al* (1997), Chenhall and Langfield-Smith (1998) have hypothesised that control systems tend to be used more intensively by organisations adopting low cost/defender strategies. Conversely, it is hypothesised that firms adopting a differentiation/prospector strategy use their control systems less intensively and make greater use of broad scope (non-financial and future oriented) information. These studies, however, have provided either only weak or no support for the hypothesised relationships.

Technology, the third category, is based on the nature of the production process and is classified into small batch, large batch, process production and mass production. Otley (1980, p 414) states that the simplest and longest established contingent variable used in management accounting is that of production

technology. Otley, points out that the distinction between different types of production technique as defined by Woodward (1965) is a factor that has long been recognised as influencing the design of internal accounting systems. For example, job costing systems are associated with batch production systems and process costing systems with process and mass production.

The fourth category focuses on the firm size, industry type, firm diversification and organisation structure. Studies by Innes and Mitchell (1995) and Bjornenak (1997) have indicated that firm size influences the sophistication of the design of management accounting systems. Drury (2000, p.653) points out that Control systems have been shown to differ by industry type. For example, controls differ in the manufacturing sector that have a large number of standard cost centres. They rely extensively on detailed variance analysis. In contrast, costs in non-manufacturing industries tend to be mostly of a discretionary nature requiring different approaches to cost control.

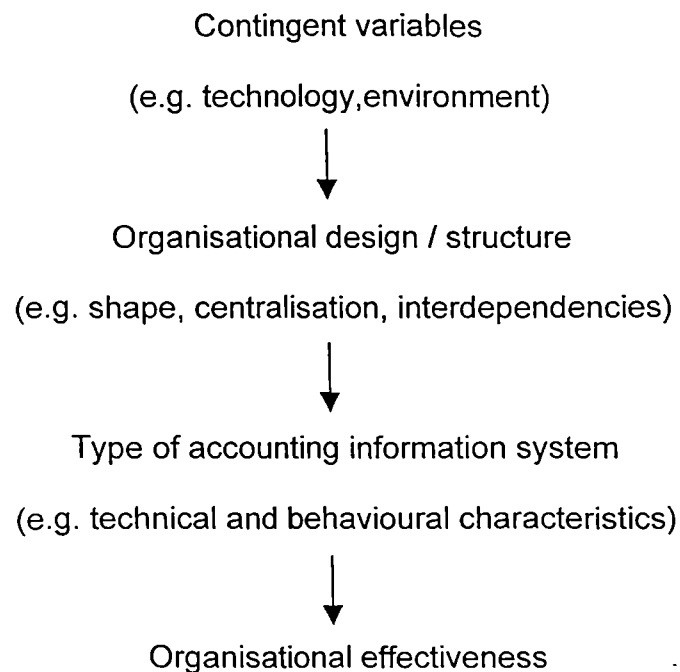
The last category as suggested by Fisher consists of knowledge and observability factors. He refers to Ouchi (1979) as an illustration of the application of these variables. Ouchi advocated that the types of controls that are appropriate are dependent on (1) the ability to measure outputs and (2) knowledge of the transformation process. When knowledge of the transformation process is high, then the behavioural controls are appropriate. Conversely, if output can be measured and knowledge of the transformation is low output measurement is preferred. A study by Rockness and Shields (1984) provides some evidence supporting Ouchi's hypothesis. They reported that behavioural controls were correlated with a high level of knowledge of the transformation process.

1.5.2 Limitations of contingency theory studies

Most of the limitations of contingency theory studies relate to how the theory has been applied rather than the underlying theoretical framework. Figure 1.2, adapted, from Otley (1980), is used to provide a model of how the contingency framework has been applied and the theoretical ideal of how it should be applied. Figure 1.2 suggests that contingent variables affect organisational design/structure which in turn influence the design of accounting information system and organisations that achieve a fit between the contingent variables and structure and accounting information system design achieve more effective performance.

Figure 1.2

A simple linear framework for AIS design



Adapted from Otley, 1980, p 420

According to Fisher (1995) most of the contingency theory studies have not combined all four stages. Typically the studies have focused only on the relationship between contingent variables and accounting information system design without considering organisational structure/design as an intervening variable. Also no attempt is made to assess whether the correlation between an identified contingent variable and accounting information system design has any effect on firm outcomes (i.e. performance).

A further limitation of the contingency framework relates to the difficulty in measuring the variables within each of the boxes specified in Figure 1.2. Otley (1980) and Fisher (1995) have criticised previous studies because they tend to use characteristics of the formal accounting information control system as a proxy for a firm's management control system. However, the formal accounting control system represents only one part of the total control system. The control system package should be evaluated as a whole and incorporate such items as organisational design/structure, personnel selection, and promotion and reward systems. According to Fisher (1995) there may be complementary and substitution effects among its components. For example, a strong internal culture where all organisational participants' beliefs are aligned with corporate objectives may reduce the need for a tight, formal control system. Furthermore, controversy exists over the definition and measurements of the relevant characteristics of the formal accounting control system.

The concept of organisational effectiveness is also extremely difficult to define and measure. Some studies (e.g. Gul, 1991 and Gul and Chua, 1994) have preferred to use the notion of managerial effectiveness rather than organisational effectiveness. Other studies (e.g. Simons, 1987) have used only financial measures (e.g. ROI) to measure effectiveness. Relying only on financial measures has been widely criticised as a proxy measure of effectiveness because they tend to be short-term and adopt a narrow focus. Various

researchers have called for the use of a multiplicity of dimensions to be incorporated in order to measure effectiveness.

Problems also apply in defining and measuring the contingent variables. Many of the contingent variables are abstract or theoretical constructs that are not capable of direct measurement such as environmental uncertainty, intensity of competition and competitive strategy. Therefore the variables are subject to measurement error and this has important implications when multiple regression analysis is used to test the contingency theory models. Where there is measurement error the observed regression coefficients will be subject to misstatement of the true relationship. This may have implications for theory in terms of drawing incorrect inferences of the true relationships between the variables. A further problem is many organisations generally face a diversity of environments in respect of the identified contingent variable and, where diversity is high, it may be inappropriate to develop measures which aggregate to the organisational level.

Fisher (1995) states that one of the major weaknesses of contingent control research is that it examines only one contingent variable and one control attribute at a time. He argues that understanding interactions between multiple contingent variables and multiple control system characteristics is required to determine the effectiveness of control system design. Most of the contingency theory management accounting research has attempted to correlate one contingency variable with one control factor. Fisher concludes that the ultimate goal of contingency theory control research should be to develop and test a model that simultaneously examines multiple contingent variables, multiple control systems and multiple outcome variables.

A final limitation of contingency theory highlighted by Chapman (1997) refers to the fact that previous studies have relied excessively on large scale, cross sectional, postal questionnaire based research that has sought to examine the interaction of a limited number of variables. In addition, researchers have used different operational definitions for the same variable. Fisher (1995) argues that future research should place greater emphasis on longitudinal studies where the interaction of variables over time may be observed.

Given the above limitations some researchers have chosen to adopt a more situation-specific contingent approach. The rationale for this approach is that factors affecting the design of accounting information systems are unique to each firm so general models cannot be established. The researcher must study each firm and accounting system individually and generalisations to other firms is likely to be questionable. Adopting this approach requires case study research because the design of the accounting information system depends on an understanding of the unique factors affecting the firm. Because the possible combination of contingent factors is so large it is considered inappropriate to attempt to establish broad classes of contingent variables.

Despite the above limitations of the contingency theory studies it should be reiterated that most of them apply to the difficulty in applying the framework rather than the underlying theoretical framework. The underlying idea that there is no universally optimal accounting information system and that 'it all depends' upon the situational factors is intuitively appealing and explains why researchers continue to seek to find a match between contingent variables and characteristics of accounting information systems. The conclusion by Otley (1980, p 425) is still pertinent today:

A contingency theory of management accounting has a great deal of appeal. It is in accord with practical wisdom and appears to afford a potential explanation of the bewildering variety of management accounting systems actually observed in practice. In addition, the relevance of organisation theory to management accounting is being necessarily recognised and contingency formulations have been prominent in

organisation theory. There thus appears to be a *prima facie* case for the development of a contingency framework of management accounting.

1.6 International comparative aspects of the study

In section 1.1 it was pointed out that most of the empirical studies relating to product costing have been undertaken in Europe and USA. Little information is available relating to product costing practices in Malaysian companies. Given that this thesis investigates product costing in Malaysian companies it would appear to be appropriate to examine and seek to explain cross-country differences between the observed practices.

Cross-country comparisons do not, however, represent one of the objectives of this study. There are two reasons for this. First, any valid comparisons would require that the same questionnaire administered at the same point in time should be used for comparing results between different countries. Second, and more importantly, the literature (e.g. Granlund and Lukka, 1998) suggests that forces exist that have resulted in a convergence in the use management accounting techniques at the international level. The role of the national culture does not feature within the application of the contingency framework that will be developed and a more detailed justification for this will be provided in the concluding chapter.

Thus, given that there is not strong support for examining international differences for the aspects of the research covered by this research this theme does not represent one of the research objectives. The choice of Malaysia as a research setting was determined mainly by the researcher being located and employed in this country. The aim was to apply the contingency theory framework in a different manner to that of previous studies and examine various aspects of product costing where little or no documented knowledge exists of current practice. Chapter 9 (section 9.3) discusses the issue of generalising the

findings across national frontiers. It should be noted, however, that where similar studies have been undertaken in different national settings the findings of these studies are contrasted with this study. Where significant differences are observed possible explanations are presented but such explanations do not seek to use international or national culture differences as explanations for the different findings.

1.7 Outline of the structure of the thesis

This thesis contains nine chapters. Chapter 1 discusses the background of the study, and provides the reasons for conducting the research study. A summary of the research problem and the research objectives is provided. The alternative management accounting research approaches are addressed and the relationship between the objectives of this study and the alternative research approaches are explained. A description of the theoretical framework (contingency theory framework) that will be applied in this research is also provided and finally the international comparative aspects of this study are clarified.

Chapter 2 provides a broad overview of the history of management accounting with the aim of highlighting the important issues addressed by the research. The history of management accounting provides an insight into the evolution of the product-costing environment over the last century up until today. To understand the issues that are addressed by this research it is necessary to understand the context and background within which the research has been conducted. Chapter 2 aims to meet this requirement.

Alternative product costing/service costing approaches are examined in chapter 3. In particular, variable costing, direct costing, traditional full absorption costing and the recent emergence of activity-based costing are examined. This chapter aims to provide the background relating to the product-costing environment.

In chapter 4, design of costing systems in terms of an optimal cost system is discussed. The chapter also discusses the different types of costs that can be used for different purposes and the issues relating to whether a single or separate cost databases are appropriate for meeting the different user requirements of product cost information. The major objective of the chapter is to develop a contingency theory model that seeks to explain the influence of contingent variables on characteristics of the product costing systems observed in this study.

A summary of the previous research empirical studies that are relevant to this study is presented in chapter 5.

Chapter 6 provides a description of the research strategy. In particular, the chapter provides a brief review of the theory of knowledge (known as epistemology) and the ontological (nature of a phenomenon's reality) assumptions of individuals that influence the sources or mechanisms which will be used to acquire knowledge or beliefs. The chapter also presents a brief summary of the literature on the alternative methodological approaches to accounting research. Following this, a discussion of the methodological approach adopted for the current research 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. The research objectives and a summary of the hypotheses are also included in this chapter.

Chapters 7 and 8 are concerned with the data analysis. Chapter 7 provides a broad description of the questionnaire responses and presents the findings relating to the seven objectives listed in sections 1.2 and 6.5 of these chapters. 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

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

HISTORY OF MANAGEMENT ACCOUNTING WITH SPECIFIC REFERENCE TO PRODUCT COSTING

2.1 Introduction

2.2 Developments in the 19th and 20th centuries

2.3 The need for a change in product costing system

2.3.1 The impact of adopting a just-in-time production philosophy

2.3.2 The impact of automation

2.3.3 The impact of changes in information technology

2.3.4 The impact of adopting a total quality management philosophy

2.3.5 A summary of the paradigm shift

2.4 The obsolescence of contemporary costing systems

2.4.1 Many products/services situation and diversification

2.4.2 Complex manufacturing environment

2.4.3 Cost structure

2.4.4 Quality and customer orientation

2.4.5 Global competition

2.5 Reluctance to change

2.6 Alternative views of the history of management accounting

2.7 Recent developments

2.8 Summary / Conclusion

Chapter 2

HISTORY OF MANAGEMENT ACCOUNTING WITH SPECIFIC REFERENCE TO PRODUCT COSTING

To understand the management accounting issues that are addressed by this research it is important to be aware of the context within which the research has been undertaken and why the issues are important. In order to meet these requirements this chapter aims to provide a broad overview, rather than a detailed study, of the history of management accounting.

The chapter begins with a description of the history of management accounting as portrayed by Johnson & Kaplan (1987) in their book "The Rise and Fall of Management Accounting". It further elaborates on the imminent need for a change in product costing systems due to the changing environment and the reluctance to change to a new system as a result of behavioural factors. The chapter also provides a description of the views by other writers (Loft, 1991; Hoskin and Macve, 1986, 1988; Hopper, 1988; Ezzamel *et al*, 1990) on the historical development of management accounting and their criticisms of Johnson and Kaplan's interpretation of the history of management accounting. After explaining these historical developments, recent developments in the evolution of product costing theory and practice are discussed and the chapter concludes with a brief discussion of the issues leading to the undertaking of the current study.

2.1 Introduction

To understand the *present* it is necessary to know the *past* (Yogananda, 1975). This axiom of relativity is necessary to comprehend current management accounting systems. Prior to the last two decades, not much interest had been shown in the history of management accounting. For example, Loft (1991, p 17) states that:

Until recently management accountants have shown little awareness of the relevance of historical understanding to current issues.Because the past was viewed as merely the imperfect prelude to the present, then the history was seen as a 'dusty' specialist subject of no relevance to current theory and practice.

Robert N. Anthony (1989) has identified in his article on "*Reminiscences About Management Accounting*" that management accounting practices such as standard costs, overhead rates, opportunity costs and profit centres had been in use during the nineteenth century in textile companies, petroleum companies, railroads and retail businesses. Books written by Frank Knight (1921), J.M. Clark (1923), John Canning (1929) highlight the usage of these established management accounting practices. The author also reports on the existence of early history of management accounting in Alfred Chandler's books "*Strategy and Structure*" (1962) and "*The Visible Hand*" (1977). However, there has been much prominence given to the significance of the history of management accounting, after the publication of Johnson & Kaplan's (1987) book "Relevance Lost: The Rise and Fall of Management Accounting". The elaborate account of the history of management accounting narrated by Johnson and Kaplan has given an insight into how the past has influenced today's management accounting systems.

2.2 Developments in the 19th and 20th centuries

Johnson & Kaplan (1987) argue that developments of management accounting thinking emerged around the late 1800's and gathered pace in the early 1900's. In particular, they point out that the Industrial Revolution was a major factor contributing to the development of management accounting. They state that management accounting started in the United States during the 19th century with the advent of industries such as textile making, railroading, manufacturing of iron and steel, and retail distribution. These industries were involved in converting resources into products or services. Entrepreneurs at that time found that centralising the many processes involved in converting the resources to the final product or service increased profits. The authors state that this view of centralised control brought about new managerial accounting procedures to

monitor and evaluate the output of internally directed processes. They also assert that management accounting did not emerge as a result of 'big businesses' especially railroading. On the other hand, they suggest that management accounting may have facilitated the growth of large-scale firms.

Advances in transportation and communication around the middle of the 19th century, the invention of railroads and telegraphs and increases in the complexity of organisations created the need for more quality management accounting information. The authors also highlight how during the late 19th century, Andrew Carnegie managed his giant steel works from 1872 to 1902. Carnegie was concerned with continuously collecting direct cost data in every process of the manufacturing activity. His operating strategy was to reduce direct costs below that of his competitors to always have a competitive advantage on price and demand. Carnegie's case shows how during the late 19th century it was necessary to have management accounting systems to provide information on direct operating costs.

The last quarter of the 19th century demanded new management information for compiling product costs as a result of complex manufacturing processes involved in firms mass producing complex machine-made metal goods. Johnson and Kaplan show how Alexander Hamilton Church advocated using product cost information to trace a firm's overall profitability to the profits earned on individual products. Church believed in including overheads within the product costs. He conveyed that using the "commercial accountants' " crude way of allocating overheads to products to get an aggregated average cost information would suffice for management purposes if the factory produced a few products and these products consumed the factory's resources at the same rate. However, when the factory produced a diverse range of products consuming the factory resources at different rates, then Church suggested that using an aggregated average cost would not reflect the accurate resource consumption for each product. Under these circumstances misleading product cost information would be generated for management purposes. Hence, the end of the 19th century saw

the need to have reasonably accurate product cost information to analyse the impact of individual products on the firm's overall profitability.

The early phase of the 20th century resulted in the emergence of multi-activity, diversified organisations and the concept of multidivisional structures. Big companies, such as Du Pont and General Motors devised management accounting procedures based on a multidivisional concept. This was done in order to overcome inefficiencies and bureaucratic disabilities that were thought to be inherent in large-scaled organisations. The multidivisional organisations helped divisional managers to utilise resources more efficiently as these organisations reduced the volume of communication between the divisional and corporate managers. In addition, operating managers were given the autonomy to pursue their divisional goals in tandem with the overall company goals. Johnson and Kaplan concluded that the multidivisional structure might have suited the earlier part of the 20th century considering the high cost of communication and processing information at that time.

According to the authors until the early part of the 19th century, managers were concerned with developing procedures for computing managerially relevant product costs. Alexander Hamilton Church's ideas on allocations support this view. However from 1914 onwards, firms were more inclined to use financial accounting information for managerial product costing purposes. Johnson and Kaplan strongly believe that the high cost of retrieving cost information was the main reason for leaning towards the financial accounting information. They assert managers and engineers were aware of decision-relevant information but the cost benefit analysis did not warrant obtaining relevant cost information specifically for management. Furthermore, the authors also claim that academic accountants during that period had strongly influenced the use of financial accounting information for managerial purposes.¹

¹ This point is discussed in section 2.5 (Reluctance to change)

According to Johnson and Kaplan, J. Maurice Clark (1923) developed the idea of "different costs for different purposes" and that "there is no one correct usage, usage being governed by the varying needs of varying business situations and problems". Furthermore Johnson and Kaplan also point out the work of two economists (R.S. Edwards and Ronald Coase) around the 1930s arguing for the relevance of variable costs and drawing attention to the limitations of financial accounting systems for management accounting purposes. Coase (1938) according to the authors, had introduced the idea of incorporating 'opportunity costs' for management information for decision-making purposes.

Another author identified by Johnson and Kaplan was William Vatter. In the mid 20th century Vatter observed the timing difference in the need for management and financial accounting information. He reiterated Clark's recommendation of different costs for different purposes and emphasised the need for different accounting systems with different degrees of completeness and timeliness for distinguishing between the needs of external users and internal users of accounting data.

2.3 The need for a change in product costing system

The last quarter of the 20th century experienced a myriad of changes in the form of diversity and complexity of products and processes, information technology and global competition (Johnson and Kaplan, 1987). These changes have brought about advanced production techniques in the form of Just-In-Time (JIT) systems, automation and computer-aided manufacturing/providing service and total quality management. As these advanced techniques differ from the traditional production techniques, they have created the need to review whether the traditional product costing systems capture the cost complexities of the changing environment.

2.3.1 The impact of adopting a just-in-time production philosophy

Because the aim of the JIT system is to achieve a goal of zero inventories and a 100% on time delivery service, the production processes need to be adjusted. This is done by producing a single product or a product family in well-defined production cells based on a flow-line principle whereby all the dissimilar machines that are needed to produce the product or product-line are placed within the same production cell. This new layout helps in reducing the work-in-progress and lead times, which are normally encountered in the traditional systems. The traditional systems with their machines grouped by functions need the products to move to the different areas where the functional machines are placed, resulting in unnecessary delay and at times unnecessary storage costs along the production flow. In the JIT system with its new layout, many of the support activities are directly traced to the product-dedicated cells resulting in the reduction of indirect costs. Cowton and Vail (1996) in their case studies identified that two of the four "JIT" companies studied, were able to trace production overheads to particular products or product families as a result of the shopfloor relayout involving product cells. This direct tracing of the costs due to the company's operational structure brought about by JIT had reduced the necessity for arbitrary allocations of indirect costs.

Various authors (McNair *et al*, 1988; Cooper, 1996; Young and Selto, 1991) have also pointed out that firms adopting the JIT system are capable of reducing the overhead costs by identifying non-value-added activities and discarding them. Also, Foster and Horngren (1988, p 435) state that the characteristics of a JIT production system include the increase in the direct traceability of costs and the reduction in the number of cost pools.

Therefore it can be argued that JIT makes product costing easier in some respects as the reduction in indirect costs decrease the need for arbitrary allocations. Hence companies using JIT production techniques may need less sophisticated costing systems.

Atkinson *et al* (1997, p 382) have demonstrated how the advancement in information technology has aided in the application of JIT in the service industry (a bank) through the following illustration:

The lending process at the bank is an example of how information technology facilitates just-in-time production in service industries. For instance, one way to reduce the batch cost of handling loan applications is to process them on a computer so that a loan application can be moved instantly over any distance. The bank clerk may receive information required to put the loan application on a computer, or customers with computing capabilities may submit loan applications electronically, eliminating the need for them to physically come into the bank. The loan application can be processed by a computer program that scans consumer credit databases to immediately reject or flag applications by customers who have credit problems. Simple loan applications can be approved on the spot, depending on verification of client's claims. This improves service and reduces the amount of loan officer time spent approving applications. Complex loan applications can be called out of the database instantly by loan officers many miles away. At that point, applications can be reviewed, and approved almost as quickly as simple loan applications. By moving away from a physical (paper) loan application required to move among people performing different tasks, the electronic process can prove to be more efficient and faster. Moreover, by eliminating the need to batch loan applications for approval, a centrally located loan officer can be provided with a constant stream of loan applications from many branches. In this way, customers can have their loan applications approved or disapproved shortly after submission. Overall, the bank can be much more responsive to its customers if it uses electronic loan application processing.

The illustration above indicates that service industries are also potential candidates for the implementation of a JIT system and hence these service industries also need to look into their service (product) costing system. There are also other reasons why service industries should look into costing systems. For example, banks generally do not have a well-developed tradition of product costing and with the current competitive environment the need to have accurate 'product-costing' is vital to meet the competitive pressures on margins.

2.3.2 The impact of automation

With automation Brinker (1997) and Ansari (1997) suggest that firms now produce a wider range of products and the proportion of indirect costs to the total cost structure has increased. Direct labour cost therefore has decreased. On the

other hand, indirect labour costs related to computer aided manufacturing has increased (Cooper and Kaplan, 1991; Cooper, 1995; Kaplan and Atkinson, 1998). In addition, the proportion of fixed to variable costs has also increased together with a subsequent increase in committed costs (Johnson & Kaplan, 1987). Cowton and Vail (1996) have pointed out that there is a direct link between the decrease in direct labour and increase in overheads with automation, i.e. when machines with salaried employees overseeing them, have replaced direct labour. The change in the cost structure creates the need to develop more sophisticated methods to assign indirect costs to products so that accurate product costs are computed. The traditional costing system with an emphasis on direct labour cost therefore would (according to Johnson & Kaplan, 1987) be obsolete in the automated manufacturing environment.

2.3.3 The impact of changes in information technology

During the earlier decades of the 20th century accessing and processing information was a tedious task with non-computerised information systems. However, the developments in computerised information technology over the past three decades have considerably reduced information-processing costs. The advanced information technology has also facilitated in the flexibility of extracting information as and when needed. For most companies these developments have reduced the costs and barriers of operating more sophisticated systems.

2.3.4 The impact of adopting a total quality management philosophy

In the case of quality, generally the traditional costing system does not incorporate quality costs into the product/service costs. Quality costs (Crosby, 1984) include:

- costs that are incurred because the quality achieved is not conforming to the desired quality (Cost of Non-Conformance - CONC), and
- costs incurred to attain the quality standards required (Costs of Quality Conformance).

These costs include:

- a) Prevention costs - the costs incurred to prevent the production of products or the provision of services that do not conform to quality standards, e.g. preventive maintenance, training of staff.
- a) Appraisal costs - the costs incurred to ensure that the products produced or services provided are not defective, e.g. inspection costs, quality audits.
- b) Internal-failure - the costs associated with products or services that do not conform to quality standards, e.g. cost of scrap, cost of downtime as a result of defects.
- c) External-failure - the costs incurred as a result of correcting the non-conforming products/services that have been delivered to external customers, e.g. warranty costs, repair costs.

In the current competitive environment, customer preferences have become vital. Therefore firms to remain competitive need quality endeavours to ensure that their products/services do meet the demanding customer satisfaction. Atkinson *et al* (1997) have pointed out that companies in the 1980s were spending around 20% to 30% of total manufacturing costs on quality-related processes. Plunkett *et al* (1985) indicated that in the UK quality related costs amounted to 5% to 15% of the total company sales revenue. This shows that the quality costs may constitute a significant amount of the total cost of the product or service. Viger and Anandarajan (1999) had observed quality cost information to be relevant for pricing decisions. Their results also indicated that quality cost information was relevant to marketing managers, and pricing decisions in a highly competitive market with demand elasticity for the product. Excluding such quality costs from the product/service cost computation may not reflect an accurate cost. Therefore,

to compute more accurate and relevant product/service costs it is necessary to incorporate such quality costs. Thus, the need arises to have an appropriate cost system that integrates quality cost information into the management cost system.

2.3.5 A summary of the paradigm shift

The paradigm shift in the product/service cost environment (see Table 2.1) has created the need for firms to review their product costing systems.

Table 2.1: Paradigm shift in product/service cost environment

Early Decades of the 20th century	Mid and later decades of the 20th century
1. Single/few product/service situation	1 Many products/services & diversification
2. Simple manufacturing environment	2. Complex manufacturing environment
3. Cost structure: Higher % of direct costs; Importance of labour costs	3. Cost structure: Higher % of indirect costs; Labour costs less important
4. Less sophisticated information technology	4. Sophisticated information technology
5. Higher costs of information accessibility/measurement	5. Lower costs of information accessibility/measurement
6. Low level of competition : - non-global	6. intensive domestic and global competition
7. Cost orientation	7. Customer orientation

The changes described above, and in Table 2.1 resulted in many writers in the early 1980's questioning the usefulness of product costing systems. One of the most notable critics was Robin Cooper. He claimed that most firms derive full cost information for decision-making obtained from cost systems designed decades ago for meeting financial accounting requirements (Cooper, 1990 a). These systems would not have caused product cost distortions, based on the scenario at that time. Critics of the simplified existing product cost models (Kaplan, 1984; Kaplan, 1985; Johnson and Kaplan, 1987; Cooper and Kaplan, 1988; Hendricks, 1988; Kaplan, 1988) claimed that the simplified systems

generated distorted product costs. Product cost distortion occurred as a result of inappropriate indirect cost allocations. Surveys have shown that many companies use simplistic overhead allocations (Hendricks, 1988; Cohen and Paquette, 1991; Emore and Ness 1991; Drury and Tayles, 1994).

2.4 The obsolescence of contemporary costing systems

It will be shown in the following paragraphs that the paradigm shift in the product cost environment summarised in Table 2.1 resulted in various commentators claiming that traditional product costing systems had become obsolete.

2.4.1 Many products/services situation and diversification

Referring to Table 2.1, the current environment of many diversified products/services can be in the form of product or volume diversity. Product diversity relates to products consuming activity resources in different proportions, while volume diversity occurs when products are manufactured in different batch sizes (Cooper, 1988). When there is high product or volume diversity, then there is a need for an appropriate costing system, with a higher number of cost pools and cost drivers, that more accurately captures the variation in resources consumed by the diversified products or services. Traditional cost systems with their volume-based second stage cost drivers may not be able to capture the variation in the resource consumption by the products/services accurately resulting in distorted product /service costs.²

2.4.2 Complex manufacturing environment

As mentioned in sections 2.3.1 and 2.3.2, the current complex manufacturing environment (see Table 2.1) with advanced production techniques, such as JIT, automation and computer aided manufacturing, needs appropriate cost systems to compute accurate product costs. The traditional cost system with its volume-based cost drivers, especially direct labour related cost drivers, is likely to produce distorted product costs in the new manufacturing environment, where

² This topic is discussed in detail in Chapter 4, Sections 4.6.1 and 4.6.2

labour cost has significantly reduced (Johnson and Kaplan, 1987; Cooper and Kaplan, 1991).

2.4.3 Cost structure

It was discussed in section 2.3.2, that automation in firms has increased the proportion of indirect costs to the total cost structure. This has resulted in a decrease in the direct labour costs. With this change in the cost structure, it is necessary to have an appropriate cost system that can assign the higher proportion of the indirect costs accurately. When the indirect cost structure is insignificant within the total cost structure, then assigning such indirect costs inaccurately will not distort the product cost. However, with the current scenario of automation and increase in indirect costs, inaccurately assigning the indirect costs will cause product cost distortion. Distorted product cost information may result in making wrong decisions that could be disadvantageous to the firms. As was mentioned earlier, the traditional cost systems with its volume-based, especially the direct labour cost based cost drivers may not be appropriate here. Therefore a more sophisticated cost system should be used when the indirect cost structure is high.

2.4.4 Quality and customer orientation:

The accelerating concept of Total Quality Management (TQM), towards the last few decades of the 20th century (Table 2.1) has marked a great change in the focus of product costing, i.e. from cost orientation to customer orientation. Ashton *et al* (1991) state that in the early 20th century, there was little innovation in products or production processes, and little incentive prevailed for firms to minimise manufacturing costs as the increased costs were absorbed by the customers. This notion is obsolete with the contemporary focus on TQM, where customers are paramount for decision-making. Therefore it is vital to lure the customers by providing quality products at low prices if the firm is to survive in the market. Reduction in prices can be comfortably done only if the cost of manufacturing can be minimised. Reducing cost of production requires accurate

product cost information based on cost drivers that are the causes of costs being incurred. The prevailing ambience during this period warrants for a more suitable product costing system giving accurate product/service costs to gain competitive advantage.

Furthermore in section 2.3.4, it was suggested that it is relevant to include quality costs into the product/service costs. The traditional cost system normally does not include quality costs and therefore it may not be suitable in a competitive environment where quality and customer orientation is significant.

2.4.5 Global competition:

Major efficiency in the communication network through advancement in information technology, and the customer-oriented culture towards the later part of the 20th century (See Table 2.1) has led to the development of global business competition. To survive, businesses require more accurate product costs in order to avoid over-costing or under-costing their products. Over or under costing may lead firms to make wrong decisions on their product profitability analysis, which in turn would be advantageous to their competitors. Here again the traditional cost system with its volume-based second stage cost drivers may produce inaccurate product/service cost information³.

The major change in the cost structure of organisations together with the emergence of a more competitive business environment has created a need for a more sophisticated system to generate more accurate product cost information. Furthermore, unlike the earlier periods, elevation in information technology has facilitated accessibility and measurement of cost data. The advent of computerised systems has made it easier and cheaper to maintain and access product cost information for meeting different requirements, which justifies the use of more sophisticated costing systems.

³ This is discussed in detail in Chapter 4, sections 4.6.1 and 4.6.2

2.5 Reluctance to change

Despite the changes in the manufacturing and competitive environment there was little evidence to suggest that either practitioners or academics were attempting to develop more sophisticated product costing systems. For example, textbooks around 1945-1950 were still based 73% on inventory valuation, 21% on cost control and 6% on management decision-making (Johnson and Kaplan, 1987). Writings during the period 1950-1980 also did not provide much innovation on management accounting practices. They were mostly based on earlier writings by Vatter (Johnson and Kaplan, 1987). There was little recognition of the need to change costing systems until the late 1980's. The catalyst for change was the enormous amount of publicity generated by Johnson and Kaplan's book, *Relevance Lost: The Rise and Fall of Management Accounting*, and their claim that current management accounting was no longer relevant to current business problems.

In their book Johnson and Kaplan were extremely critical of practitioners, teachers and researchers of management accounting. They state that:

Cost accounting text books and academic research continue to concentrate on highly simplified, frequently abstract representations of cost systems ... Researchers in universities were busy developing highly sophisticated models for management accounting in simplified, stylized production settings. The research was neither motivated by actual phenomena nor tested nor even testable on the data from contemporary organizations.... The contemporary academic literature on applying analytical techniques to management accounting problems was devoid of references to systems "actually in use" or to "systems installed in well-known (organizations)." Instead the references were to the writings of other university researchers' (pp 169, 177).

The authors felt those academic cost accountants, more than auditors or managers may have contributed to accounting's lost relevance for cost management. According to the authors, Church and other early twentieth century writers had pointed out that the academic accountants were forging managerial relevance out of financial accounting information by using a model of a simple manufacturing firm, producing a homogeneous line of goods, which was unrealistic for the real world situation. These authors also stressed that academic

management accountants used "decision models" derived from the economists' neoclassical theory of the firm, for management decisions. Such models, they argued were oversimplifying the "real life" decision problems, and this simplification of the problems had enabled the academic writers to make the inventory cost information from financial reports "relevant" to management decisions. Therefore they felt that the academic cost accountants might have contributed to the lost relevance for cost management since World War II (Johnson and Kaplan, 1987).

Johnson and Kaplan also suggest that the high cost of measurement, and the influence of people trained in universities for financial accounting taking over the role of managers in manufacturing companies, were also one of the main reasons for the use of financial accounting data for management accounting purposes. Furthermore the immense increase in joint stock companies requiring audited financial reports was a contributing factor for using financial accounting information for management accounting purposes.

However they agree that, by the end of World War II, academic accountants realised the need for "managerial accounting for decision making". During this period writings on the limitations of financial accounting information for managerial purposes were identified. Nevertheless, Johnson and Kaplan claim that the writings were concerned with making financial accounting information more useful for management accounting purposes and not debating on the use of "integrated" costs to products.

Drury (1990, pp 132-133) disputed Johnson and Kaplan's argument on the influence of academic management accountants, stating that management accounting education does advocate approaches that are similar to the views of desirable management accounting practice supported by Johnson and Kaplan. Drury argues that Johnson and Kaplan's views on the relevance of management accounting is more on the gap (existing between management accounting

education and management accounting practice) as suggested by Scapens (1983) rather than the relevance lost because of management accounting education. Scapens has suggested that the gap may be due to the lack of understanding of management accounting education or the preference for simpler alternative techniques based on the cost-benefit analysis.

Bromwich and Bhimani (1989) report that the National Association of Accountants in the USA and the Society of Management Accountants in Canada (SMAC) strongly endorsed the criticisms on management accounting practices. They also say the SMAC believes the management accounting courses taught were not useful for contemporary operations or in guiding strategy. Choudhury (1986, p 22), claims that:

in recent years, management accounting researchers have tended to neglect practical issues and this imbalance in research focus needs to be rectified.

Ashton *et al* (1991) pointed out that Western industrialised countries held strong positions in international markets during the 1950s and 1960s, and were not much concerned about accurate product cost information, as their domineering position in the market was to their advantage. According to the authors, there was little incentive for firms to minimise manufacturing costs, as increased costs could always be passed on to the customers. Furthermore, reactive management accounting systems present at that time were based on mechanistic rather than innovative styles of management. This state of mind prevalent then could have been the cause for the acceptance of the prevailing cost system design.

Regarding Johnson and Kaplan's criticisms of management accounting practice it should be noted that, at that time, their views were based on observations from only a very small number of companies. The view that management accounting was in crisis that prevailed in the late 1980's was based on anecdotal evidence and the impressions gained from informal contacts with practitioners rather than from large-scale surveys of practice. For example, Anthony (1989, p 18), claimed that 'Information about management accounting practices is abysmally poor' and

that 'Almost all the information is anecdotal.' He also argued for the need of survey information relating to management accounting practices and criticised statements made in the literature about the use of particular techniques when no statistical evidence was available relating to how many companies actually used the techniques.

Despite the lack of empirical evidence at the time there was a consensus that product-costing systems had remained unchanged for decades and there was a need to develop more sophisticated systems.

2.6 Alternative views of the history of management accounting

Most of this chapter has drawn off Johnson and Kaplan's interpretation of the history of management accounting. However, not all writers agree with their interpretation. In this section the views of other writers are briefly summarised.

Ezzamel *et al* (1990) disagree with Johnson and Kaplan's interpretation of history although they agree with the authors' moving of 'accounting's history centre stage in the search for a better understanding of accounting's power'. However, they claim that Johnson and Kaplan's diagnosis of the causes of the modern 'disease' is questionable. Referring to records (Stone, 1973; McKendrick, 1970; Hopwood, 1987; Jones, 1985; Edwards, 1989) on the early examples of cost calculations around the 18th and the 19th centuries, Ezzamel *et al* (1990) conclude that it is not possible and also is counterproductive to search for the exact period when financial accounts were used for cost calculation. Therefore their argument is that the precise time of the 19th century quoted by Johnson and Kaplan as being the time when financial accounting data took precedence in computing cost information for managerial purposes is doubtful.

Ezzamel *et al* feel that adoption of financial accounts for cost calculation could have occurred as early as the 13th century when double entry bookkeeping was invented. The authors also strongly refute Johnson and Kaplan's belief that

management accounting at its outset was sound and the irrelevancy came by only after the first quarter of the 20th century. Ezzamel *et al* argue that cost management based upon accounting was problematic and bound to be problematic from its outset.

Ezzamel *et al* referring to Hoskin and Macve (1988) argue that the 'rise of managerialism' with "engineering-minded" scientific managers playing the role of management consultants, occurred in the early part of the 19th century. This early managerialism at the Springfield Armory and then in the US railroads had played a crucial role in disseminating management practices to other industries. The authors elaborate on management practices such as the 'time and motion study ' conducted by Daniel Tyler in 1832, to determine a 'fair price' for each piece-work, not based on past historical practice, but based upon a norm of what the good worker working solidly could and should achieve. This, the authors claim, is an alternate view of the relationship between changes in business organisations and the development of management accounting systems. Johnson and Kaplan's 'Chandlerian' view was that:

developments occurred as rational businessmen responded to the opportunities of new technologies and new markets, while sensibly weighing up the cost of internalising the control of yet more activities (p 161).

Loft (1991) mentions how Hopper (1988) creates an alternative version to Johnson and Kaplan's history regarding the emergence and development of cost and management accounting systems. Adopting a critical research approach (see chapter 1, section 1.3.4) Hopper explains the changing phases of capitalism had brought about changes in controls over labour processes, which in turn had been the cause for the emergence and development of management accounting systems. According to Loft, Hopper claims that the control of labour as a result of 'homogenization' of labour from the 1870s was the decisive factor for the changes in the cost and management accounting practices during this period and therefore cost accounting developed during this period. The period of 'homogenization' of labour is explained by the author as:

a period where work was reorganised and restructured (facilitated by mechanisation and increasing plant size) in such a way that more semi-skilled, as opposed to skilled labour could be used and workers became more easily substituted for each other (p 28).

Semi-skilled workers required the use of elaborate record keeping to get information on what aspects of the work could be speeded up, to control labour. This is similar to the time-motion study that was developed with the rise of managerialism as discussed in the third paragraph above.

Furthermore, as indicated in section 2.5, Drury (1990) has argued against the claim by Johnson and Kaplan that academic cost accountants have contributed to the lost relevance of management accounting. He states that contemporary management accounting textbooks and management accounting education does not emphasise direct labour hours as the overhead allocation rate but insists on the use of allocation bases that have the closest relationship to the overhead cost incurred. The other criticism relating to the 'financial accounting mentality triumphs' is unlikely to be attributable to management accounting education because management accounting education stresses the inappropriateness of financial accounting information for management accounting purposes. Therefore, Drury concludes that management accounting education actually advocates similar views as Johnson and Kaplan's on the desirable management accounting practices. Hence, the irrelevance may be because of the gap between management accounting education and management accounting practice, rather than the inadequacy of management accounting education.

2.7 Recent developments

During the late 1980s, as a result of the enormous criticisms made by Johnson and Kaplan, there was a need to conduct survey related research in many countries to identify if management accounting was really in a crisis. Bromwich and Bhimani in 1989 prepared a report for the Chartered Institute of Management Accountants, in response to these criticisms, and stated that in the UK the management accounting profession was not in a crisis and they suggested for an

evolution and not a revolution in management accounting. However the authors in their 1994 updated report have identified,

the urgent need to commission further empirical studies concerning not only the manufacturing sector but also the service sector, to identify and evaluate new management accounting systems and to evaluate the reasons for some companies' reluctance to change their accounting systems in any fundamental way (p 247).

Subsequently, criticisms on the lack of management accounting research and the dependence on anecdotal evidence (Anthony, 1989) and the unavailability of reliable survey data to verify cost accounting practices in industries (Holzer and Norreklit, 1991) have prompted the emergence of survey related researches in many countries. In recent years surveys have been undertaken in the following countries:

- UK (Drury *et al*, 1993; Drury and Tayles, 1994, 2000; Innes and Mitchell, 1995; Cobb *et al*, 1992)
- Ireland (Clarke, 1992, 1997)
- Malaysia (Brewer, 1998)
- Norway (Bjornenak, 1997 a and b)
- Greece (Ballas and Veniers, 1996)
- Australia (Joye and Blayney, 1990,1991; Chenhall and Langfield-Smith, 1998)
- Sweden (Ask *et al*, 1992)
- Japan (Yoshikawa *et al*, 1989)
- US (Emore and Ness, 1991; Green and Amenkhienan, 1992)

Apart from the increase in survey related research, Kaplan who has been the prominent critic of management accounting education and practice, stated that the period from the mid 1980s has seen a revolution in management accounting theory and practice in the form of new concepts and product costing techniques, especially in the area of activity-based costing (Kaplan, 1984). The knowledge of ABC techniques has now become widespread and practitioners have identified the need to be well versed with this new concept. This is witnessed by the

increased attendance of practitioners at ABC conferences. Furthermore the contents of current management accounting textbooks are now placing greater emphasis on more sophisticated approaches to product costing and cost system design (Drury, 1996, 2000; Atkinson *et al*, 1997).

Choudhury (1989) has claimed that there has been a lack of practical issues identified in conducting management accounting researches. It is a reflection of the suggestion by Henderson (1970) that management research should follow the model of medical research, i.e. to build theory based on careful observation from clinical and field research. Kaplan (1994) points out that currently this practice-oriented innovative action research approach (see chapter 1, section 1.3.5) of working closely with companies to develop theories explaining new practices is now becoming more prevalent in management accounting research.

2.8 Summary / Conclusion

The discussions on the history of management accounting as portrayed by Johnson and Kaplan has revealed many issues pertaining to current management accounting practices. Johnson and Kaplan (1987) claimed that the current management accounting practices were actually developed by 1925 after which it has stagnated. They argue that academic management accountants had strongly influenced the management accounting practices. However, critics of their version have provided other possible reasons for the development of management accounting, such as the rise of managerialism in the beginning of the 19th century and the homogenization of labour in the 1870s. Furthermore, it has been pointed out that there is a possibility of a gap between theory and practice rather than concluding that academic accountants were the cause for the irrelevance of management accounting practices. Subsequently, the authors assert that academic accountants trained in financial accounting concepts were the reason for the influence of financial accounting on management accounting practices. It was also noted that there was a great need for theoretical research

to be conducted in tandem with management accounting practices as theory failed to address the reality faced by practitioners.

As a result of the historical changes that have taken place in organisations over the past decades, it was pointed out that there has been a paradigm shift in the product-costing environment. This paradigm shift has indicated the need to alter the management accounting systems to cater for the current environment and needs.

Strong criticisms by Johnson and Kaplan on the current management accounting practices based on anecdotal evidence and the lack of survey findings on these criticisms has prompted survey related research of management accounting practices in many countries over the past two decades. The recent developments have shown that management accounting theory and practice have undergone a change with the emergence of new concepts and techniques especially in product costing with the emergence of ABC.

The criticisms based on the history of management accounting and the need to have more survey findings on management accounting practices has been the cue for undertaking the current study focusing on product costing. Bromwich and Bhimani (1994) have stated:

As management accounting moves into the twenty-first century, what happens in this last decade of the millennium will be crucial....Certainly shifts in management philosophies will continue to occur, trends will come and go and new realisations will emerge as technological advances and other societal changes take place. Within such a context of dynamic change, management accounting cannot afford to be inward oriented. Its continued development must rest on its rich history side by side with an appreciation of pressures, constraints and opportunities that enable it to maintain a proactive edge.

The history of management accounting described in this chapter has provided the horizon for explaining the development of management accounting practices and the paradigm shift in the product-costing environment. The aim has been to highlight the background information for identifying the variables influencing the

product costing practices for conducting this research. The next chapter will examine the major features of traditional and modern costing systems.

Chapter 3

PRODUCT/SERVICE COSTING

3.1 Introduction

3.2 Alternate product costing systems

3.3 Traditional costing system versus Activity-Based Costing (ABC) system

3.3.1 Traditional costing systems

3.3.2 Activity-Based Costing systems

3.4 Developments in the theory of Activity-Based Costing system (ABCs)

3.4.1 Hierarchy of activities

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3.5.4 Theory of Constraints

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3.5.6 Decision relevant information

3.6 Theory of Constraints (TOC) and Activity-Based Costing (ABC)

3.7 Summary / Conclusion

Chapter 3

PRODUCT/SERVICE COSTING

Following the discussion on the history of management accounting in the previous chapter and the indication of the emergence of new management accounting techniques such as the ABC, this chapter focuses in more depth on the alternative product costing approaches that are discussed in the literature. It includes a discussion of the traditional approaches advocated in the literature such as variable costing, direct costing and traditional full absorption costing systems. This is followed by a description of the systems that have emerged more recently such as activity-based costing and throughput accounting. The chapter also describes recent theoretical developments relating to ABC systems and contrasts ABC with traditional costing systems and throughput accounting.

3.1 Introduction

Over the decades, conventional wisdom of management accounting has suggested two main alternative approaches to product costing, namely:

1. Direct/variable costing whereby only variable or direct costs are assigned to products or services.
2. Full costing whereby fixed, variable, direct and indirect costs are assigned to products or services.

The attaching of direct costs poses no problems as they can be directly traced to their respective products or services. Assigning indirect costs needs to be done carefully if resource consumption is to be accurately measured and cost distortion avoided. Traditional assignment methods have not changed since the early 1900's and have proved to be suitable for meeting financial accounting requirements. By the mid 1980's many shortcomings had been identified with traditional assignment methods for management purposes and new methods of

assigning indirect costs emerged in the late 1980's. The following section 3.2 describes the evolution in product costing approaches.

3.2 Alternate product costing systems

Cost systems vary in terms of what costs are assigned to cost objects and their level of sophistication (Drury and Tayles, 2000). This section briefly describes the different types of costing systems. They are:

- i. Variable costing systems;
- ii. Direct costing systems;
- iii. Traditional absorption costing systems;
- iv. Activity-based costing systems.

Variable costing systems assign only variable costs to products. Many textbooks use the terms *direct costing* or *marginal costing* to infer variable costing. Drury (1996) criticises the use of such terminology. He argues that neither direct nor marginal costs reflect variable costs, as direct costs may include non-variable items like direct labour. Adopting the economists' definition, marginal cost represents the extra cost of producing an additional unit. Thus, fixed costs will be included within the marginal cost in a situation where the production of an additional unit will result in an increase in fixed costs. Therefore, adopting a narrow definition of variable costing, only the variable costs are assigned to products or services. Whether or not direct labour costs are included within variable costs depends upon the time period under consideration. Variable costing profitability analysis involves a comparison of sales revenues with variable costs. The difference shows the contribution to fixed costs and profits. Thus, products or services that have an unfavourable contribution to fixed costs and profits are highlighted for more detailed special studies relating to their future viability. The limitation of this system is that it considers only short-term variable costs and ignores the avoidable fixed costs that are relevant for decision-making and profitability analysis.

Direct costing is often considered to be synonymous with variable costing. However, since it incorporates direct fixed costs it can be distinguished from variable costing. As the name implies direct costing systems assign only the direct costs to products or services. In terms of direct costing profitability analysis, direct costs are deducted from the total sales revenue and the difference represents the contribution towards indirect costs and profit. Indirect costs are not included in the product or service costs. According to Drury and Tayles (1996), this can be justified only if the costs of the joint resources that fluctuate according to the demand for them are insignificant. Otherwise indirect costs would be relevant for product costing and omitting them will result in distorted product or service cost. However, this system identifies unfavourable contributions to indirect costs and profits which gives a cue for further studies on such products or services. The further studies should attempt to identify the cost savings arising from those joint resources that can be reduced if a product or service is discontinued.

Traditional full absorption costing systems assign both the direct and indirect variable and fixed costs to products and services. Generally accepted accounting principles in most countries require that for financial accounting purposes only manufacturing costs should be assigned to products and non-manufacturing costs should be treated as period costs. This requirement has also resulted in many companies choosing to follow the same approach for management purposes and assign only manufacturing costs to products. Thus the term 'full costing' is misleading and does not necessarily imply that all costs are assigned to products or services. If all costs are assigned to products/services the profitability analysis will report operating profits rather than contributions to fixed and / or indirect costs and profit.

By the mid-1980 the prominent critics of traditional costing systems (Kaplan, 1985; Cooper and Kaplan, 1987) were highlighting their deficiencies in terms of the methods used to allocate indirect costs to products/services. They assert that

direct labour or other volume-based cost drivers fail to accurately measure the consumption of non-volume based activities and hence result in providing distorted product or service costs. Using purely volume based cost drivers tend to over-cost high volume products and services and under-cost low volume products or services.⁴

Kaplan (1985) and Cooper and Kaplan (1987) claim that all costs become variable in the long-run and they argue that, to avoid cost distortion, there is a need to include those joint resource costs that fluctuate in the long-term according to their demand for them.

The authors also state that the cost of joint resources (i.e. the indirect costs) should be allocated using cause-effect relationships between the activities needed to produce the products or services and the consumption of the activity resources by products. Hence, based on the new idea of activity analysis in assigning costs to products or services, ABC systems emerged.

3.3 Traditional costing system versus Activity-Based Costing (ABC) system

The major criticisms of traditional costing systems relate to joint cost assignment methods. Cooper and Kaplan over the years since 1988 have argued that traditional systems produce distortions in product costs. Such product cost distortions have engendered wrong decision-making, which in turn has affected profitability and competitiveness adversely. Reflecting on the product cost evolution since the early decades of the 20th century (see Chapter 2, Table 2.1), it is reiterated that simplistic methods used by the traditional systems based on direct labour hours, machine hours or material costs percentage, in assigning joint resources to the products are unlikely to be pertinent in today's changing environment.

⁴ This point is discussed in section 3.3.1

Cooper and Kaplan (1988 a) have advocated the use of ABC to evade the shortcomings of traditional systems. They argue that virtually all of a company's activities exist to support the production and delivery of today's goods and services and therefore they should be considered as product costs. The traditional costing systems and the ABC systems are discussed in the following sub-sections.

3.3.1 Traditional costing systems

Traditional costing systems adopt the two-stage allocation process. The first stage involves the apportioning of overheads to production and service departments. The service departments' overheads are then reapportioned to the production departments to ensure that all the overheads are finally charged to the production departments. The rationale for this reapportionment being, the service departments exist to provide services to the production function, and as such it is appropriate that these costs are assigned to the manufacturing departments to be finally absorbed into the product costs. The second stage involves the tracing of the costs in the production departments' costs pools into the products/services using cost drivers.

This second stage has been open to many criticisms, because of the use of very simplistic volume-based absorption rates (Drury, 1988; Horngren and Foster, 1987; Louderback and Hirsch, 1982). The traditional systems assume that products consume all resources in proportion to their production volumes and thus report distorted product costs. Cooper and Kaplan (1988 a, p 97) explicitly illustrates the flaw in the traditional product costing system with the following example:

...consider two hypothetical plants turning out a simple product: ballpoint pens. The factories are the same size and have the same capital equipment. Every year Plant I makes 1 million blue pens. Plant II, also produces a variety of similar products: 60,000 black pens, 12,000 red pens, 10,000 lavender pens, and so on. In a typical year, Plant II produces up to 1000 product variations, with volumes ranging between 500 and 100,000 units. Its aggregate annual output equals the 1 million

pens of Plant I, and it requires the same total standard direct labour hours, machine hours, and direct material.

Plant I producing only one type of product operates in a simple manufacturing environment with few support activities. In contrast, Plant II with its more complex operations will require higher support facilities. There will be more set-ups, inspections, scheduling of machines, inventory control, assembling and shipping vendor dealings, engineering changes etc. Plant II will also operate with considerable higher levels of idle time, overtime, inventory, rework and scrap. These support activities are not volume-related. Hence if the traditional method of volume-based allocation of costs is used, all the pens, immaterial of their complexities, will have the same cost per pen.⁵ Hence, the higher volume products will be burdened with a higher proportion of the cost than their lower volume counterparts. This is misleading since the lower volume pens place considerably higher demands on the support activities. Therefore more of the support activities should be charged to the lower volume pens.

3.3.2 Activity-Based Costing systems

ABC on the other hand, focuses on the activities performed and the causes of the activities. A relationship is recognised between costs of resources, activities and the cost objects (i.e. the products or services). Resources are consumed by activities, which are then demanded by the cost objects.

Cooper (1988) observes that in the conventional costing system the focus is on the product volume and consequently costs are traced to these products using a volume base. With an ABC system, activities play a major role. Costs are traced from activities to products based on the products' demand for these activities.

Thus, the allocation bases are measures of the activities performed. Hirsch and Nibbelin (1992, p 40) state that with ABC systems, the focus changes from assigning costs to determining why resources are in place. They also state that ABC directs management's attention toward reducing support department costs

⁵ It is assumed that all pens consume the same quantity of the volume-based cost-driver (e.g. direct labour hours or machine hours)

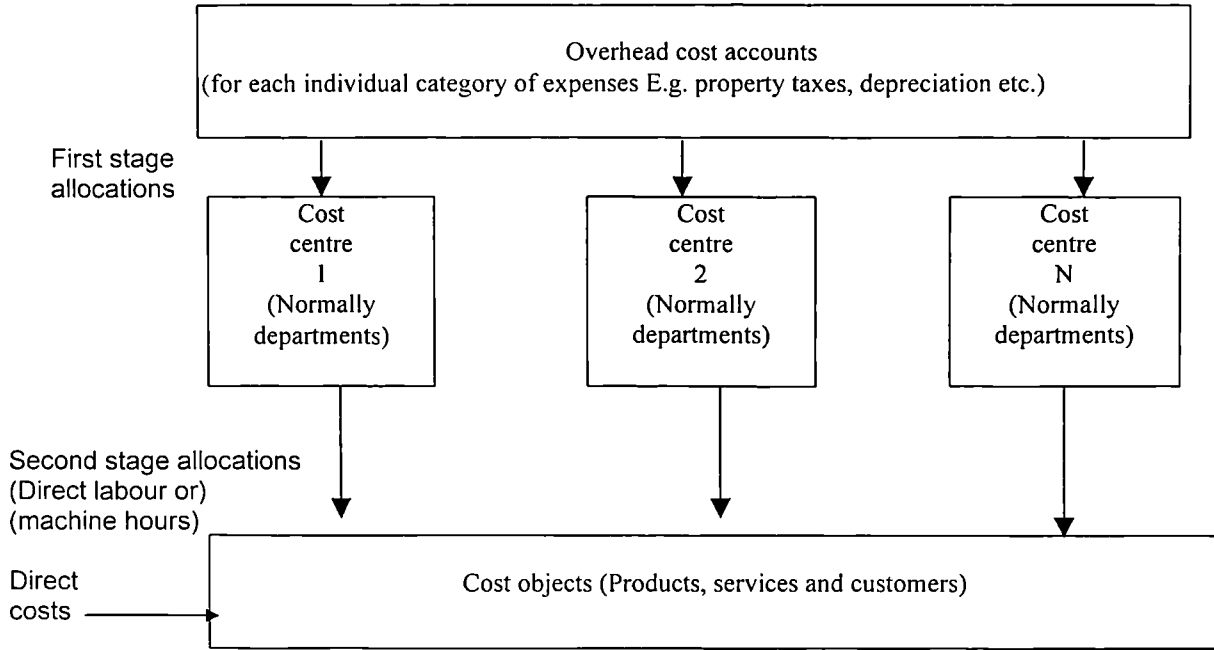
by asking the question " *why do these supporting resources exist?*" rather than simply deciding on a fair way to allocate them. With an ABC system it is recognised that volume is not necessarily the variable related to cost allocation. Whereas, the traditional system basically views volume as the *raison d'être*. The ABC system uses both volume-related or volume-unrelated allocation bases.

Figure 3.1 illustrates the two-stage allocation process for the traditional and the activity-based costing systems. It is seen from Figure 3.1 that the ABC System is similar to the traditional system in that it assigns costs to products following a two-stage process. In the first stage the ABC system assigns overheads to activities forming activity based cost centres. Unlike the traditional production department cost centres as shown in Figure 3.1 (a), the ABC system establishes service activities cost pools as well as production activities cost pools. The overheads from these cost pools are then directly assigned to the products using activity cost driver rates as shown in Figure 3.1 (b). The reapportionment of service department costs as in the traditional costing system is thus avoided (Drury, 1996).

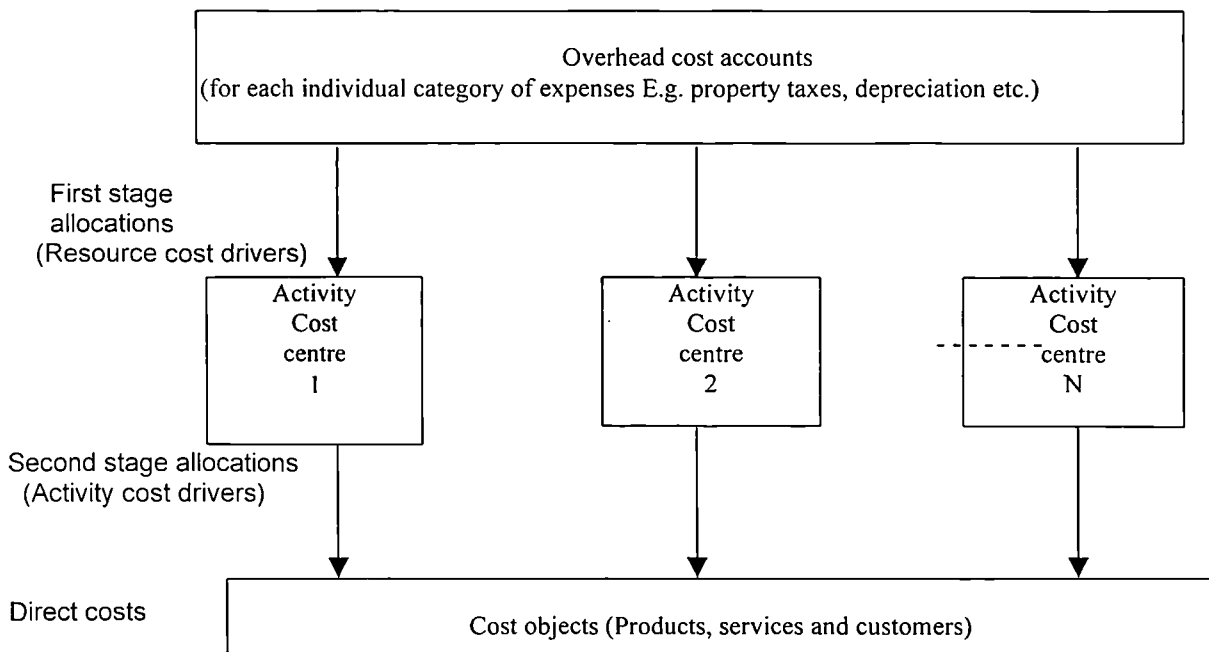
Figure 3.1

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

(a) Traditional costing systems



(b) Activity-based costing systems



Source: Colin Drury, Management and Cost Accounting, 5th Edition 2000, p. 339

3.4 Developments in the theory of Activity-Based Costing System (ABCS)

There have been considerable developments in the theory of Activity-Based Costing System (ABCS) in the 1990s. According to Drury and Tayles (2000), this was in response to the many criticisms of the theory of ABC and the over-exaggerated benefits of ABCS. Cooper (1990 b) reported the first theoretical development that established a hierarchy of activities. Cooper and Kaplan (1992) were responsible for the second development by recognising ABCS as a resource usage model. The third development by Kaplan (1990) and Cooper and Kaplan (1991) showed why product costs do not provide information that can be used directly for decision-making. Instead, they provide attention-directing information highlighting products/services requiring more detailed studies. These theoretical advancements are discussed in the following sub-sections.

3.4.1 Hierarchy of activities

Cooper (1990 b) explains the four levels of activities in the hierarchy as unit-level, batch-level, product sustaining and facility sustaining activities.

Unit-level activities are performed for each unit of product produced or service provided. Hence these activities are directly proportional to the units of products produced or the services provided. Examples of unit-related activities and their appropriate cost drivers (Atkinson *et al*, 1997) are inspection of every item (cost driver being number of units inspected), supervision of direct labour hour (cost driver being direct labour hours), and consumption of power and oils to run machines (cost driver being machine hours). Cooper (1990 b) points out that traditional costing systems are also appropriate for assigning the unit-level activities to products/services because these activities are volume-related and thus the volume-based drivers used by traditional systems are appropriate cost drivers.

Batch level activities are performed for each batch produced rather than the number of units produced within the batch. For example, production scheduling,

machine set-ups and processing customer orders are normally performed each time a batch of goods is produced or service provided. Therefore, these activities are directly proportional to the number of batches made. Examples of batch-related activities and their appropriate cost drivers are machine set-ups (cost driver being set-up hours), purchase ordering (cost driver being number of orders), production scheduling (cost driver being number of production runs). The expenses incurred in performing these batch-level activities are normally considered to be fixed by traditional costing systems, as these expenses do not vary with the units of production. Traditional systems therefore incorporate these expenses within volume-based fixed overhead rates that may result in overcosting high-volume products (normally made in large batch sizes) and undercosting low-volume products (normally made in small batch sizes)⁶.

Product sustaining activities are performed to make it possible to produce a product or service. The cost of product-sustaining activities increases with the number of products and product-lines. However they do not vary in direct proportion to the number of products or product-lines. Examples of product-sustaining activities provided by Atkinson *et al* (1999, p 99) are given below:

Designing new ice-cream flavours; developing, maintaining, and improving recipes; and designing, packaging and marketing materials for individual ice cream flavours. The demand for these activities is higher in a plant producing seven products than in a plant producing only one product, even though both plants have identical total production volumes.

Other examples of product-sustaining activities and their appropriate cost drivers include, engineering activities (cost driver being engineering change orders {ECO}), parts administration (cost driver being number of parts).

Finally, facility (or business) sustaining activities are performed to enable production to occur (Cooper, 1997). Atkinson *et al* (1997, p 99) explain that the facility-sustaining activities are required to support the upkeep of the plant and the associated managerial infrastructure that makes production possible. These

⁶ Indicated in the last paragraph of Section 3.3.1

activities are not related to the units or batches produced. They are common and joint to all products, and are not expected to change with the number of individual products, the number of production runs, or the number of units manufactured. Drury (2000, p 346) states that for facility-sustaining costs to change, there needs to be a dramatic change in activity, resulting in an expansion or contraction in the size of the plant, which is unlikely to occur in most organisations. As these costs tend to be unavoidable for most decisions, they are not assigned to products/services but are treated as common costs to all products and deducted as a lump sum from the total of the operating margins from all products. Examples include plant management, accounting and personnel, housekeeping, lighting, rent.

Kaplan and Cooper (1998, pp 260-263) have emphasised the importance of assignment of expenses adopting the hierarchical basis where the cause-and-effect relationship can be identified. By relying only on cause-and-effect allocations arbitrary allocations are avoided. They have also emphasised the use of cost hierarchies to develop activity-profitability maps by different cost objects.⁷

Cooper (1997) suggests that instead of reporting the full cost of each product *unit*, the ABC system should report the cost of manufacturing the *total* output of each product. This is because the ABC *unit* cost suggests an inappropriate degree of variability. Cooper explains that batch related costs can be reduced only by decreasing the number of batches (or by making the batch process more efficient), not simply by reducing the number of units produced. Hence, the reporting of *unit* product costs suggests an inappropriate degree of variability. The ABC system with its recognition of the hierarchy overcomes the inappropriate suggestion of variability by reporting separately unit-level, batch level, and product level costs separately within the product costs. However, he states that the arbitrary allocation of the facility-level costs to products adds no

⁷ This topic will be discussed in Section 3.4.3

information about the economics of production. Nevertheless, since some organisations may wish to report full product costs, he calls for further research relating to the treatment of facility-level costs. He elucidates the need for the total product cost with the following example (p B 1-8):

Reporting total product costs and differentiating between the cost of facility sustaining, product-sustaining, batch level and unit level costs makes it easier for users of reported product costs to understand the implications of their decisions. For example, the decision to accept a special order of a product that is already being made will not require the performance of additional product-sustaining activities. Therefore, the cost of these activities should be ignored in the decision to accept that order. Similarly, if the batch size for a special order differs from the standard batch size, the average cost of the batch-size activities performed on that product is not the appropriate cost to consider when making decisions.

By keeping the costs of the three types of activities separate, ABC systems make it easier to determine the relevant cost of a given decision. Managers must recognise, however, that ABC systems are not decision-making tools. ABC systems do not report relevant costs for all possible decisions; no cost system can do that. ABC systems do, however, provide a superior way to determine relevant costs.

3.4.2 Resource usage model

Since the introduction of ABC in the 1980s, it has evolved from just being a cost allocation model to a resource usage model and an attention-focussing device (Cooper, 1997). Cooper and Kaplan (1992) state that ABC systems are models of resource consumption, attempting to measure the costs of using the resources and not supplying the resources. They further argue that the fixed versus variable cost framework is not applicable with an ABC system's measurements of resource usage costs. The authors further delve into this concept by formalising a relationship between the costs of resources used and the costs of resources supplied through the following equation:

$$\text{Activity availability} = \text{Activity usage} + \text{Unused capacity}$$

Or

$$\text{Cost of activity supplied} = \text{Cost of activity used} + \text{Cost of unused activity}$$

Unused capacity is the result of resources supplied exceeding resources used. In the short run some of the resources supplied cannot be matched to the usage and hence they become fixed. Resources for which the supply and the usage can be matched are termed variable. Hence, with ABC systems in the short run the resources supplied may remain fixed but the usage of these resources will invariably fluctuate with the activities performed. With traditional systems fixed costs are allowed to remain constant even with the reduction in the usage of resources. On the other hand, with ABC systems, the unused capacity should be investigated and appropriate steps taken to reduce or nullify the unused capacity. This positions the ABC system in the role of planning and budgeting in addition to its primary role of allocating costs to cost objects. Cooper and Kaplan (1992, p 2) illustrate this role of the ABC system with the following example:

Consider a purchasing department in which the equivalent of 10 full-time people (the resource supplied) are committed to processing purchase orders (the activity performed). If the monthly cost of a full-time employee is \$2,500, the monthly cost of the activity, 'Process Purchase Orders,' equals \$25,000. Assume that each employee, working at practical capacity, can process 125 purchase orders per month, leading to an estimated cost of \$20 for processing each purchase order. Thus, the organization, 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.

From this example it is clearly seen that the cost of unused capacity \$5,000 is the difference between the activities supplied and the activities used. In the traditional system the \$25,000 will be considered as a fixed cost. With the ABC system, the \$5,000 of unused capacity should be investigated and the necessary

steps should be taken to avoid such excessive spending. Alternatively, the unused resources should be allocated to profitable uses.

Cooper (1990 a) explains the logic of ABC by stating that the ABC systems measure changes in the level of consumption of resources and not in the level of spending on resources i.e. cash flow. Hence there emerges their idea that ABC systems are models of resource consumption. In other words they concentrate on the demand for activities. They are not a model of spending, which looks at the capacity provided to perform those activities. A reduction in production is related to the activity demanded, and not necessarily with the cost of resources supplied. This acknowledgement has raised queries on the causal relationship between activities and costs, by Piper and Wally (1990). However Cooper (1990 a) has clarified the assertion by defining costs in terms of resource consumption and not in terms of spending, as ultimately the level of spending is reflected in the level of demand or resource consumption. The ABC system as a resource usage model distinguishes between spending on resources that are currently being used productively and spending on resources that are currently in excess supply (Cooper, 1990).

3.4.3 Attention-focusing device

Developments in the theory of ABC systems have also recognised the system as an attention-focusing device. Kaplan (1990) and Cooper and Kaplan (1991) have asserted that the reported product costs from an ABC system provide attention-directing information, rather than information that can be used directly for decision-making. Cooper (1997) states that the role of a resource usage model is to develop profitability maps that are used to focus managerial attention.

A profitability map describes the profitability of cost objects (i.e. products, customers or other outputs). Cooper's (1997, p B1-17) analogy of the profitability maps is the geological maps, which are used to determine the likely site of oil by conducting seismic surveys. The seismic surveys further pave the way to drilling

test holes to find oil. According to Cooper, the profitability maps are similar to the geological maps in that they are used to identify the most likely place to find profit-improving projects. He says that the profitability map acts to focus management attention on a limited range of potential decisions. Generally the number of potential decisions to explore at random is unmanageable. The author quotes an example whereby a company with only 100 products having a potential of 2^{100} product mix decisions to evaluate. Therefore, the profitability maps will enable the manager to focus on the profit improving projects only, such as potential discontinuation or expansion decisions.

Once the profit improving projects are identified, special studies can be conducted to explore the cash flow implications of each potential project decision. The purpose of a special study is to convert for each potential decision the profitability map that reflects resource usage to a cash-flow map that reflects more precisely the changes in resource supply and revenues. As special studies involve high costs it is paramount that such studies are carried out parsimoniously. Hence, by virtue of supplying more accurate cost information, the ABC system provides appropriate profitability maps which in turn aids in performing the necessary special studies.

As was mentioned in section 3.4.1 Kaplan and Cooper have identified that cost hierarchies can be used to develop activity profitability maps. These hierarchical profitability maps as illustrated in Figure 3.2 attempt to classify costs according to the causes of their variability at different hierarchical levels. From Figure 3.2 it is seen that the lowest hierarchical levels are shown at the top of the diagram. They include different cost objects such as product, customer and facility contributions and the highest levels (shown at the bottom of the diagram) are the product lines, distribution channels, and country profits. These hierarchies identify the lowest level to which costs can be meaningfully assigned without relying on arbitrary allocations.

The column in Figure 3.2 with products as the lowest cost object in that hierarchy shows that a unit level contribution margin for each individual product is calculated by deducting unit-level activities from the sales revenue. The next higher level in the hierarchy shows the contribution margin derived by deducting batch related activities from the unit level contribution. From this contribution margin, the product-sustaining activities are deducted to obtain a higher level of contribution margin. As Kaplan and Cooper claim, contributions differentiated at these three levels, facilitate the understanding of the implications of the decisions made in terms of cost and profit behaviour. For firms marketing their products by brands, Figure 3.2 shows another level of hierarchy whereby, brand-sustaining expenses are deducted from the third contribution level to arrive at the product brand contributions. These product-brand sustaining expenses, such as management and brand marketing are attributed to the brand and not to individual products within the brand because these expenses benefit all the products within the brand and not any specific individual product.

The next higher level in the hierarchy relates to the product-line. Here all product-line sustaining expenses are deducted to get the product-line profits. As in the case of brand sustaining expenses, the product-line sustaining expenses, such as the research and development, marketing, distribution expenses are incurred for the benefit of the whole product line and not individual products. Therefore these expenses should be attributed to the whole product line and not to individual products.

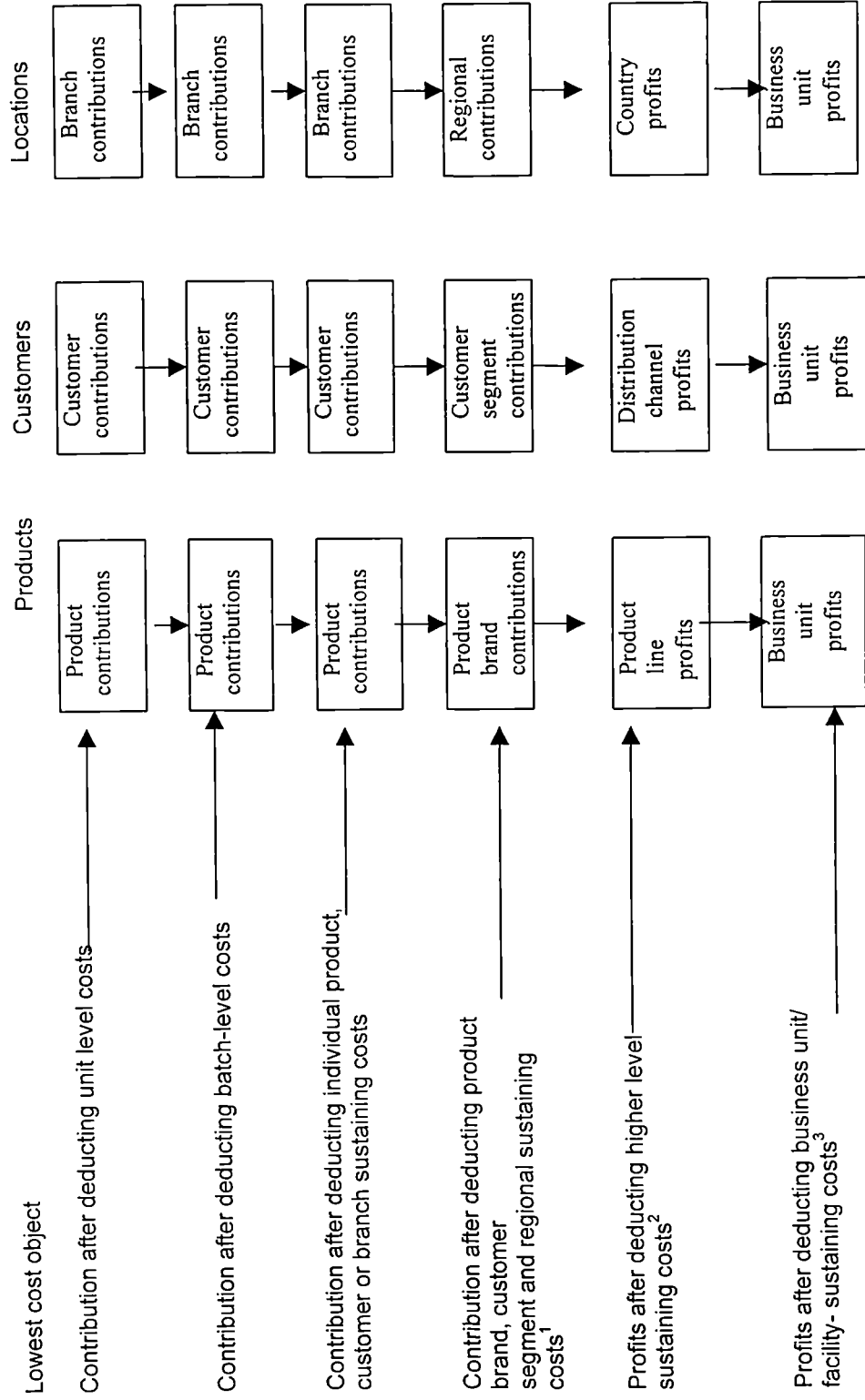
The final highest level in the hierarchy is the business unit level. The business unit profit will be derived by deducting the facility-sustaining expenses from the sum of the individual product-line contributions.

The same approach as above applies to cost objects customers and locations. The whole procedure for these two cost objects is illustrated in the last two columns of Figure 3.2

The hierarchical profitability maps enable managers to identify areas where special attention should be devoted to brands, product-lines, customers, distribution channels, facilities and regions. Kaplan and Cooper (1998, pp 260-261) state:

Hierarchies identify the lowest level to which certain costs can meaningfully be assigned. They help identify the impact on resource consumption of adding or dropping items at each level of the hierarchy. For example, if the firm drops a brand, activities at the brand level and below will be affected, but activities done at higher levels, such as the product-line level will be unaffected. Similarly, eliminating an object at one level of the hierarchy should cause all activities related to that object at lower levels of the hierarchy to disappear. For example, if a product is dropped, then all of the batch and unit-level activities associated with that product will disappear. The identification of hierarchies allows managers to forecast the effect of decisions to add or drop objects such products, brands, customers and facilities.

Figure 3.2
An illustration of hierarchical profitability analysis



Note

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

(Source: Colin Drury, Management and Cost Accounting 5th Edition 2000, p. 348)

3.5 Arguments against Activity-Based Costing systems

Much has been said about the merits of the ABC system in assigning the indirect costs to products/services in an appropriate manner. Hirsch and Nibbelin (1992, pp 39-40) state that ABC is not a new idea in management accounting as many of the aspects of ABC systems have been accepted in management accounting for decades and they agree that the basic ideas underlying ABC systems are sound. However these authors have drawn attention to the possible limitations of ABC systems, particularly in the areas of handling incremental, separable, sunk and common costs. Advocates of the Theory of Constraints (TOC) and other writers have also drawn attention to the limitations of ABC systems. These arguments are discussed in the following sub-section.

3.5.1 Incremental costs

Hirsch and Nibbelin (1992) note that ABC systems have expanded the idea of incremental costs by focusing managers' attention on what causes resources to be consumed. However, they argue that some of the costs assigned to products under ABC systems may not be incremental and therefore should be omitted when making decisions for which only incremental costs are relevant. The following illustration (p 43) is used by them to support this argument:

Suppose a company has several products. The industrial engineering department manager is asked to find out how engineering resources are used. Suppose that one engineer spends about half his time on one product (Product A) and the other half on tasks that benefit several products (i.e. common costs). An ABC system might assign one-half of that engineer's time to Product A. However, if the company decided to drop Product A, that cost would not disappear. In other words, the cost is traceable, but not avoidable. While one might argue that the half-person capacity freed by dropping Product A would be available for a new product or for some other activity, the cost assigned to Product A is not really incremental, even though the cost may be traced to Product A under an ABC system. (Such a cost would be incremental if, for example, the use of that half-time position would allow the company to avoid hiring another person for needed activities.)

The ABC product cost generated in this manner may not reflect the relevant product cost for decision-making. In such circumstances the authors claim that the managers are actually trading in the distorted product costs obtained from the

traditional system for the distorted product cost from the ABC system. Therefore the need to identify costs that are not incremental in any cost systems is vital.

3.5.2 Common costs

For the allocation of common support department costs (e.g. set-up costs) the ABC system may use the number of set-ups as a cost driver resulting in products being charged a fixed fee based on the number of set-ups. However, the assumption here is all set-ups take the same time to complete, which may not be true. Nevertheless this problem can be overcome by the use of duration drivers instead of transaction drivers. Transaction-based cost drivers use number of transactions generated by the activity, whereas duration-based cost drivers are concerned with the duration of the said activity. Inevitably the duration-based cost drivers are more time consuming and costly to use as compared to the transaction-based drivers.⁸ Nevertheless Hirsch and Nibbelin (1992) argue that even if set-up times were used as the cost driver, a cost that is not incremental is assigned. They explain that the set-up costs may consist of salaries and benefits of employees who perform these set-ups, based on the current capacity of the plant and that these costs will remain fixed unless the basic structure of the plant were to change.

3.5.3 Sunk costs

As for sunk costs, Hirsch and Nibbelin (1992) note that some of these costs are traceable and hence may be relevant for decision-making. For example, depreciation is generally considered to be a sunk cost as it is based on the original cost of an asset and hence not relevant for managerial decision-making. Even the ABC systems avoid such sunk costs for decision-making purposes. The authors debate on the relevancy of certain sunk costs with the following example (p 43):

If a product that uses single-purpose machinery were discontinued, the machinery would be sold. The accounting system would consequently

⁸ A discussion of the different types of cost drivers is provided in section 4.3.2.1

show a reduction in annual depreciation, but that reduction is not indicative of a real savings. The economic event of note in the disposition of dedicated assets is a single period cash inflow (assuming the equipment has a salvage value). That cash inflow is relevant to the decision; annual depreciation expense by itself - even depreciation for separable equipment - is not. The lost tax shield from depreciation on the equipment would also have cash flow effects in subsequent periods, but this is not reflected in the allocated cost. Managers must therefore recognise that a portion of product costs are sunk costs. These sunk costs must be eliminated and converted to cash flows when evaluating a product line.

3.5.4 Theory of Constraints (TOC)

Limitations in the ABC systems have also been addressed by the advocates of the Theory of Constraints (TOC). ABC works on the assumption that decisions are made from a long run perspective (Campbell et al, 1997). Hence, it has been criticised for its inability to support short-term decisions. Kee (1998 a), argues that a company's resources, such as the rent of factory equipment, may be contracted in advance, or they may be influenced by management policy as in the case of retaining workers in periods of excess labour capacity. Such costs are considered to be committed costs and as such, in the short run, a company will be unable to adjust its expenditures for these types of resources to meet its production needs. Under such circumstances the cost of the resources traced to a product under ABC may not reflect the incremental cost of their production in the short run. The TOC advocates also criticise ABC systems for their failure to incorporate constraints into the analysis of a company's products (Kee, 1998 b). This is because, ABC considers the long-term perspective and hence short-term resource constraints are not taken into account. A more detailed comparison of ABC with throughput accounting is presented in section 3.6.

3.5.5 Unit costs, unused capacity and future cash flows

Drury (2000, pp 355-357) has discussed on the pitfalls of using ABC information when dealing with unit costs, unused capacity and future cash flows. As for the unit costs, batch level activity costs are divided by the number of units in the batch and product-sustaining costs are divided by the number of products produced.

Such unit costs will be a constant average cost per unit of output and it will differ according to the selected output level. Here again the unit cost becomes volume dependent, which was one of the main flaws identified in the traditional costing system. Drury provides the following example to illustrate this flaw:

Consider a situation where the cost per set-up is £1,000 for a standard batch size of 100 units for a particular part, giving an average set-up cost per part of £10. If a special order requiring the part is received for 50 units then the batch size will differ from standard batch size and the average cost of the set-up for processing the parts of £10 is not the appropriate cost to use for decision-making. There is a danger that costs of £500 could be assigned to the order. However if the special order requires one set-up then the activity resources consumed will be £1,000 pounds for an additional set-up, and not £500. Care must therefore be taken when using ABC information.

As for the concept of managing unused capacity, human resources can be managed more easily as they are flexible and can be adjusted in small increments so that the supply of resources can be adjusted to the usage of resources. On the other hand, it is difficult to adjust the supply of physical resources to the resource usage. This is because physical resources are normally supplied to cover a wide range of activity usage, and there has to be a dramatic change in activity for the supply to change. Thus a change in resource usage may not affect resource supply.

Drury concludes that if there is no link between the resource usage and resource supply (spending), such as for physical resources as described above, then the future cash flow impact will be zero for most decisions. Therefore the cost of resource usage would be fixed and unavoidable as in the traditional costing system. The traditional costing system also accurately traces the cost of unit-level activities to products and facility-sustaining costs cannot be assigned accurately by any costing system. In these circumstances only batch-related costs will be more accurately assigned using ABC systems. Thus, for many organisations the

proportion of costs that can be more accurately assigned to cost objects by ABC systems and that can be expected to have a future cash flow impact, may be quite low. Under these circumstances sufficiently accurate cost information for decision-making may be obtained even with a simplistic costing system.

3.5.6 Decision relevant information

Piper and Walley (1990, 1991) have strongly criticised the logic of ABC. The authors say that ABC may provide more relevant information than traditional product costing, but question the decision relevant information provided by the ABC as compared to the contribution approach. The ABC approach, they argue, is an absorption costing system and hence suffers from the inherent deficiencies of the absorption costing model and the quality of information provided. Furthermore the authors also criticise the ABC model as a simplistic model treating the relationship between activity and resource consumption as being linear, absolute and certain. They also state that ABC systems do not provide decision relevant information because they only consider relating activities to products and do not consider other complex situations such as the changing environment and the need to be concerned with actions that add value.

3.6 Theory of Constraints (TOC) and Activity Based Costing (ABC)

The TOC concept was introduced by Eliyahu M. Goldratt in the early 1980s. Goldratt (1990) suggests that any system will encounter a few constraints and these constraints determine the system's performance. Hence, the TOC compels the need to concentrate on such constraints rather than on product costs for decision-making. The TOC also focuses on throughput, which is the difference between the sales and cost of raw materials. Other variable costs are not considered, because the advocates of TOC recognise that, other than the bought in materials, all other costs are not variable over a short-run period. Hence, they are considered to be irrelevant for decision-making. Ruhl (1997, p 19) illustrates this concept through the following example:

Suppose that employees at a manufacturing plant currently perform 100 setups each month. A manager who wants to cut labour costs tells employees to

produce in larger batch sizes and thus make fewer setups, so only eighty setups are made the next month. Despite this management action, the amounts paid to employees remain the same, because no employees are laid off. Thus in deciding whether or not to reduce the number of setups, the total setup cost is irrelevant. TOC also recognises that it is often infeasible to lay off employees during periods when demand for the company's products is low, and it is impossible to "lay-off" physical assets. Short of closing an entire plant or discontinuing a division, therefore, the company will incur the same total costs. Thus, the only costs that will vary between alternatives are the costs of purchased inputs such as raw materials and purchased components. These costs are relevant and TOC explicitly includes them in the calculation of throughput.

Kaplan (1990) points out that fixed costs keep growing and have increased the most within organisations over the last two or three decades. He suggests that such fixed costs should be explained not by the amount of output produced but by the diversity of the company's products, customers, distribution channels and product lines. This is because organisations expand output by introducing new models, new lines of business, new distribution channels, and new customers and not just increasing the sales of a single product to a single customer. He states that increasing diversity and complexity increases the organisation's infrastructure to meet the demands created by the new products, customers and distribution channels. Therefore most, if not all, the "traditional fixed overhead" are really variable (pp 4-5).

Based on the concepts of 'throughput' it is implicitly seen that TOC is a short-term management accounting tool as all costs are variable in the long run. Labour costs and other committed capacity costs can be influenced by management in the longer term according to requirements. This indicates that the use of ABC or TOC depends on time horizon. As Holmen (1995) states, TOC is more appropriate for short term planning and ABC for the long term planning. Ruhl (1997) also suggests that TOC is appropriate depending on the problem management faces. He states that if the management problem is concerned with variable costs and throughput then TOC is applicable. If it is on overheads then ABC becomes appropriate.

However, Shank and Govindarajan (1989) argue that there are only very few purely short-run decisions and many decisions have more long-run than short-run implications. They further question the exact time when the short-run ends and the long-run begins and the consequences of the accumulation of a series of short-run decisions are really equivalent to long-run decisions.

Kaplan (1990, p 14) provides the following example relating to fixed costs and short-term decision-making:

Someone says, I can make 100,000 pens a month, but because of slack demand conditions, I am currently producing only 60,000 pens a month. A salesperson calls in an order for a specialty purple pen. It's not a product that I am now making, but it's something I can design and produce. I have excess capacity, I'm paying the labor and engineers anyway, the machines are there (and already paid for), so why not take the order because the price exceeds the incremental materials and energy costs of making the purple pen?

The author states that they (Cooper and Kaplan) tell two things to the manager:

- i. agree with the salespeople in this case because the economies of making the purple pen with the excess capacity is overwhelming ;
- ii. Never ask this question again.

Their reasoning for the second statement is:

Suppose that every month managers see that they have excess capacity to make 20,000 more pens, and salespeople are calling in special orders for turquoise pens, for purple pens with red caps, and other such customized product. Why not accept all these orders based on short-run contribution margin? The answer is that if they do, then costs that appear fixed in the short-term will start to increase, or expenses currently being incurred will be incapable of being reduced. Once they get into the incremental order business, they will need the organizational resources to design, schedule, purchase, produce, market, sell, deliver, and service these incremental orders. And our ABC analysis has revealed that such short-run, incremental business makes disproportionate demands on the organization's support resources. The special business, taken on an incremental analysis basis, has substantial diseconomies of scope. Companies may still decide to accept orders based on short-run contribution margins but we believe that managers will find it useful to have a signal as to the demands these orders place on the total organizational resources. In this way they can attempt to adjust price, delivery terms, manufacturing technology, or product designs so that the

revenues they receive from special orders exceed the expenditure of resources demanded to handle the special orders. The activity-based product and customer costs provide an estimate of the magnitude and cost of these demands.

Cooper and Slagmulder (1999) have explicitly discussed the integration of activity-based costing and the theory of constraints in making optimal decisions. The authors state that the profitability maps created by an activity-based costing system are based on general purpose costs designed to focus managerial attention and not support decisions. They explain that the conversion from resource usage to resource supply is particularly important when the proposed change in resource usage predicted by the ABC system is not equivalent to a change in the resource supply. When the resource usage exceeds the resource supply then a capacity limit exists and management should consider such 'bottlenecks' when making decisions. Cooper and Slagmulder clarify that a pure ABC system does not recognise bottlenecks because it assumes that resource demand and usage always match. Hence the ABC resource usage model gives importance to excess capacity and ignores bottlenecks when making decisions. Therefore, when bottlenecks exist, the authors claim that the ABC profitability maps lose their decision relevance, and special studies are required to understand the implications of decisions that involve these resources. One of the attributes of the theory of constraints is the identification of 'bottlenecks' when making optimal short-term decisions.

The authors (pp 20-21) provide the following example to show the perceived superiority of TOC over ABC in resolving short-term implications of bottlenecks:

Assume that the firm has to choose among manufacturing three products A,B and C. The three products consume four different resources: material, labour, machining (the current bottleneck resource), and inspection. The cost of the supplied capacity for labour is \$50, for machining \$20, and for inspection \$50. All three products have the same selling price, but product A has the lowest ABC costs. Consequently, ABC favours the manufacture of product A because it has the highest reported profits.

TOC takes a different approach; it splits resources into two categories. The first category incorporates all resources that are purchased on an "as needed" basis. These are the resources that vary directly with the

changes in the level of production. The other category of resources is acquired on an "in-case" basis. The costs of these resources will be incurred irrespective of the level of usage. Under TOC, the costs of these "in-case" resources are grouped into the category "operating expenses" and treated as fixed costs. For the purpose of the TOC analysis relating to product mix they are essentially ignored. Thus, TOC can be viewed as an extreme form of contribution analysis. The objective under TOC is to maximise "throughput" defined as revenues minus the cost of the "as needed" resources. In the illustrative example, the only cost that is subtracted is material. Consequently Product A has the highest unit throughput and, on the surface, is the favoured product under both TOC and ABC. Product A, however, consumes twice as much of the bottleneck resource "machining" as products B and C. Therefore, in a given time frame, the firm can manufacture two units of product B or C for every unit of product A. Despite the fact that product A has the higher unit throughput, product C generates the highest overall throughput and hence profits. Thus, the correct decision is to manufacture product C, not product A. Thus the appropriate metric for such short-term decisions is not ABC profits but the throughput per unit of the constrained (or bottleneck) resource.

By concentrating on the concept of 'constraints' the TOC is concerned with managing the constraints and identifying opportunity costs, so as to increase the efficiency of processes. As one constraint is arrested another may emerge and therefore it is a continuous process of identifying and managing the constraints. This is related to the 'continuous improvement process' as depicted by Crosby (1985). Campbell *et al* (1997) conclude that "activity analysis using time rather than cost measures can be useful in identifying and eliminating non-value-added activities in the constraint, thus reducing constraint cycle time and increasing throughput". The idea of process improvement in TOC is to increase throughput.

Nevertheless, Cooper and Slugmulder (1999) claim that the drawback to the TOC approach is that it ignores operating expenses that can be managed over the long-term. This they illustrate with the same example as above. The authors (p 22) state:

The ABC system indicates that product C is approximately half as profitable as products A and B, raising the question: Should product C be discontinued? A special study indicates that the inspection resource is dedicated to the production of product C. Therefore, if product C is discontinued, the inspection costs of \$50 can be avoided and the overall profits of the firm will increase. A TOC analysis between products A and B now indicates that the best solution is to manufacture two units of product

B, generating an overall profit of \$60 which is higher than the original TOC profit of \$14.

From the above illustration, the authors conclude that TOC and ABC are complementary, not competing, cost management techniques, which can coexist and be used together to identify the best short-term and long-term product mixes.

Several writers (Spoede *et al*, 1994; Kee, 1995; Ruhl, 1997; Campbell *et al*, 1997) have identified the complementary roles played by the ABC system and the TOC, which is in contrast to the earlier belief that the two theories are incompatible.

3.7 Summary / Conclusion

This chapter has identified the alternate product costing systems in the form of the variable costing, direct costing, traditional absorption costing and the contemporary ABC systems. Throughput accounting (Theory of Constraints) was also discussed in some detail to provide a description of the different approaches to product costing and also to contrast TOC and ABC systems. The benefits and limitations of the first three costing systems and the factors that brought about the introduction of the ABC system, were discussed. It was highlighted that the ABC system is not used to make decisions, but is used as an "attention-directing " tool to indicate areas that need special studies to make decisions.

Developments in the theory of ABC systems, such as the hierarchy of activities and resource usage model, have formed a basis for developing appropriate profitability maps that provide contribution margins at different hierarchical levels. This enables managers to take necessary actions, such as adding or dropping certain hierarchical levels that can transform unprofitable cost objects into profitable cost objects and thus raise overall the profitability of the organisation (Kaplan, 1990). It was also pointed out that, in contrast to the earlier belief of the competing nature of TOC and ABC, contemporary writings have suggested that these two concepts are complementary.

Based on these alternate costing systems, the following chapter will discuss the concept of an optimal cost system. In addition, those factors that have been identified in the literature that are likely to influence the choice of cost system design by organisations will be discussed. In particular, the chapter will consider whether there is one optimal cost system that is applicable to all organisations or whether the choice is dependent on potential explanatory variables/contingent factors.

Chapter 4

COST SYSTEM DESIGN

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Chapter 4

COST SYSTEM DESIGN

Having discussed the alternative forms of the product costing systems in the preceding chapter, this chapter begins by briefly explaining the purposes for which product cost information is used and outlining the type and accuracy level of product cost information needed for the different purposes. Following this, an optimal cost system is described and the factors influencing the design of such a system are identified. The chapter proceeds with an explanation of two basic approaches to maintaining costing systems. First, maintaining a single database from which different types of costs are extracted for different purposes. Second, separate databases for each specific purpose for which cost information is required. The sophistication of the cost system design in the form of the number of cost pools maintained and the number and types of the cost drivers used, is described. Finally a contingency theory model is developed that seeks to explain the influence of contingent variables on characteristics of the product costing systems observed in this study.

4.1 Introduction

Drury and Tayles (2000) point out that, manufacturing organisations require product-costing systems that generate cost information for meeting the following requirements:

1. internal profit measurement and external financial accounting requirements in order to allocate the manufacturing costs incurred during a period between cost of goods sold and inventories;
2. providing useful information for managerial decision-making requirements;
3. profitability analysis for internal attention-directing purposes.

Non-manufacturing organisations that do not have partly or fully completed stocks require a product costing system for meeting only the second and third requirements.

For inventory valuation and profit measurement, if the cost system is able to provide fairly accurate measurements of the division between aggregate costs of goods sold and inventories, the system will suffice. In contrast, product cost information required for

strategic decision-making and profitability analysis has to be more accurate. The system should measure the consumption of resources by *individual* products/services reasonably accurately, so as to avoid product/service cost distortion, and to distinguish between profitable and unprofitable products/services.

However, it should be noted that some commentators have reported instances where product costs are also used for influencing desirable behaviour. In such circumstances the norm of attempting to calculate accurate individual product costs may not be followed. Instead, less precise, biased costs are applied to induce desirable behaviour.

4.2 Product costs used for influencing desirable behaviour

It is important to note that Merchant and Shields (1993) have identified some organisations that prefer to measure product costs less precisely, having costs that may be deliberately biased. They argue that such biases may be appropriate to influence behaviour in *positive directions*, with the consequence being better results. According to them, the rationale for an upwardly biased cost is to protect against the tendency to shave profit margins excessively when making pricing decisions. They illustrate this rationale with the example of salespersons who earn commissions based on sales revenue, and have the authority to give discounts in order to secure sales. They say that the cost pads are intended to prevent the salespeople from giving discounts that "shave prices down to the true cost level".

In the case of biased costs in the downward direction, the aim is to stimulate demand and consumption. This is illustrated with their example of the Corporate Data Processing Services (CDPS) department of the Boise Cascade Corporation. The CDPS did not allocate purchasing, set-up, and application assistance costs (i.e. personal computer supporting costs) to PC users because the aim was to stimulate PC use.

Merchant and Shields also state that at times, certain cost systems are designed to give less precise cost measurement with the intention of inducing specific positive behavioural responses. For example, although several criticisms have been targeted at the use of direct labour hour as the overhead allocation base, especially in an automated

environment, some Japanese companies have implemented the controversial labour hour rate for behavioural reasons. Hiromoto (1988, p 462) provides the following practice in Hitachi :

The Hitachi VCR plant is highly automated yet continues to use direct labour as a basis for allocating manufacturing overhead. Overhead allocation doesn't reflect the actual production process in the factory's automated environment. When I asked the accountants whether that policy might lead to bad decisions, they responded with an emphatic no. Hitachi, like many large Japanese manufacturers, is convinced that reducing direct labour is essential for ongoing cost improvement. The company is committed to aggressive automation to promote long-term competitiveness. Allocating overheads based on direct labour creates the desired strong pro-automation incentives throughout the organisation.

Hiromoto states that the Japanese argue that it is more important to have an overhead allocation system that motivates employees to work in harmony with the company's long-term goals than to pinpoint production costs. Innes and Mitchell (1995) have observed that Japanese firms have the objective to motivate cost-conscious behaviour rather than to produce accurate product costs. Hence they use motivational cost drivers. In Japan direct labour hours are still used as motivational cost drivers, as it makes labour a costly resource and motivates designers to design labour out of the products.

The idea of such controversial cost systems is to focus the employees' attention on the factors managers feel are most critical for generating continuous improvement and competitive advantage. For example, when the firm adopts a strategy of reducing the number of unique parts it processes for certain activities then the firm can reinforce this strategy by using the number of parts as the cost driver to assign costs to activities. Using number of parts as the cost driver is likely to assign a higher cost to activities needing a large number of unique parts to be processed. This tends to overcost products/services needing such activities. Therefore, to reduce the reported product costs firms may endeavour to reduce the number of unique parts. As Merchant and Shields (1993) say, these cost systems focused the employees' attention on the factors managers deemed most critical to their success.

Despite the above observations, reasonably accurate product cost information is generally likely to be required to aid strategic decision-making.

4.3 The concept of an optimal product costing system

Kaplan (1988) describes a good product cost system to be one that should report all the expenses incurred across the organisation's entire value chain. Porter (1985) recognises 'value chain' as a series of value creating activities from receiving of raw material to the final product or service being delivered to the customer.

Kaplan (1988) states that a product's cost does not end with its value-added costs only, but includes other resource consumption activity costs involved in distributing, selling, and other support servicing. He also argues that expenses incurred for the benefit of future products represent an investment in future products. Hence, such costs should not be assigned to current products. As explained in section 3.4.2, Kaplan advocates that expenses of unused capacity should be excluded from product cost calculation.

Three factors, *viz.* cost of measurement, cost of errors, and product diversity are identified by Cooper (1988), to be instrumental in determining an optimal costing system. He points out that the optimal cost system is not necessarily the most accurate cost system. An optimal cost system is one that minimises the sum of the cost of measurement and the cost of errors. Costs of measurements are identified as those costs associated with measurements required by the cost system, whilst cost of errors are those associated with making poor decisions based on inaccurate product costs. Costs of measurements and costs of errors are negatively correlated; hence the optimal cost system should be the point at which the marginal cost of an improvement just equals the marginal benefits of the improvement. This indicates the need for a cost benefit analysis when considering the level of sophistication applicable to the design of cost systems.

Cooper is therefore drawing attention to the fact that there is not a universal optimal costing system which applies to all organisations. An optimal costing system is dependent upon costs versus benefits criteria, which will differ depending on the particular circumstances applying to each organisation. Although he does not specify it Cooper is implicitly suggesting that a normative contingency theory approach should be applied to determining optimal product costing systems.

With the development of sophisticated information technology over the past two decades, the cost of measurement has declined enormously. Likewise, the acceleration in current global competition together with the emergence of deregulation has increased the negative impacts of the cost of errors. The dramatic change in these two factors together with the multiplicity in product diversity, have prompted the need for adaptable cost systems. That is a single costing system that is flexible enough to provide the relevant information for the different purposes for which the cost information is used. The extent to which firms use a single database from which different costs are extracted for different purposes or whether separate databases are used for obtaining different cost information represents one of the objectives of this research (see chapter 1, section 1.3).

Bruns *et al* (1996) have stated that it is possible to maintain a single cost data base for meeting all requirements provided that the data is selected, analysed, aggregated and reported according to the needs of the information. The other alternative is to have different cost databases for the different purposes for which the cost information is required. Kaplan (1988) states that no single cost system can adequately answer the demands made by the diverse functions of cost systems. He stresses the need for the development of separate, customised cost systems to cater for the diverse purposes and the audiences' demands.

Kaplan and Cooper (1998) suggest that separate, customised stand-alone approaches (using activity-based-costs) systems be developed for management accounting purposes and that a separate system should also be maintained for financial accounting purposes. Such stand-alone ABC systems can be developed into a fully integrated activity-based system providing a single database for both management accounting and financial accounting information. This they say can be done only after reviewing the stand-alone system (which can be maintained at standard cost) periodically and becoming confident of their capabilities and understanding their limitations. From such integrated databases, expenses that are not inventoriable can be stripped away when preparing cost information for external reporting. Likewise the system will perform the necessary and arbitrary allocation of facility-sustaining costs (required for external reporting) not included in the ABC systems, to product units. As for management accounting decision making, only

relevant cost for that purpose will be extracted. Such integrated "Enterprise-Wide Systems (EWS) will provide an integrated set of operating, financial and management systems. Kaplan and Cooper explain that the EWS has a common data structure and a centralised, accessible data warehouse that permits data to be entered and accessed from anywhere in the world.

4.4 A brief discussion of the different categories of costs that may be extracted from the cost system and assigned to products/services

The following categories of costs may be abstracted:⁹

- (i) Direct costs excluding all overheads
- (ii) Direct costs plus the assignment of indirect costs using only cause-and-effect allocations
- (iii) As (ii) above plus a share of those facility-sustaining costs that are assigned using methods that do not rely on the cause-and-effect relationship

(i) Direct costs excluding all overheads:

This method only assigns uniquely attributable direct costs to cost objects. The difference between sales revenues and direct costs represents the contribution to indirect costs and profit. The costs of joint resources that fluctuate in the long-term according to their demand are excluded. The assumption made here is that product decisions are independent when profitability analysis is used directly for decision-making. This is appropriate if the costs of those joint resources that fluctuate according to the demand for them are insignificant. However, the direct costing system 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 exceed the lost contributions.

⁹ This classification is derived from Drury and Tayles (2000)

(ii) Direct costs plus the assignment of indirect costs using only cause-and-effect allocations:

This approach is appropriate where interdependencies exist among a series of decisions. For example, as Cooper (1990) 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 (say 50 products) may allow considerable savings in the fixed overhead spending.

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.

The authors have suggested that the indirect costs be allocated using the cause-effect relationship between the activity needed to produce or provide the product/service and the consumption of the joint resource by this activity. Arbitrary indirect cost allocations are to be excluded as this may distort product/service cost information. The facility-sustaining costs, where it is not possible to identify cause-effect relationships, are likely to be unavoidable and irrelevant to most decisions. Hence, they should not be assigned to products.

ABC systems using many cost centres (pools) and a variety of different cost drivers are likely to be most suited for allocating indirect costs based on cause-and-effect relationships.

(iii) As (ii) above plus a share of those facility-sustaining costs that are assigned using methods that do not rely on the cause-and-effect relationship

For external reporting purposes, stocks need to be valued with a fair share of the facility-sustaining costs, which are unavoidable and irrelevant for most decisions. As Drury and

Tayles (2000) have stated, the facility sustaining costs are common and joint costs that 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. However, for cost-plus pricing decisions or tendering 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. Nevertheless, these costs should be allocated according to the benefits received or should be allocated based on the principle of 'equity or fairness' (Young, 1985).

4.5 Different costs and levels of accuracy for different purposes

The previous section identified the different categories of costs that may be extracted from the cost system and assigned to products. This section discusses the different categories of costs that the conventional wisdom of management accounting suggests should be assigned to products for different purposes.¹⁰ The extent to which different cost information is used for different purposes represents one of the objectives of this study (see chapter 1, section 1.2).

It was pointed out in section 4.1 product cost information is required for different roles *viz.* stock valuation for external reporting purposes, strategic decision making and profitability analysis for internal attention-directing purposes. External financial regulations require that only manufacturing costs be assigned to products/services. Therefore, costs where it is not possible to identify allocation bases that are the causes of the costs varying in the long term, and which may not be relevant for decision-making (such as manufacturing facility-sustaining costs), are included in the product cost for stock valuation purposes. On the other hand, for decision-making purposes, incremental non-manufacturing costs should also be assigned to products. For profitability analysis that is used directly or as attention-directing information for strategic decision-making, it is appropriate to include direct costs

¹⁰ The conventional wisdom of management accounting is assumed to be represented by the content of current textbooks

and indirect costs where it is possible to identify allocation bases which are causes of the costs varying. Facility sustaining costs are likely to be irrelevant as these costs can normally be expected to remain unaltered with the different decisions that are made.

As for the accuracy requirement, for stock valuation purposes, Kaplan & 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. Drury (2000, p 47) clarifies this with the following illustration of a firm producing 1,000 different products and incurring a cost of £10 million for a period of which £7 million relates to cost of sales and £3 million relates to inventories.

A well-designed product costing system should accurately analyse the £10 million costs incurred between the cost of sales and inventories. Approximate but inaccurate *individual* product costs may provide a reasonable approximation of how much of the £10 million should be attributed to cost of sales and inventories. Some product costs may be over stated and others may be understated, but this would not matter for financial accounting purposes as long as the *total* of the individual product costs assigned to cost of sales and inventories was approximately £7 million and £3 million.

However for decision making and profitability analysis 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. 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. This implies that more accurate product costs are required for decision-making and profitability analysis. 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.

The third cost classification (4.4 iii) system described above would be suitable for organisations where stock valuation is significant and also the cost-plus pricing is important to determine the final selling price. This third system can be maintained by having separate suitable databases. Alternatively, instead of maintaining a separate database the costs falling within this third category could be extracted from a single database. From this single database, all (full) costs for pricing and only manufacturing costs for stock valuation, including the facility-sustaining costs, can be extracted.

However, for strategic decision-making and profitability analysis, only direct costs and indirect costs with cause-and-effect identifiable cost drivers should be extracted. The inclusion of indirect costs, such as the facility and business-sustaining costs, using arbitrary allocation bases would distort the product cost information and hence lead to wrong decision making. Thus, firms maintaining a single database need to extract only the direct and cause-and-effect related indirect costs. Alternatively, if separate databases are maintained then the cost database used should accumulate only the direct and cause-and-effect related indirect costs. The second cost classification (4.4 ii) system described above is appropriate for this purpose.

For those firms where the financial accounting stock valuation and cost-plus pricing is not significant, or non-manufacturing organisations where stock valuation is not an issue, then the single cost data base is more likely to cater for profitability analysis and strategic decision-making.

Nevertheless it is important to note that different levels of accuracy for different purposes cannot be maintained within a single database.

4.6 Attributes of sophisticated/unsophisticated costing systems

One of the objectives of this study is to investigate the level of cost system design in Malaysian companies. Also the characteristic of the product costing system that will be examined within the contingency theory framework is the level of cost system sophistication. This section examines what constitutes a sophisticated/unsophisticated costing system.

Generally, the sophistication of the cost system in assigning indirect costs to products/services will vary in relation to the number of cost pools and the number and variety of the appropriate cost drivers. The more cost pools and the variety of different second stage cost drivers that are used the higher is the assumed level of sophistication. 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 second stage cost drivers thus implying that higher levels of cost system sophistication are associated with the reporting of more accurate product costs. According to Kaplan and

Cooper (1998, p 99), a relatively simple ABC system should have 30–50 activity cost pools and many different types of activity cost drivers. Cooper (1989, p 34) stresses, the sophistication and the accuracy level of the cost system may also be affected by the type of cost drivers used. This issue is discussed in section 4.6.2.1

4.6.1 Number of cost pools

The number of cost pools required should depend on the nature of activities performed. Cooper (1989) argues that there is a need to have more cost pools if the activities recognised are heterogeneous. The reason being, using a single cost pool for heterogeneous activities poses a difficulty in identifying an appropriate cost driver that correlates positively with the consumption of the various activities aggregated together. For example, Cooper (1989, p 34) illustrates the need to have more cost pools with the following illustration:

Every time a new batch is run in a metal-cutting operation, new tools have to be drawn from the tool room, inserted and qualified. The feeds and speeds of the machine must be altered, parts moved from inventory storage to the shop floor, the first part has to be inspected, the batch scheduled, and so on.

Under such circumstances, aggregating the various activities into a single cost pool will pose the problem of identifying the appropriate cost driver that can trace the costs of the different activities without causing product cost distortion. In the above example, Cooper questions which of the following would be the appropriate cost driver - number of set-ups, set-up hours or number of times scheduled?

This engenders the need to have more cost pools if the activities are not similar. Appropriate cost drivers may then be used for the different activities, thus reducing cost distortions. Having many cost pools and different cost drivers may increase the cost and time of measurement. Identifying unique 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, p 214) 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.

4.6.2 Number of cost drivers

Cooper (1989, p 45) states that the number of different cost drivers to be used (and therefore the level of cost system sophistication) depends on:

- Desired accuracy level of reported product costs
- Degree of product diversity
- Relative cost of different activities
- Degree of volume diversity
- The correlation of the cost drivers with activity consumption

Desired accuracy level of reported product costs

The higher the accuracy desired, the greater the number and variety of cost drivers required. Using few cost drivers to trace the costs of many different activities may not capture accurately the resources consumed by the various activities (see section 4.6.1).

Degree of product diversity

The greater the degree of product diversity the more cost drivers are required. Cooper (1988) and Kaplan (1990) have emphasised the need for an accurate costing system when there is product or volume diversity. Product diversity exists when products consume activities in different proportions. Cooper (1989, p 34) explains products are considered diverse when they consume activities in different proportions. He provides an example of two products, one requiring five inspection hours per 100 direct labour hours and the other product consumes only one inspection hour per 100 direct labour hours. Cooper uses the following example to show the effect of product diversity on reported product costs:

A production facility produces equal quantities of two products, A and B. Both products are produced in equal-size batches of fifty units. Two activities are required for products A and B: inspection and machining a surface. These two activities cost the same amount per hour. Both products also consume one hour of machining per unit. However, it takes ten

hours to inspect the first unit of A produced and five hours to inspect the first unit of B produced. If the costs of inspection are traced to products A and B using machine hours as the cost driver, equal amounts of inspection are traced to both products because one unit of each product consumes one machine hour. This would result in distorted product costs as Product A needing more inspection time would be undercosted and Product B requiring lesser inspection time would be overcosted. Therefore, the distortion in the reported product costs becomes higher with higher product diversity. Hence it may be more appropriate to use different cost drivers for the different activities.

Product diversity can also be explained in terms of the consumption ratios, which represent the proportion of each activity consumed by a product. Drury (2000, p 341) illustrates how the uses of volume-based drivers such as direct labour hours can result in the reporting of distorted costs when product diversity is significant. He presents an example of two products one of which is a high-volume product consuming 30% of direct labour hours and the other a low-volume product consuming 5% of direct labour hours. However, both products consume 15% of the non-volume-related processing costs. If volume-based cost drivers are used, the high volume product that consumes 30% of the direct labour hours will be overcosted as compared to the low volume product that consumes only 5% of the direct labour hours. This is because the volume-based consumption ratios (0.3 for the high-volume product and 0.05 for the low-volume product) are different from the consumption ratios for the non-volume-related activities (0.15 for both products). Therefore, volume-based cost drivers will assign six times more non-volume-related overheads to products whereas using non-volume rated cost drivers will correctly assign 50% of the overheads to each product. Therefore, the traditional costing system using volume-based cost drivers tends to produce distorted product costs, because of the existence of non-volume related overheads and also the existence of product diversity due to different consumption ratios.

Relative cost of various activities

Cooper explains that the relative cost of the various activities is a measure of how much each activity costs as a percentage of the total cost of the production process. Cooper says 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. For example, if an activity accounts

for 20 percent of the cost of a particular product, then tracing twice as much of that activity to the product will cause reported product costs to be 20 percent too high. Alternatively, if the activity accounts for only 0.2 percent, then the distortion introduced will only be 0.2 percent. Therefore the author suggests that the greater the number of activities that represent a significant proportion of the total cost of the products, the more cost drivers are required to avoid any cost distortion.

Degree of volume diversity

The greater the range of batch sizes, the more cost drivers required. Volume diversity, as Cooper (1989, p 37) has stated occurs when products are manufactured in batches of different sizes. The following example by Cooper illustrates the effect of volume diversity on reported product costs:

A production facility produces two products A and B. Two activities are required to produce these products: inspection and machining a surface. The two activities cost the same per hour. Both products consume one hour of machining per unit, but it takes ten hours to inspect the first unit of A produced and five hours to inspect the first unit of B produced. A production batch of product A contains fifty units, and a production batch of product B contains five units.

The total number of machine hours consumed for one batch of both product A and B is 55(50+5). As production of one unit of products A and B consumes one machine hour, the cost driver machine hours will trace 15/55 hours of inspection to each unit of products A and B. Therefore a batch of product A will receive 13.64 ($50 \times 15/55$) and a batch of product B would receive 1.36 ($5 \times 15/55$) hours of inspection. The ratio of actual to reported inspection costs would be 0.733 ($10/13.64$) for product A and 3.67 ($5/1.36$) for product B. This results in product A being overcosted and product B being undercosted. To avoid this type of product distortion, Cooper suggests that separate cost pools for batch level activities should be identified and non-volume based cost drivers used to measure the consumption of resources by batch sizes rather than volume.

Drury and Tayles (2000) re-emphasise that if volume-related cost drivers are used most of the costs will be assigned to high volume products which are likely to be produced in a smaller number of high volume batches. Conversely, low volume products with a large number of low volume batches will be assigned a smaller share of batch level activities. This implies that low volume products are likely to be undercosted and high volume

products overcosted. Thus, firms with product/volume diversity should consider having an accurate product costing system to avoid any product cost distortion.

The correlation of the cost drivers with activity consumption

Low correlation of the cost driver with the actual consumption of the activity results in the need for more cost drivers. This is illustrated by Cooper (1989, p 43) with the following example :

If the cost driver used is the number of orders processed, the system assumes that every order is processed identically. The distortion that results if this assumption does not apply can be reduced if the orders can be split into categories that consume different quantities of inputs. For example, it may take longer to order an item of raw material than it takes to order a purchased part. The distortion introduced by using number of orders processed can thus be reduced by using two cost drivers: number of raw material orders processed and number of purchased parts orders processed.

The selection of imperfectly correlated cost drivers can thus result in the reporting of inaccurate product costs. Increasing the number of cost drivers in the above illustration will increase the level of accuracy of the reported product cost.

4.6.2.1 Types of cost drivers

Three different types of cost drivers are identified by Cooper (1989). They are transaction, duration and intensity cost drivers. Transaction drivers, such as the number of set-ups, number of receipts, and the number of products supported, count how often an activity is performed (Kaplan & Atkinson 1998, p 108). According to the authors transaction drivers are the least expensive and the least accurate types of cost drivers because they assume that the same quantity of resources is required every time an activity is performed. For example the use of a transaction driver such as the number of set-ups assumes that all set-ups take the same time to perform. As the authors have suggested, the use of transaction drivers can be acceptable if the variation in the amount of resources required by individual products/services is small. If the variation is great then a more accurate driver, such as the duration driver should be used.

Duration drivers represent the amount of time required to perform an activity. The following illustration by Kaplan & Atkinson (1989) shows the appropriateness of using

duration drivers when significant variation exists in the amount of activity required for different outputs.

Simple products may require only 10–15 minutes to set-up, whereas complex, high-precision products may require 6 hours for set-up. Using a transaction driver, such as number of set-ups, will overcost the resources required to set up simple products and will undercost the resources required for complex products. To avoid this distortion, ABC designers would use a duration driver, such as set-up hours, to assign the cost of set-ups to individual products.

Hence duration drivers may be more accurate than transaction drivers but they are likely to be more expensive because an estimate is required of the duration time each time the activity is performed.

Kaplan and Cooper (1998, p 97) state that for some activities even the duration drivers may not be sufficiently accurate. Therefore they suggest the use of intensity drivers which are the most accurate activity cost drivers. They illustrate the use of such intensity drivers in the following example:

... a particularly complex product may require special set-up and quality control people, as well as special gauging and test equipment each time the machine is set up. A duration driver, like set-up cost per hour, assumes that all hours are equally costly, but does not reflect extra personnel, especially skilled personnel, and expensive equipment that may be required on some set-ups but not others. In these cases, activity costs may have to be charged directly to the output, based on work orders or other records that accumulate the activity expenses incurred for that output.

The authors also state that these intensity drivers are very costly to implement and therefore should be used only when the resources associated with performing an activity are both expensive and variable each time that 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. Cooper (1989, pp 42-44) also affirms that the selection of the appropriate cost drivers depends on the following factors:

- a) *Cost of measuring the cost driver* - Increased product/service cost accuracy is likely to be obtained when more cost drivers are used. Increasing the number of cost drivers may increase the cost of measurement. Therefore Cooper (1989) suggests that ABC

systems use drivers whose quantities are relatively easy to obtain. This is achieved by using drivers that indirectly capture the consumption of activities by products, e.g. replacing inspection hours with the number of inspections. Measuring the duration of inspection hours is likely to be more time consuming and costly as compared to measuring the transaction, number of inspections carried out. However, the author states that this replacement is acceptable only if the duration of each inspection is about the same. If the duration is significantly different, then product cost distortion may occur because inspections needing more time will be undercosted and those needing less time will be overcosted. This cost distortion may be acceptable if the accuracy of the product/service cost information is not important because the cost of an error in making a wrong decision may not be directly influenced by the product/service cost information. For example in the case of market-based product/service pricing decisions, the accuracy of the product/service cost information may not be important.

- b) *Correlation of the selected cost driver to the actual consumption of the activity* - Cooper (1989) states that if cost drivers capture the consumption of activities by products indirectly, then there would be the risk of reported product cost distortion. The author says that correlation is important in the selection of cost drivers for both volume-related activities and activities unrelated to volume. Cooper (1989, p 43) provides the following example to illustrate this point:

If direct labour hours is the cost driver used to trace the cost of the electrical power consumed by the machines, the reported product costs will be distorted if direct labour hours are not perfectly correlated with the consumption of electrical power.

- c) *Behaviour induced by use of the cost driver* - Cooper also states that the effect a particular cost driver will have on the behaviour of individuals in a firm should be considered in selecting the cost driver. Cost drivers may be selected to induce favourable behaviour from the individuals in the firm. For example, when the firm adopts a strategy of reducing the number of unique parts it processes for certain activities then the firm can reinforce this strategy by using the number of parts as the cost driver to assign costs to activities. Using number of parts as the cost driver is likely to assign a higher cost to activities needing a large number of unique parts to be processed. Therefore efforts will be taken to reduce the number of unique parts in order to reduce the activity costs.

4.7 Potential contingency variables influencing the cost system design

In Chapter 1 it was pointed out that the dominant objective of this study was apply a contingency theory framework to examine the relationship between the identified contingency factors and aspects of the product costing systems. Drawing off the literature review in the preceding sections of this chapter and previous chapters the contingency theory model is developed in this section. As indicated in chapter 1 (section 1.5) most of the literature that has applied a contingency theory framework has examined aspects of accounting control systems. The few studies that have applied a contingency theory framework to product costing have defined the characteristics of costing systems as ABC/non-ABC systems. The only survey-based research that has examined product cost systems from a broader perspective is the UK study by Drury and Tayles (2000). This current study seeks to apply the contingency theory framework by adopting a wider perspective than any of the previous studies (Including Drury and Tayles, 2000) to capture aspects of the product costing systems. In particular, alternative measures of cost system sophistication will be used to represent the characteristics of the product costing systems. The specific measures that are used to measure the level of sophistication of the product costing system are explained in detail in chapter 8 (section 8.2).

Based on the literature review the following contingent factors have been identified as influencing the level of sophistication of the product costing systems:¹¹

- i. cost structure of the firm
- ii. size of the firm
- iii. competitive environment
- iv. competitive strategy
- v. product diversity
- vi. volume diversity
- vii. type of organisation
- viii. usage of the Just-In-Time (JIT) system
- ix. the extent to which a financial accounting mentality predominates within the firm

¹¹ The explanatory variables (i) to (vii) influencing the cost system design were derived from Drury and Tayles (2000)

The possible influence of the above explanatory variables will be discussed in the following sub-sections and the formulation of hypotheses specifying the relationship between each variable and the level of cost system sophistication presented. Figure 4.1 provides a diagrammatic illustration of the relationship between the above contingent variables and the aspects of the product costing system (i.e. the level of sophistication of the product costing system). An explanation of how the contingent variables are measured can be found Chapters 6 (see Table 6.3 and section 6.14) and 8 (sections 8.4 – 8.10).

Figure 4.1

A proposed contingency theory framework of product costing

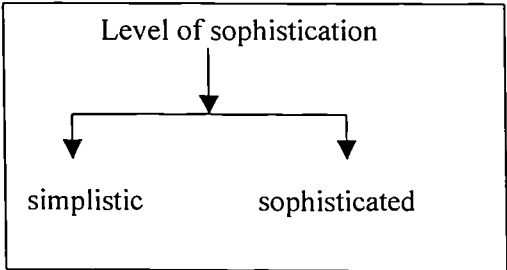
(1)

(2)

Identified contingent
(explanatory variables)

Characteristics of product costing systems

- i. cost structure of the firm
- ii. size of the firm
- iii. competitive environment
- iv. competitive strategy
- v. product diversity
- vi. volume diversity
- vii. type of organisation
- viii. extent of usage of the Just-In-Time(JIT) system
- ix. the extent to which a financial accounting mentality predominates within the firm



4.7.1 Cost structure of the firm

Firms having a higher indirect cost composition have a greater need to accurately assign indirect costs using the cause and effect allocation bases that avoid distorted product/service cost information. Decisions made based on distorted cost information may lead to dropping profitable products/services and continuing with unprofitable products/services. Where direct costs are high, simplistic overhead allocations are unlikely to distort the product costs and therefore a less sophisticated costing system is likely to be appropriate. There is also an argument for not assigning overheads to products and for such firms to adopt direct or variable costing systems. Given that the proportion of indirect costs is low the non-assignment of overheads may not have a significant effect on the product/service cost information (see sections 2.4.3 and 3.2). Brierley *et al* (2001), found that direct material costs were higher than indirect costs from their review of European and USA surveys and concluded that it may not be worthwhile investing in sophisticated cost systems when the proportion of indirect costs is low.

Cooper (1988, p 44) states that when overheads become more important, the effective management of such overheads becomes equally important.

He argues that:

traditional cost systems with their reliance on a few volume-based allocation bases, make it difficult (if not impossible) to understand the relationship between the products produced and the appropriate level of overhead.

The author stresses that an ABC system would provide insights into the relationships between the products produced and the appropriate level of overhead and hence would lead to better management of overheads. In other words, ABC systems are more suited to firms having a higher proportion of overheads in their cost structure.

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

Hypothesis 1(H1): *The greater the proportion of indirect costs within an organisation's cost structure, the higher the level of the sophistication of the costing system.*

4.7.2 Size of firm

Generally larger organisations are more likely to have a more complex product environment. This is because larger firms may have more resources and hence they are able to handle a larger number of activities in a diversified range. This may lead to frequent interdependent decision-making, which is likely to create the need for a more sophisticated costing system that more accurately assigns indirect costs to products/services.

Sophisticated cost systems are likely to be more expensive to operate and require staff with the requisite expertise and smaller firms may not have sufficient resources to operate them. Nord and Tucker, (1987) have noted that innovations are adopted easily in large firms as they have more complex and diverse facilities. Empirical studies (Blau and McKinley, 1979; Dewar and Dutton, 1986; Damanpour, 1992) have also supported the view that company size is positively related to the adoption of innovations. Therefore it can be expected that larger firms are likely to have a more innovative sophisticated costing system.

Smaller firms on the other hand, may be involved with fewer products/services and infrequent and independent decision-making processes. Product/service decisions may not be inter-dependent. There will be less need for a sophisticated costing system in these circumstances.

Furthermore, a sophisticated system is usually associated with higher operating costs and requires appropriate staff expertise. Findings from studies by Innes and Mitchell (1995) and Shields (1995) have pointed out the variable, cost, as one of the constraints in implementing sophisticated cost systems. The reason is that it is more likely that larger firms have greater

access to resources to experiment with the introduction of more sophisticated systems.

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

Hypothesis 2(H2): *The greater the size of an organization, the higher the level of the sophistication of the costing system.*

4.7.3 Competitive environment

Firms facing intense competition need to cost their products/services accurately to avoid any cost of errors. Cooper (1988, pp 43-44) demonstrates the cost of errors taking the following forms:

- Making poor product-related decisions, such as aggressively selling unprofitable products, setting prices inappropriately, or introducing products into unprofitable niches;
- Making poor product-design decisions, such as increasing the number of unique parts in a product to reduce its direct labour content when the cost of maintaining those parts exceeds the labour savings;
- Making poor capital investment decisions based on overhead savings that do not materialise; and
- Making inaccurate budgeting decisions about the level of operating expenses required.

Cooper (1988) stresses that competitors are likely to take advantage of any cost of errors made. For example, due to distorted product/service cost information, the profit margin of an overcosted product/service may look unattractive and the firm may mistakenly decide to drop the product. A competitor may take advantage of this decision and capture a market of what is found to be a profitable product/service. Hence firms facing intense competition ought to have a more sophisticated product/service costing system for computing accurate product/service costs that avoid the cost of any errors. It should be noted here that undercosting leading to acceptance of bids that prove to be unprofitable or overcosting leading to loss of profitable businesses is less likely to be a problem where competition is low.

Cooper (1988) has stated that firms facing increased, focussed and creative competition together with deregulation, need to reduce the cost of errors by measuring product costs as accurately as possible to have a competitive advantage.

Firms with increased competition are prone to increased cost of errors, as competitors are alert to take advantage of any errors made. Cooper (1988) also states that deregulation has forced firms not only to control overall efficiency but also manage its competitive position. He identifies that the cost systems of most regulated firms were measuring the cost of functional activities and not the cost of products. The reason being when the products' prices were regulated, there was no apparent need for the firm to unnecessarily waste its effort to report accurate product costs. Therefore, product cost information was not considered to be of vital importance to the firm. However, with the emergence of deregulation, unregulated competitors were ready to cut prices to obtain a competitive advantage. Hence deregulation and increased competition have created the need for firms to adopt more sophisticated costing systems that improve the accuracy of the reported product costs. Studies by Libby and Waterhouse (1996) and Simons (1990) have also highlighted the positive relationship between competition and the employment of a sophisticated cost control system. Bruns and Kaplan (1987) have also recognised competition to be one of the factors influencing the cost system design.

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

***Hypothesis 3(H3):** The greater the intensity of competition faced by an organisation, the higher the level of the sophistication of the costing system.*

4.7.4 Competitive strategy

Porter (1985, p 1) explains that competitive strategy is the search for a favourable competitive position in an industry, aiming to establish a profitable and sustainable position against the forces that determine industry

competition. Porter has suggested the following three broad competitive strategies for firms to maintain their competitive advantage:

- a) overall cost leadership
- b) differentiation
- c) focus (segmentation)

Overall cost leadership

The cost leadership strategy aims at becoming the lowest cost producer in the industry. Porter (1985) claims that if a firm can achieve and sustain overall cost leadership, then it can command prices lower than its rivals and also its low cost position can result in higher returns. Cost leadership generally depends on large-scale production economies of scale. Therefore such firms are more concerned with producing a limited range of high volume products resulting in low product and volume diversity. In these circumstances a traditional volume-based costing system may report reasonably accurate product costs.¹²

Differentiation

By differentiation, a firm seeks to be unique 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 or it differentiates itself from its competitors by providing something unique which is valuable to its customers. 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. Without a sophisticated costing system that reports accurate product cost firms adopting a differentiation strategy run the risk of not being able to determine whether the higher revenues generated from the products or services exceeds the extra costs associated with differentiation. Product/service diversity as a consequence of a differentiation strategy will therefore require a

¹² This point is explained in section 4.6.2

sophisticated cost system to compute accurate product costs (refer to product/volume diversity in section 4.7.5).

Focus

The focus strategy segments the market and focuses on a particular market segment. Porter (1985, p 15) asserts 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.

Porter further explains that the focus strategy has two variants, *viz.*

- i. the cost focus whereby the firm seeks a cost advantage in its target segment
- ii. the differentiation focus whereby a firm seeks differentiation in its target segment.

Therefore as was discussed above, firms having a cost focus may find that a traditional volume-based costing system will report reasonably accurate product costs whereas firms adopting a differentiation focus need to have a more sophisticated non-volume-based costing system.

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

Hypothesis 4(H4): *The competitive strategy adopted by the organisation has no influence on the level of sophistication of the costing system.*

4.7.5 Product/volume diversity

Cooper (1988) and Kaplan (1990) have emphasised the need for an accurate costing system when there is product or volume diversity. Estrin *et al* (1994) also claim that product diversity causes traditional costing systems to report distorted product costs. Malmi (1999) points out the relationship between product diversity and the costing system employed. Product diversity exists when products consume activities in different proportions. Therefore it is necessary to have sophisticated cost systems that can capture the variation in resource consumption by the different products to avoid computing

distorted product costs. Volume diversity occurs when products are manufactured in batches of different sizes. A sophisticated cost system having separate cost pools for batch-level activities with non-volume based cost drivers would be appropriate to measure the consumption of resources by batch sizes. This can avoid undercosting low volume products which are obtained by producing in large number of low-volume batches and overcosting high volume products likely to be produced in smaller number of high volume batches.

Kaplan (1990) has stressed that when there is high product diversity, it is essential to have a costing system that will be able to report accurate average long-run product costs which can be used as attention directors for special studies. Cooper and Kaplan (1991) have also stated that when there is high product diversity, the feasibility of generating uniquely relevant costs for each decision is debatable because decisions become inter-dependent in a highly diversified product situation. Therefore it is necessary to have a cost accumulation system that identifies the direct as well as the indirect joint resources that fluctuate in the long run according to the demand for them.

Thus firms with product/volume diversity have a greater need to adopt a sophisticated product costing system to minimise product cost distortion.

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

Hypothesis 5(H5)(a): *The greater the level of product diversity, the higher the level of sophistication of the costing system.*

Hypothesis 5(H5)(b): *The greater the level of volume diversity, the higher the level of sophistication of the costing system.*

4.7.6 Type of organisation

At first it was considered that ABC cost systems were applicable to only manufacturing organisations. On the other hand, Kaplan and Cooper (1998) have argued that service companies are more suited to the adoption of ABC than manufacturing companies as most costs in service organisations are

indirect and unlikely to be accurately assigned using traditional costing systems. Hence these organisations have a greater need to allocate the higher proportion of indirect costs accurately to avoid any service cost distortion.

The authors emphasise that more 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 composition in manufacturing organisations are much lower as compared to service organisations. Therefore they argue that a sophisticated system like ABC is more suited to the service industries.

Drawing off the writings of Kaplan and Cooper (1998), it should be noted that for services provided, most resources are supplied in advance, and any unused resources in the short-term cannot be managed by adjusting the short term spending to supply the resources. The traditional costing system considers such costs to be fixed and irrelevant for most decisions. This short-term traditional view is questionable because the joint resource costs that fluctuate according to their demand in the long run are likely to be relevant for decision-making. Also, unlike the manufacturing firms, service organisations' end products are intangible, and therefore cost measurement can be more difficult.

Atkinson *et al* (1997) referring to the US economy, claim that the difficulty in service cost measurement did not pose a problem in the past as most of these service organisations were Government owned and regulated. As such there was no need for firms to cost their services to make decisions as all losses were taken care of by the regulatory bodies. However recent developments in competition and deregulation have resulted in the need for service organisations to be aware of their service costs to be able to make proper decisions. As was mentioned earlier in section 4.7.6, it is important to measure the cost of services as accurately as possible to avoid losing business to competitors.

The cost structure and the competitive and deregulated environment of the service organisations therefore highlight the need for measuring costs accurately to have a competitive advantage. Hence the need to use a sophisticated cost system is apparent.

However, Shields (1997) claims that the design and effectiveness of cost accounting systems are dependent on the specific nature of different industries. As DiMaggio and Powell (1983) have explained, organisations have a tendency to imitate other organisations in the same industry, to ensure that they do not lag behind their counterparts. This 'imitating' behaviour, defined as the 'fad perspective' by the authors, may result in firms adopting costing systems maintained by other firms. The literature on diffusion of innovation also indicates that accounting innovations, such as the ABC may be adopted by industries due to the 'fad perspective' amongst the firms within the industry. Therefore firms in each industry may be using similar cost systems to maintain uniformity, for fear of losing out to competitors in the industry.

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

Hypothesis 6(H6): *The business sector in which an organisation operates has no influence on the level of sophistication of the costing system.*

4.7.7 Extent of Just-In-Time (JIT) usage

In chapter 2, (section 2.3.1) and chapter 5 (section 5.6) it was pointed out that firms adopting a JIT system may be able to measure costs accurately even with a simplified system because JIT systems generally lead to an increase in direct costs and reduction in indirect costs. It was also pointed out that the JIT manufacturing layout, having well-defined production cells with product dedicated facilities, facilitated the assignment of a high proportion of costs directly to products/product lines. Thus, firms which have implemented a JIT system, are unlikely to require a sophisticated cost system. Studies by Hoque (2000), Cassidy (1993) have indicated that JIT firms have a lesser

need for sophisticated ABC systems. Bhimani and Bromwich (1991) have also noted the need for management accountants to revise their costing systems to reflect the new realities of advanced manufacturing methods such as JIT.

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

Hypothesis 7(H7): *The greater the extent of the use of JIT techniques, the lower the level of sophistication of the costing system.*

4.7.8 Financial accounting mentality

If a financial accounting mentality dominates in firms, priority is likely to be given to adhering to financial accounting requirements rather than adjusting the information for decision-making requirements. As less accurate costs would suffice for meeting financial accounting needs, a less sophisticated cost system may be used for meeting financial accounting requirements.

Where a financial accounting mentality dominates within an organisation priority is likely to be given to constructing product costs that meet financial accounting rather than management accounting requirements. Hence their cost accumulation and level of sophistication for indirect cost assignment would be a system that caters more for the external financial accounting requirements. It can therefore be concluded that given that the degree of accuracy needed is less for financial accounting stock valuation an unsophisticated costing system is more likely to be used where a financial accounting mentality prevails.

Previous studies by Hopper *et al* (1992) and Scapens *et al* (1996) in the UK found that there was no evidence of financial accounting dominating management accounting. However, other studies by O'Dea and Clarke (1994) in Ireland and Haldma *et al* (1998) in Estonia showed that financial accounting did influence management accounting.

A study by Joseph *et al* (1996) showed that, although they concluded that management accounting was not dominated by financial accounting, integrated financial accounting and management accounting systems were used, with little discretion in the content of management reports. They also observed a tendency for the reports to be dictated by financial reporting requirements. These contradicting findings create a need to confirm if the adoption of a cost system is influenced by the financial accounting mentality prevalent in firms.

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

Hypothesis 8(H8): *The greater the level of financial accounting mentality observed the lower the level of sophistication of the costing system.*

4.8 Summary / Conclusion

In the first part of this chapter it was noted that factors such as the cost of measurement, cost of errors and product diversity as identified by Cooper (1988) influenced the choice of the level of cost system sophistication. Apart from these factors it was also observed that behavioural factors can, on rare occasions, also influence the choice of cost system design as evidenced in some Japanese companies that prefer to measure costs less accurately to influence behaviour in a positive direction. Nevertheless, the need for reasonably accurate product/service cost information was emphasised for strategic decision- making.

It was also highlighted in this chapter that a cost system may consist of a single cost database whereby different cost information is extracted for different purposes. Alternatively, separate cost databases may be maintained. The costs that may be included or extracted from the cost databases were classified into the following three categories, *viz.* (i) direct costs excluding all overheads; (ii) direct costs plus the assignment of only those indirect costs where cause-and-effect allocation bases can be established; (iii) direct costs plus the assignment of indirect costs using both cause-and-effect and arbitrary allocation bases. It was pointed out that for

categories (ii) and (iii), the level of sophistication in assigning the indirect costs might differ from being simplistic to being very sophisticated.

The chapter concluded by drawing off the literature review to develop a contingency theory model that seeks to explain the influence of contingent variables on characteristics of the product costing systems observed in this study. A distinguishing feature of the model is that it adopts a wider perspective than any of the previous studies to capture aspects of the product costing systems. In particular, it was pointed out that alternative measures of cost system sophistication are used to represent the characteristics of the product costing systems.

Having discussed in this chapter, the alternative cost accumulation and assignment systems together with the possible influence of the potential explanatory variables on the cost system design, the various findings by researchers in different countries on these aspects will be discussed in the next chapter.

Chapter 5

RELEVANT STUDIES ON PRODUCT/SERVICE COSTING SYSTEM

5.1 Introduction

5.2 Different costing methods used

5.3 Number of costing systems used

5.4 The cost structure of firms

5.5 The use of the second stage overhead allocation rates

5.6 The use of Activity-Based-Costing (ABC)

5.7 Influence of financial accounting on management accounting systems

5.8 Factors influencing the implementation and success of ABC

5.9 Summary / Conclusion

Chapter 5

RELEVANT STUDIES ON PRODUCT/SERVICE COSTING SYSTEM

This chapter provides an insight into the findings of the previous research studies relating to product costing practices. It begins with a review of those studies that have examined the number and type of the costing systems used and the level of sophistication employed in terms of the second stage cost drivers that are used. The chapter continues with a summary of the findings relating to the usage of ABC systems and the factors influencing their adoption and success. Studies of the influence of financial accounting on management accounting are also described. The chapter concludes with the identification of some of the limitations of the studies and the gaps in the literature that will be addressed by the current study.

5.1 Introduction

It was pointed out in chapter 1 that prior to the early 1990's little was known about management accounting practices. For example, Anthony (1989, p 18) stated that 'Information about management accounting practices is abysmally poor' and that 'Almost all information is anecdotal.' He argued that there is a need for survey information relating to the use of management accounting techniques and criticised the assumptions that are often made in the literature that a particular technique is used by most companies when no statistical evidence is available relating to how many companies use that technique. These views were also reinforced by Holzer and Norreklit (1991, p 7) who stated that 'Cost accounting practices in industry are difficult to verify since no reliable survey data is available.'

However, the recent era has seen a growing interest amongst academicians and practitioners in practice-oriented research particularly relating to surveys of

management accounting practices. This may be due to the changing business environment in the form of deregulation, global competition, advancement in information technology, changes in cost structures, and the reduction in information processing costs. Apart from this, the strong criticisms around the late 1980s by Kaplan and Cooper, of traditional costing systems providing distorted product costs and the emergence of ABC may have acted as a catalyst to conduct research relating to management practice.¹³

Studies of product costing itself have been conducted in several countries. For example, studies have been conducted in Sweden (Ask & Ax, 1992), the UK (Drury *et al*, 1993; Drury and Tayles, 1994, 2000; Innes & Mitchell, 1995), Finland (Lukka & Granlund, 1996), Norway (Bjornenak, 1997), the USA (Emore and Ness, 1991; Green and Amenkhienan, 1992), Australia (Joye and Blayney, 1990, 1991) and Japan (Yoshikawa *et al*, 1989).

In the following sections the findings from relevant studies on product or service cost systems will be discussed. In particular, the different costing methods used, the number of costing systems used, the cost structure of firms, the use of second stage overhead assignment methods, the use of ABC, and the influence of financial accounting on management accounting systems together with the influence of certain factors on the success of ABC will be examined.

5.2 Different costing methods used

Various studies have been undertaken in several countries that have examined the extent to which full cull costs, whereby indirect costs are assigned to products/services, are used. 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

¹³ See chapter 2, section 2.7 for a more detailed discussion of this point

costing separately while 30% of the firms used full costing together with variable 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 UK used absorption costing as specified in the UK financial accounting standard for stocks and work in progress, to value stocks for management accounting internal profit reporting purposes.

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.¹⁴ Bjornenak (1997) reported a similar finding in a survey of Norwegian companies. His study showed that different costing methods were preferred in different situations. The variable costing method was widely used for pricing (34%), profitability analysis (48%), 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.

Most of the studies conducted indicate that the full costing represents the dominant costing method. Given this situation it is not surprising that researchers and practitioners have given a considerable amount of attention to improving the accuracy of the assignment of indirect costs.

5.3 Number of costing systems used

Previous studies on the number of costing systems used indicate that the majority of organisations prefer a single costing system. A study by Bailey (1991) in the UK showed that an integrated system for financial accounting and management accounting was maintained. Friedman and Lyne's (1995) study indicated that some firms were reluctant to adopt ABC systems due to the

¹⁴ At the time of the survey, absorption costing was not a legal requirement for external reporting.

difficulty in implementing the ABC system as the only costing system. This implies that firms are not willing to have more than one costing system. A study by Scapens *et al* (1996) implied a preference for a single costing system because of the ease with which information for management accounting and financial accounting can be extracted from a single database. The study by Granlund and Lukka (1998) pointed out that Finnish companies preferred a single cost accounting system for its simplicity. The respondents also felt that with a single costing system, the need to reconcile the figures between financial accounting and management accounting systems could be avoided. The latest study by Drury and Tayles (2000) in the UK also substantiates the earlier findings with only 9% of the manufacturing sectors surveyed having separate costing systems for stock valuation and profitability analysis.

5.4 The cost structure of firms

Surveys in the UK by Innes and Mitchell (1990, 1991), Murphy and Braund (1990), Drury *et al* (1993), Bromwich and Inoue (1994 a) and Drury and Tayles (2000) indicated that the direct material costs were the predominant factor in the cost structure of most firms followed by overheads. Their studies also showed that the proportion of direct labour in the total cost structure was relatively small. Apart from the UK, surveys undertaken in Belgium (Kerremans *et al*, 1991), Sweden (Ask and Ax, 1992), Ireland (O'Dea and Clarke, 1994), Denmark (Sorensen and Israelsen, 1994) and Finland (Lukka and Granlund, 1996) also reported similar results with direct materials being the predominant cost and direct labour representing the lowest proportion of total costs.

As for the proportion of overhead costs, the survey by Drury *et al* (1993) showed that in 19% of the responding firms, manufacturing overheads constituted more than 37% of the total manufacturing costs. The average percentage of overheads to total costs was 20% for manufacturing overheads and 18% for non-manufacturing overheads whereas direct labour averaged 12% of total costs. Thus, the proportion of overheads costs were significantly higher than the direct

labour costs. Further evidence indicating a significantly higher proportion of overhead costs in relation to direct labour costs was also reported by Clarke (1992). Cinquini *et al* (1999) in Italy, observed that there was a variation in the proportion of overhead costs in relation to the total product costs depending on the different industries.

A comparison of the surveys in the UK (Drury *et al*, 1993), USA (Green and Amenkhienan, 1992), Australia (Joye and Blayney, 1990) and Belgium (Kerrimans *et al*, 1991) indicates that they have reported very similar results in terms of cost structures. They all report that direct costs and overheads averaged approximately 75% and 25%, respectively, of total manufacturing costs.

The findings from these studies conflict with the claims made by the proponents of ABC that the changes in the cost structures over the years have resulted in overheads becoming the dominant costs in most organisations.

5.5 The use of the second stage overhead allocation rates

One of the elements in determining the level of sophistication in assigning indirect costs is the cost drivers that are used in the second stage of the two stage allocation process. The study by Drury *et al* (1993) indicated that 21% of the responding firms were using separate support department overhead rates to assign service/support department costs to products. A further 45% of the firms were using a less refined method and allocating support/service department costs to production departments and then using production department overhead rates to charge these costs to the products. Some companies did not use the two stage allocation process and thus used very unsophisticated costing systems. Instead, a blanket overhead rate was used by 27% of the firms. Drury *et al* (1993) also noted that the usage of blanket overhead rates differed between small (30%) and large firms (16%).

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 a usage of between 20%-30%. However only 5% of the companies in Finland (Lukka and Granlund, 1996) were using a single plant-wide rate. Furthermore, the survey undertaken in Norway (Bjornenak, 1997 b) pointed out that only one firm used the single plant-wide rate and none of the companies responding used this rate in Greece (Ballas and Venieris, 1996).

The latest study by Drury and Tayles (2000) indicated that only 3% of the firms were using a single cost pool. They attribute the low usage rate, as compared to the earlier UK and the USA studies, to the time period between the studies. They suggest 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 rate 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.

The surveys also indicated that there was a preference to use the direct labour hour basis as the second stage overhead absorption rate although there has been much criticisms of its use.

5.6 The use of Activity-Based Costing (ABC)

Previous surveys undertaken in the early 1990's have reported ABC adoption rates of approximately 10% in the UK (Innes and Mitchell, 1991; Drury *et al*, 1993), 10% in Ireland (Clarke, 1992) and 14% in Canada (Armitage and Nicholson, 1993). The study by Innes & Mitchell (1995) on activity-based costing in UK's largest companies 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, as the study revealed that users still continued to operate their traditional systems in conjunction with the ABC system. The majority of their respondents were yet to decide or even begin consideration of the ABC system. Innes *et al's* (2000) later study indicated that there was no

growth in the popularity of ABC and the adoption of it over the 5-year period (between their 1995 and 2000 studies). The findings also revealed that the major deterrent of ABC adoption were the complexity and cost of the ABC system.

The survey by Ask & Ax (1992) on product costing in the Swedish manufacturing industry concluded that most companies were trying to identify more cost drivers, although they were not non-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.

The more recent surveys conducted over the last decade have revealed an increasing interest in ABC but the adoption rate has continued to be slow. However recent surveys have revealed a higher adoption rate of ABC among firms. Findings from studies in the UK showed that the adoption rates were 20% (Innes and Mitchell, 1995) and 21% (Evans and Ashworth, 1996). In the USA reported adoption rates were 53% (Hrisak, 1996) and 27% (Shim and Sudit, 1995). As ABC was initiated in the US this may account for the apparent higher adoption rate amongst the US companies although the divergent usage reported by the two studies questions whether respondents claiming to use ABC were actually using it. Thus the usage rate reported by Hisak may be overstated. The Norwegian study by Bjornenak (1997 b) also showed a high adoption rate of 40%, but he defined ABC adopters as organisations that had implemented, were currently implementing or wishing to implement ABC. Therefore the term 'ABC adopters' may have been defined in different ways compared with other researchers.

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 Mitchell

(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. To partially explain their different interpretation in the usage of ABC Dugdale and Jones identify a strong and weak definition of ABC.

Apart from the adoption of ABC, surveys conducted have also examined the application of ABC. The study by Innes and Mitchell (1991) in the UK showed that one of the major uses of ABC information was for managerial decision-making. Cobb *et al* (1992) noted that one of the responding firms used ABC for cost management rather than for product costing. However, Nicholls (1992) in the UK reported that 65% of the respondents used ABC to obtain 'true' product costs. Innes and Mitchell (1995) and Innes *et al* (2000) also noted that more than 50% of the respondents used ABC for cost reduction and pricing purposes. The Finnish research by Lukka and Granlund (1996) found that ABC information was most suited for decision support and product profitability analysis. The survey by Groot (1999) in the Netherlands indicated that Dutch food companies used ABC information for cost reduction, calculating product profit margins, improving production processes, planning and budgeting and performance evaluation. In Ireland, Clarke (1992) and Clarke *et al* (1999) observed that ABC was used for decision-making, improved product costing and profitability analysis.

Bjornenak (1997a) adopted a contingency theory framework to study the influence of variables such as the cost structure, existing cost systems, product diversity, size and competition, on the adoption of ABC systems in the Norwegian manufacturing industry. Bjornenak in his study defines adopters as companies that have implemented ABC, are currently implementing it or plan to do so. His findings revealed that there was a weak significance for the hypothesis that adopters have a different cost structure from non-adopters. Adopters had a marginally higher percentage of overhead costs than non-adopters ($p < 0.10$). The

proportion of overheads within the cost structure was measured by overhead costs as a percentage of total value-added costs (direct labour + overhead).

His study also showed that adopters had more product variants (used to measure product diversity) but this was not statistically significant. However, his results showed that non-adopters made significantly more customised products than adopters. This contradicts the belief that customised products having higher diversity will need an ABC system to measure costs accurately (Cooper 1988). Bjornenak (1997 a) concludes that customised production increases the cost of developing a more sophisticated costing system, and hence it 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.

Bjornenak's findings also indicated that non-adopters had higher levels of competition than adopters. This conflicts with the views expressed by Cooper (1998) relating to the influence of competition on ABC adoption. However, again the findings had very weak statistical significance. The results on the variable, existing cost system showed (statistically not significant) that adopters had a more refined system. Bjornenak concludes that the existing cost system is an ambiguous concept as most companies were using both variable costing and absorption costing. Regarding the variable, size of the firm, Bjornenak's study revealed a strong significance in the adoption rate and the size of the firm; adopters being from larger firms. He attributes 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 only size as a potential explanatory factor for the adoption of ABC, had a strong statistical significance.

Booth and Giacobbe (1998) also adopted a contingency theory framework in a study of 207 Australian manufacturing firms. They examined the effect that explanatory factors such as the cost structure, product diversity, competition and

size of firms had on ABC adoption decisions. The respondents of this study were grouped into the following categories :-

1. Firms having shown an interest in adopting ABC
2. Adoption / non-adoption of ABC as an idea
3. Adoption / non-adoption of ABC as a practice

The influence of the explanatory factors on the above three categories was examined. A similar measure as that of Bjornenak was used for the overhead cost structure. The overhead component of the current product cost and the change of overhead cost over the years preceding the survey were considered.

The results were significant for the following observations:

1. firms showing an interest in the adoption of ABC had a current overhead cost structure that was higher than those firms that had never considered the adoption of ABC;
2. firms adopting ABC as an idea indicated a higher variation in overhead costs as compared with those firms rejecting it as an idea.

As for product diversity, two different measures were used. The first measure was on the number of product lines that the firm had and the second measure was on product line innovation. The results were significant only for the first measure with the mean number of lines for those firms adopting ABC as an idea being slightly higher than those firms rejecting it as an idea. The results also showed that only those firms showing an interest in the adoption of ABC were significantly larger than those firms that did not show any interest in it. The explanatory factor competition did not show any significant relationship between any of the three categories of firms.

Some studies that have not sought to adopt a contingency theory framework have, nevertheless, identified factors that distinguish ABC adopters from non-adopters. Studies by Davies and Sweeting (1993) and Drury and Tayles (1996) show that the size of firms does have an influence on the adoption of the ABC

systems. The survey by Freedman (1994) highlighted the respondents' views that ABC systems are complex and costly. Joshi (1998) observed that larger firms with economies of scale are more likely to implement the ABC system. This is supported by the Cobb *et al* (1992) study whose findings showed that small companies did not implement ABC system 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.

It was also noted from the findings of Hoque (2000) in New Zealand, that there was a significant variation in the use of ABC and the use of cost information between JIT and non-JIT firms. The study indicated that firms using JIT have fewer requirements for ABC and also these JIT firms attached relatively less importance to cost information for various managerial activities such as price setting, evaluation of efficiency of managers, production and sales strategy, evaluation of efficiency of production process, quality management related activities, benchmarking decisions and performing customer profitability analysis. These findings support the argument that in JIT firms, the major proportion of their costs are direct costs and therefore there is less need to accurately allocate indirect costs to their products/services¹⁵. Bhimani and Bromwich (1991) and Swenson and Cassidy (1993) have also suggested that JIT companies are more likely to use a simplified costing system.

Hoque also examined the impact of automation on the adoption of ABC systems. He found no significant relationship between automated and non-automated firms and the use of ABC and cost information. This contrasts the literature¹⁶ suggesting that highly automated firms have a greater need for the use of cost information for managerial decision-making.

¹⁵ This point is discussed in Chapter 2, Section 2.3.1

¹⁶ Refer to Chapter 2, Section 2.3.2

Two recent studies by Drury and Tayles (2000) in the UK and Abernathy *et al* (2001) in Australia, have adopted a contingency theory framework using characteristics of the costing system that do not relate to ABC adoption/non-adoption. Drury and Tayles (2000) used number of cost pools and number of types of cost drivers used by firms to be the proxy measures to represent the characteristics of the costing system. In contrast, based on a case study of five companies, Abernathy *et al.* viewed costing system design choices as varying along three dimensions, i.e.:

1. nature of the cost pools (activity cost pools versus responsibility cost pools)
2. number of cost pools (single versus multiple)
3. type of cost pool (hierarchical cost pools)

A continuum representing these three dimensions was used to evaluate the costing system's level of sophistication. The simple traditional costing system (with one cost pool and a volume based cost driver) was at one end of the continuum, and the other extreme end showed the sophisticated system (costs are grouped into a number of cost pools, having hierarchical cost pools and a variety of hierarchical cost drivers). Hierarchical cost pools are set by classifying the major activities into unit, batch, product-sustaining and facility-sustaining categories and then assigning the expenses of the firm into these hierarchical groups. The expenses of these hierarchical categories are then attributed to individual products by using hierarchical cost drivers that reflect the underlying behaviour of the products' demands for these activities (Cooper and Kaplan, 1991).

Drury and Tayles (2000) research findings indicated that the potential explanatory factors, the competitive environment faced by the organisation, size and the type of business an organisation engages in have a significant influence on the costing systems. Abernathy *et al* (2001) focussed on the effect of product diversity on cost system design and they argue that their case studies challenge the conventional wisdom as to the situations in which investment in ABC systems will be justified. They state that previous research

claiming that product diversity creates a need for ABC systems has been based on a simplistic approach to the notion of product diversity neglecting factors such as the investment in advanced manufacturing techniques (AMT) in response to customer demands for greater product diversity.

5.7 Influence of financial accounting on management accounting systems

The research findings on the number of cost systems used (see section 5.3) shows that most of the companies preferred maintaining a single cost system for both financial accounting and management accounting purposes. However the pilot study by Hopper *et al* (1992) reported that although single systems were used, whereby financial accounting and management accounting systems were integrated, the databases allowed some flexibility in the design of management accounting systems. Therefore there was no evidence of financial accounting dominating management accounting. A study by Scapens *et al* (1996) revealed similar results to Hopper *et al* (1992) study. Furthermore, their study indicated that with advancement in technology, it was possible to extract accounting information for various needs from a single cost database. These survey results do to some extent provide evidence that financial accounting is not dominating management accounting systems.

Nevertheless, the Irish study by O'Dea and Clarke (1994) did show that one out of the sixteen financial controllers interviewed, felt that financial accounting dominated management accounting. Subsequently, Haldma *et al* (1998) in Estonia found that financial accounting information was used for management decision-making. Therefore it may be concluded that there is mixed evidence as to the extent to which financial accounting dominates management accounting systems.

5.8 Factors influencing the implementation and success of ABC

Anderson (1995) used a case study to study activity based costing implementation in General Motors. She used the first four stages of Cooper and

Zmud's (1990) 6-stage model of: Initiation; Adoption, Adaptation, Acceptance, Routinization, and Infusion. Cooper and Zmud had used this model to study the adoption and infusion of material requirements planning (MRP) systems. Anderson's study revealed that organisational factors, such as support by upper management and investment in training, and contextual factors such as competition, relevance to managers' decisions and compatibility with existing systems were found to affect the various implementation stages of ABC in different ways. Following this study, Krumwiede (1998) used a contingency theory framework to examine the organisational and contextual factors affecting the ABC implementation stages. Krumwiede's (1998, p 243) dependent variable, the stages of ABC implementation (adapted and modified from Cooper and Zmud, 1990) were divided into 10 separate categories as follows:

- Not considered - ABC has not been seriously considered. Use either single or departmental / multiple plant-wide allocation methods only
- Considering - ABC is being considered and implementation is possible, but implementation has not been approved
- Considered then rejected - ABC has been considered (not implemented) but was later rejected as a cost assignment method
- Approved for Implementation - Approval has been granted to implement ABC and devote /spend the necessary resources, but analysis has not yet begun
- Analysis - ABC implementation team is in the process of determining project scope and objectives, collecting data and / or analysing activities and cost drivers
- Getting Acceptance - Analysis is complete and ABC model has project / implementation team support, but ABC information is not

yet used outside of accounting department for decision-making

- Implemented then abandoned - ABC was implemented and analysis performed but is not being pursued at this time
- Acceptance - Occasionally used by non-accounting upper management or departments for decision making. General consensus among non-accounting departments that model provides more realistic costs. Still considered a project or model only with infrequent updates
- Routine System - Commonly used by non-accounting upper management or departments for decision-making and considered normal part of information system
- Integrated System - ABC is used extensively and has been integrated with the primary financial system. Clear benefits can be identified, such as: non-value-added activities identified, process performance improved, products priced better and strategic / operating decisions improved

Krumwiede's research findings were similar to Anderson's (1995). He pointed out that the impact of various factors changes during the different stages of ABC implementation. His study showed that the organisational factor, top management support has a strong link to ABC implementation and usage. This is seen from his findings that indicated that top management support was

significantly lower for the "Implemented then Abandoned" stage than the "Integrated" stage. Another study by Shields (1995) also showed that there was a significant relationship between top management support and ABC success.

Furthermore, Krumwiede's study also pointed out that there was weak evidence (although not significant) to indicate that the contextual factors, Total Quality Management (TQM) and Lean Production Practices (LPS) had some relationship with ABC implementation. His findings revealed that firms with higher mean scores for TQM and LPS had reached the integrated system stage (Firms indicating ABC is "used extensively" were classified as Integrated system if ABC is integrated with their primary financial system, p 248). As for the relationship between information technology (IT) and adoption of ABC, Krumwiede's findings highlighted that there was a significant positive association between strong existing IT and the adoption of ABC. His study suggested that IT scores were significantly higher for the 'Integrated' system firms than the 'Routine' system group (Firms indicating ABC is "used somewhat" were placed in the Routine stage, p 248). He concludes that his research findings support Reeve's (1996) and Anderson's (1995) claim that strong existing information systems facilitate the integration with ABC to provide the needed operational data. However their study also suggested that IT had a significant and positive relationship between the "considered and Rejected Stage" and the "Approved for Implementation Stage". He also points out that IT was relatively high for the "Considered and Rejected stage" and the "Implemented and Abandoned Stage".

Krumweide also concludes that firms with high IT scores may reject or abandon the implementation of ABC because of the perceived importance of their existing cost systems to provide most of the cost information for decision making. These mixed responses on IT show that high quality IT may have a positive or negative impact on the organisation's need to implement the ABC system dependent on the mindset prevalent in the organisation.

Friedman and Lyne' (1995) case study research also identified certain factors that affect the implementation of ABC in the firms they studied. According to them resistance, the threat of redundancy, the threat of using external consultants' expertise for implementing ABC, data collection problems, and the delay in time period in implementing the activity-based techniques were the reasons for the failure of ABC, or for the significant dampening of the ABC success. However, their study indicated that management support, and a clear perceived need and commitment for the implementation of ABC were considered to be success factors for the implementation of ABC. The high cost of implementing an ABC system was a factor identified to be a deterrent for the implementation of the ABC system ¹⁷

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

Shields and Young (1989) and Shields (1995) identified the need to incorporate top-management support and the need to encourage employees to work in groups, rather than as individuals, in studies of factors influencing the success of ABC. Brewer in his study attempted to recognise the national culture implications of these factors as he considered that the influence of national culture characteristics had important implications.

Therefore in his study, Brewer used two out of the six predictions formulated from Hofstede's (1980) taxonomy of work-related cultural values, which were:

- i. A company that relies upon high-level managers to champion ABC

¹⁷ Refer to Section 5.6. paragraph 6

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

- ii. The cross-functional team-based approach to work inherent in ABC systems will result in more defensive behaviour in individualist cultures, thereby reducing ABC success relative to collectivist cultures where cross-functional teams co-operatively work in groups. The term 'Individualism' is also another of Hofstede's traits of national culture which states that an individualism culture believes in autonomy whereas the low-individualism or collectivist culture prefers to work as a team. Here, Brewer identifies Malaysia as having a collectivist culture and the US as having an individualist culture. Therefore based on prediction (ii) he advocates that Malaysian plants will have a higher level of ABC success as compared to the US plants. Focussing on these predictions, Brewer drew up the following research hypothesis that "the level of ABC success will be greater in HS's Malaysian plant relative to its U.S. plants and his research findings were consistent with his hypothesis. The study therefore suggests that national culture does have an impact on the success of ABC and therefore it is necessary to cater for the cultural differences when evaluating the likely success of ABC implementation. Nevertheless, as Brewer has cautioned, the generalisability of his findings have to be considered because his study is based only on one company i.e. the Harris Semiconductor Company.

Other than Brewer's study on the impact of national culture on the success of ABC, the literature review did not identify any literature relating the influence of national culture on product costing systems. The literature search indicated that national culture has been applied mainly as a variable relating to how management control and performance measurement systems (e.g. Merchant *et al*, 1995) were used in different countries. Because of the absence of any theoretical literature linking national culture and product costing this variable has not been pursued within this thesis.

5.9 Summary / Conclusion

Studies undertaken in many different countries indicate that:

- Full costing is the dominant costing system;
- A single costing system is mostly used;
- A significant number of firms use simplistic costing systems (e.g. blanket overhead rates);
- Direct labour based rates are the most widely used second stage cost driver;
- ABC adoption rates are low;
- Apart from size there is little evidence of other factors influencing the adoption of ABC;
- Top management support appears to be a major factor influencing ABC success;
- The evidence relating to whether financial accounting dominates management accounting is conflicting and inconclusive.

It is apparent from the literature review of the empirical studies relating to product costing that most of the studies can be categorised as practice-oriented survey based research that describe management accounting practice without attempting to develop or test any existing theory. Another major feature is that, although the questionnaire content has differed, surveys seeking to gather similar information have been replicated in many different countries. This may be attributed to the fact that researchers have been interested in the nature of

management accounting in their own countries, particularly where there is a scarcity of knowledge relating to practice. Such research has provided new knowledge and enabled researchers to incorporate into their teaching a comparison of conventional wisdom with practices in their own country, rather than having to make the comparisons with other countries. This partially explains why the current study has incorporated aspects that have been covered in surveys that have been undertaken in other countries (e.g. ABC usage).

Another distinguishing feature that can be identified from the review of the empirical studies is that the surveys have concentrated on a single country and there has been no attempt to undertake cross-country research/comparisons. Possible reasons for this are the difficulty of administering the same survey instrument in different countries and the absence of theory supporting the development of hypotheses that product costing practices will differ between countries.

Although most of the research has been survey based, case study research has begun to emerge within the last decade. Most of the case study research has focused on ABC implementation problems and ABC success but the recent case studies reported by Abernathy *et al.*, (2001) have provided a rich insight into factors unique to organisations that influence the design of product costing systems.

All of the studies reported can be classified within the mainstream research category. The literature review identified only one study that drew off social theory. An article by Jones and Dugdale (2002) used social theory to explore the rise of ABC. The details of this study are not reported since they are not directly relevant to the objectives of this study.

The literature review also provided support for pursuing some of the objectives of this study. It was apparent from the review that some of the objectives specified

in chapter 1 (section 1.2) had not been examined in previous studies. For example, the objectives relating to investigating the level of cost system sophistication, whether different cost information is used for different purposes and the treatment of non-manufacturing costs in relation to decision-making have not been examined in previous studies. Furthermore, the nature, content and role of profitability analysis has been examined by only one previous study.

In terms of the dominant objective of this study – applying a contingency theory framework to examine the influence of contingent factors on the design of product costing systems, only three surveys [Bjornenak (1997a), Booth and Giacobbe (1998) and Drury and Tayles (2000)] have adopted this framework. The first two studies used ABC adoption/non-adoption to identify the characteristics of the product costing system, but ABC adoption was defined in a questionable way (showing an interest in ABC rather than implementing ABC). The study by Krumweide (1997) also adopted a contingency theory framework but concentrated on the ABC implementation stages. Apart from the study by Krumweide the other studies relied on Likert scale scores from single questions rather than using composite scores from multiple questions. Thus, the previous contingency theory studies have important limitations relating to using a narrow perspective for capturing the characteristics of the product costing system and the methods of measuring the contingent variables. This study seeks to overcome these limitations. The review of the empirical studies has therefore provided strong support for pursuing the objectives of this study.

Chapter 6

RESEARCH STRATEGY

6.1 Introduction

6.2 A brief review of the theory of knowledge

6.3 Alternative methodological approaches to accounting research

6.4 A discussion of the methodological approach adopted

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Chapter 6

RESEARCH STRATEGY

The aim of this chapter is to provide an insight into the research methodology that is adopted for undertaking the research. At this stage it is appropriate to note that research methodology refers to the overall approach applied to the research process involving theoretical formulation, data collection and analysis. In contrast, research methods relate to the techniques of the research (e.g. the statistical techniques). Given that research is about the acquisition of new knowledge the chapter begins with a brief review of the literature relating to the theory of how knowledge is acquired (epistemology). This is followed by a description of the literature that seeks to explain the factors that influence the alternative methodological approaches that are used in accounting research. These factors are then used to support the methodological approach adopted for this research. The chapter continues with a reiteration of the research objectives presented in chapter 1 and a summary of the hypotheses that were developed in chapter 4. The remaining sections of the chapter provide a comprehensive description of the research methodology. Finally, the chapter concludes with a discussion of the statistical tests used in analysing the data.

6.1 Introduction

This empirical study was conducted in Malaysia. There were two reasons for choosing Malaysia. First, as was stated in chapter 1, most of the surveys were conducted in Western Europe and the USA. There is a scarcity of empirical management accounting research that has been undertaken in the South East Asian region. This motivated the researcher to conduct research relating to product costing within her home country of Malaysia. Second, as the researcher

is located in Malaysia, administering a survey outside of Malaysia would have been extremely difficult.

6.2 A brief review of the theory of knowledge

Research is concerned with the acquisition of new knowledge. It is therefore appropriate to begin this chapter with a brief review of the theory of knowledge (known as epistemology). Epistemology focuses on how knowledge is acquired, which various philosophers have defined as justified true belief. To ascertain how knowledge is acquired requires a consideration of:

1. How do individuals determine and justify their beliefs?
2. What are the sources or mechanisms that individuals use to acquire knowledge/beliefs?

The first question is concerned with the nature of a phenomenon's reality. The term ontology is used to describe what individuals determine to be 'real.' Ryan *et al.*, (2002, p 13) describe two opposite general categories for determining what is 'real' - empirical realists and idealists. The former consider that reality is determined by empirical evidence and whether a statement is true or not can be determined only by whether it can be verified by observation. Thus, reality is considered to be objective (i.e. unbiased) and external to the individual. In contrast, idealism is based on the principle that individuals determine whether statements are true or false by their consistency with either their other beliefs or with the beliefs of other individuals. This implies that knowledge and reality can be socially constructed and in its most extreme form what is true is what individuals or society choose to believe to be true. Thus, truth has no objective basis.

The ontological assumptions of individuals described above influence the sources or mechanisms that they will use to acquire knowledge/beliefs. Although there are many sources of our beliefs Ryan *et al.*, (2002, p 11) classify them into

two distinct sources – empiricism and rationalism. Empiricism relates to gathering knowledge by observation such as the careful or repeated observation of events. It is based on the principle that beliefs about the world cannot be justified by reason alone. Rationalism relates to gathering knowledge by the process of reason alone. Drawing off an illustration from Ryan *et al.*, (2002) knowledge of the existence of perfect markets is derived from rationalism based on reasoning and not by observation since they do not exist in space or time.

6.3 Alternative methodological approaches to accounting research

Several writers have sought to classify accounting research and/or explain the factors that influence the alternative methodological approaches that are used in accounting research. This section provides a brief summary of some of this literature. A major theme that emerges from the literature is that the assumptions which the researcher holds regarding the nature of the phenomenon's reality (ontology) will effect the way in which knowledge can be gained about the phenomenon (epistemology), and this in turn affects the process through which research is conducted (i.e. the research methodology). Thus, the selection of an appropriate research methodology cannot be undertaken without a consideration of the ontological and epistemological assumptions that underpin the research.

The following sub-sections provide a summary of the following articles:

- (i) Tomkins and Groves (1983);
- (ii) Chua (1986);
- (iii) Laughlin (1995)

Tomkins and Groves (1983)

The writers challenged the conclusions of a report published by the American Accounting Association (Abdel-khalik and Ajinkya, 1979) in which they explored alternative methodological approaches and concluded that the scientific method

should be the 'ideal' method of accounting research. The report describes the scientific method as beginning with a well-formulated theory, which is used to develop hypotheses, which identifies relationships between sets of dependent and independent variables. Data collected using a highly structured and predetermined set of procedures is analysed by mathematical and statistical techniques to validate the hypotheses and thus generalize the results. This approach is based on abstraction, reductionism and statistical methods.

Tomkins and Groves support the use of scientific methods in certain circumstances but argue that they should not necessarily be the dominant method. Other methods may be preferred for certain kinds of research. In particular, they argued that naturalistic methods using field research may be preferable for studying accounting in its natural settings to explore the interactions with its broader organizational and social context. Researchers would then develop holistic theories to interpret day-to-day accounting practices in the context of the wider social systems of which they are a part.

To determine appropriate methodological approaches Tomkins and Groves draw off a six-fold classification of ontological assumptions based on a continuum ranging from objective to subjective. At the objective end reality is classified as a concrete structure where there is an external reality that is independent of the researcher whereas at the subjective end it is classified as a projection of human imagination where reality exists in the mind of the individual. Towards the objective end of the continuum the scientific method is likely to be appropriate but towards the subjective end naturalistic methods are likely to be preferred.

Chua (1986)

Chua classifies accounting research by the following categories:

- Mainstream accounting research;

- Interpretive accounting research, and
- Critical accounting research.

Mainstream accounting research encompasses traditional (economic-based) management accounting research, behavioural accounting research and research drawing off organisational theory as described in sections 1.3.1 – 1.3.3 in chapter 1. Definitions of interpretive and critical accounting research were provided in chapter 1 (section 1.3.4).

For each of the above categories Chua describes their dominant assumptions which define the domains of beliefs about knowledge, empirical phenomena (i.e. physical and social reality) and the relationship between the two. Table 6.1, adapted by Ryan *et al.*, (2002) from Chua (1986) provides a summary of the assumptions for each of the three categories of accounting research.

The first set of beliefs listed within the items labeled 'A' in each of the three panels listed in Table 6.1 relate to the epistemological and methodological assumptions. The epistemological assumptions determine what is to count as acceptable truth by specifying the criteria and process of assessing truth claims. The methodological assumptions indicate the research methods deemed appropriate for gathering the valid evidence. Chua states that what is considered an appropriate research methodology will depend on how truth is to be defined (i.e. the epistemological assumptions).

The second set of beliefs listed within the items labeled 'B' in each of the three panels listed in Table 6.1 relate in order of presentation to assumptions about ontology, human intentions/rationality and societal relations. The third item, labeled 'C' states the assumptions that are made about relationships between items 'A' and 'B' (i.e. relationships relating to knowledge and the physical world).

Chua stresses that for each research category the issue of ontology (item B in Table 6.1) lies prior to and governs subsequent epistemological and methodological assumptions.

Table 6.1: Assumptions relating to alternative categories of accounting research

1. Mainstream accounting research

A. Beliefs about knowledge

Theory and observation are independent of each other, and quantitative methods of data collection are favoured to provide a basis for generalizations.

B. Beliefs about physical and social reality

Empirical reality is objective and external to the subject (and the researcher). Human actors are essentially passive objects, who rationally pursue their assumed goals. Society and organizations are basically stable, and dysfunctional behaviour can be managed through the design of control systems.

C. Relationship between accounting theory and practice

Accounting is concerned with means, not ends – it is value neutral, and existing institutional structures are taken for granted.

2. Interpretive accounting research

A. Beliefs about knowledge

Theory is used to provide explanations of human intentions. Its adequacy is assessed via logical consistency, subjective interpretation, and agreement with the actors' common-sense interpretations.

B. Beliefs about physical and social reality

Reality is socially created and objectified through human interaction. Human action is intentional and has meaning grounded in the social and historical context. Social order is assumed and conflict mediated through shared meanings.

C. Relationships between accounting theory and practice

Accounting theory seeks to explain action and to understand how social order is produced and reproduced.

3. Critical accounting research

A. Beliefs about knowledge

Criteria for judging theories are always temporal and context bound. Social objects can only be understood through a study of their historical development and change within the totality of relations.

B. Beliefs about physical and social reality

Empirical reality is characterized by objective, real relations, but is transformed and reproduced through subjective interpretation. Human intention and rationality are accepted, but have to be critically analysed because human potential is alienated through false consciousness and ideology. Fundamental conflict is endemic in society because of social injustice.

C. Relationships between accounting theory and practice

Theory has a critical imperative; in particular the identification and removal of domination and ideological practices.

Source: Ryan *et al.* . 2002. p 43 . adapted from Chua 1986

Laughlin (1995)

Laughlin presents a three dimensional framework for classifying research in the social sciences. He expresses these dimensions in terms of choices that should be made before undertaking any empirical investigation using three broad strands that he labels theory, methodology and change. He states that in broad terms choice with regard to “theory” involves deciding on a view about the nature of the world (i.e. ontology) and what constitutes knowledge either past or present and how it relates to the current focus of investigation (i.e. the epistemology assumption). The choice in relation to “methodology” involves taking a position on a combination of the nature and role of the observer in the discovery process and the level of theoretical formality in defining the nature of the discovery methods. Finally, the choice in relation to “change” involves taking a position on whether the investigation is intentionally geared to achieve change in the phenomena being investigated.

Laughlin views the three dimensions as a continuum but to simplify the presentation he singles out three levels; namely high, medium and low which he describes as follows:

- Theory dimension relating to the level of theorisation prior to the research. High levels of prior theorising are indicative of a world which, despite empirical variety, has high levels of generality and order and has been well researched through previous studies. Conversely, low levels of prior theorising assume that the world where generalities are likely to be impossible and where it is inappropriate to derive insights from previous studies.
- Methodological dimension concerning the level of theorising in the research process. At the high end of the continuum the nature of the research process is highly theorised. There is an implicit assumption that the researchers' subjectivity or bias plays no part in the process, apart from the application a pre-determined set of techniques. At the low end of the continuum, the

researcher is directly involved in the research and uses his or her perceptual skills being completely uncluttered by theoretical rules and regulations.

- Change dimension which Laughlin describes as the attitudes of the researcher towards maintaining the current situation that is being investigated and also about the necessity for actually doing something about this situation. He explains that those who believe in “high” levels of change are of the view that everything they see is bound to be inadequate and incomplete and in need of change whereas those who believe in “low” change see little problem in maintaining the status quo.

Laughlin produced a framework consisting of a matrix that presented combinations of the above three dimensions, which he then used to classify different social theories that accounting researchers have drawn off. To contrast mainstream research, interpretive and German critical theory he extracted the diagonals from the matrix and presented them in a table (see Table 6.2). The column labeled high/high/low in terms of theory, methodology and change in Table 6.2 represents mainstream accounting research. The column labeled medium/medium/medium represents a form of critical theory, which he describes as German critical theory. Finally, the column headed low/low/low represents the more interpretive approaches to accounting research. Table 6.2 also illustrates the importance of levels of theorisation in distinguishing different methodological approaches in accounting research.

Table 6.2: Laughlin's key characteristics for alternative categories of accounting research

	High/high/ Low ^a	Medium/medium/ Medium ^a	Low/low/ Low ^a
<i>Theory characteristics</i>			
Ontological belief	Generalizable world waiting to be discovered	"Skeletal" generalizations possible	Generalizations may not be there to be discovered
Role of theory	Definable theory with hypotheses to test	"Skeletal" theory with some broad understanding of relationships	Ill-defined theory-no prior hypotheses
<i>Methodology characteristics</i>			
Role of observer and human nature belief	Observer independent and irrelevant	Observer important and always part of the process of discovery	Observer important and always part of the process of discovery
Nature of method	Structured, quantitative method	Definable approach but subject to refinement in actual situations, invariably qualitative	Unstructured, ill-defined, qualitative approach
Data sought	Cross-sectional data used usually at one point in time and selectively gathered tied to hypotheses	Longitudinal, case-study based. Heavily descriptive but also analytical	Longitudinal, case-study based. Heavily descriptive
Conclusions derived	Tight conclusions about findings	Reasonably conclusive tied to "skeletal" theory and empirical richness	Ill-defined and inconclusive conclusions but empirically rich in details
Validity criteria	Statistical inference	Meanings: researchers + researched	Meanings researched
<i>Change characteristics</i>			
	Low emphasis on changing status quo	Medium emphasis open to radical change <i>and</i> maintenance of status quo	Low emphasis on changing status quo

Source: Laughlin (1995, p 80)

^a Theory, methodology and change

6.4 A discussion of the methodological approach adopted

The discussion in the previous section provides support for the statement made by Ryan *et al.*, (2002, p 46) relating to social science research:

The research process is not a value-neutral, objective search for the truth

According to Harre (1986) the governing moral principle is that researchers publish what they honestly believe to be true. It is apparent from the discussion so far in this chapter that the researcher can choose from a range of methodological approaches but the choice will be influenced by assumptions which the researcher holds relating to ontological and epistemological issues. There is no one ideal research methodology and if accounting research is to fully explore all aspects of the subject a variety of methodological approaches must be employed.

Regarding the current research it was pointed out in chapter 1 that the overriding objective of the research was to explore the influence of potential explanatory variables on the design of product costing systems. To achieve this objective a contingency theory framework has been adopted. This framework seeks to identify relationships between potential explanatory contingent variables and characteristics of the product costing system, defined as the level of sophistication. To identify if statistically significant relationships exist, a large number of observations are required thus requiring a cross sectional postal questionnaire survey.

Underpinning this researcher's choice of the major research objective and the application of the theoretical framework is an ontological assumption that reality is determined by empirical evidence that can be verified by observation (i.e. an empirical realist). Thus, in terms of Tomkins and Groves' six-fold classification of

ontological assumptions this researcher is viewing the world at the objective end where reality is considered to be independent of the researcher. The above assumptions are consistent with Chua's ontological assumptions for mainstream accounting research (i.e. item B in the first section of Table 6.1) and the 'high' ontological belief relating to Laughlin's first theory characteristic in Table 6.2.

It was pointed out at the beginning of the previous section that the researcher's ontological assumption will affect the way in which knowledge can be gained about a phenomenon (epistemology). Based on the assumptions described in the previous paragraph the appropriate mechanism for gathering knowledge is by empirical observation of the phenomenon. This is consistent with Chua's epistemological assumption applied to mainstream accounting research that theory and observation are independent of one another (i.e. item A in the first section of Table 6.1) and Laughlin's second theory characteristic in Table 6.2 whereby there is a definable theory with hypotheses to test.

The ontological and epistemological assumptions govern the research methodology. Based on the above discussion this research falls within the mainstream research category thus complying with Chua's assumption of a methodology based on quantitative methods of data collection to provide a basis for generalisations (see item A in the first section of Table 6.1). In terms of Laughlin's framework the mainstream category is depicted in the high/high/low column of Table 6.2 and the research methodology adopted by this researcher is consistent with the characteristics listed in the table. Finally, given that the ontological assumptions are at the objective end of Tomkins and Groves' continuum the scientific method is considered to be the most appropriate methodology in these circumstances.

Drawing off elements of the scientific method and Laughlin's methodology characteristics the methodology applying to the research presented in this thesis can be described as beginning with a well-formulated theory (see theoretical framework in section 1.5 and chapter 4), which is used to develop hypotheses (see chapter 4 – particularly section 4.7), that identifies relationships between dependent and independent variables (see multiple regression model in section 8.13). Cross-sectional data collected using a highly structured and predetermined set of procedures (see sections 6.5 - 6.12) is analysed by mathematical and statistical techniques to validate the hypotheses (see sections 8.3 – 8.13) and thus generalise the results.

The methodological approach is explained in greater detail in sections 6.7 – 6.15 of this chapter. Given that the research objects were presented in chapter 1 it is appropriate to reiterate them in section 6.5. The hypotheses that were developed in chapter 4 are also summarised and listed in section 6.6.

6.5 Research objectives

The preceding chapters 2-5 indicated the need to compute products/services costs with sufficient accuracy to assist in making good decisions. Computing accurate product costs requires that a cost system is designed to accurately measure the consumption of indirect costs by products/services. This is considered to be crucial because of the increase in the indirect costs occurring over the past decades (chapter 2, section 2.3.2).

The discussion on the history of management accounting in chapter 2 highlighted the paradigm shift in the product costing environment and the inappropriateness of the current product costing systems in terms of the assignment of the indirect costs (chapter 2, section 2.3, Table 2.1). The chapter also provided the historical background information for identifying the potential explanatory variables influencing the product costing practices.

In chapter 3 the alternative product costing systems, *viz.* the variable costing, direct costing, traditional absorption costing, and activity based costing (ABC) systems were described. A detailed discussion of activity based costing systems highlighted that they represent resource usage models that can be used to develop profitability maps to focus managerial attention. The ABC system has also been recognised as an attention-focussing device providing attention-focussing information, rather than information used directly for decision-making. This chapter also focussed on the identification of cost hierarchies that can be used to develop activity profitability maps (section 3.4.3). Cooper (1997) highlighted the importance of the product profitability analysis in making decisions and the hierarchical approach to product profitability maps to make better decisions.

Subsequently in chapter 4 the discussion on the level of sophistication needed to assign indirect costs to products/services (sections 4.6; 4.6.1–4.6.2;) highlighted the need for a high number of cost pools and cost drivers to avoid computing distorted products/services costs. It was noted that the accuracy of reported costs rises with the increased number of cost pools and cost drivers. In section 4.5 the relationship between the purposes of the product/service cost information and the types and accuracy level of cost information required were discussed. It was noted that for financial accounting stock valuation purposes less accurate aggregate level costs including facility-sustaining costs were acceptable. Whereas, for decision-making and profitability analysis more accurate costs, excluding the facility sustaining costs were used. It was mentioned in section 4.7.8 that if a financial accounting mentality is dominant in firms, priority is likely to be given to adhering to financial accounting requirements in computing product costs even for management decision-making and profitability analysis. Furthermore the influence of other potential explanatory variables (Section 4.7.1–4.7.8) on the cost system design were also discussed. This discussion provided the basis for the adoption of a contingency theory theoretical framework for the

current study, whereby the cost systems design was identified to be the dependent variable and the potential explanatory variables were recognised to be the contingent (independent) variables, as shown in Table 6.1.

Previous studies conducted by Drury and Tayles (1993, 2000), Bjornenak (1997), Brewer (1998), Abernathy (2001) have also identified the influence of certain explanatory variables on the design of the cost system (chapter 5).

Based on the above discussions the study will focus on the following research objectives. The over-riding objective is to explore the influence of potential explanatory variables on the design of product costing systems in Malaysian companies, particularly on the level of sophistication maintained. In addition the research also has the following objectives:

1. To examine the extent to which firms use a single database from which different costs are extracted for different purposes or whether separate databases are used for obtaining different cost information.
2. To explore the extent to which different cost information is used for different purposes.
3. To investigate the level of sophistication of the cost system design maintained by Malaysian companies;
4. To investigate if a financial accounting mentality is prevalent in the Malaysian companies;
5. To investigate the treatment of non-manufacturing costs in manufacturing companies;
6. To examine the extent of usage of ABC systems in the Malaysian companies;
7. To examine the nature, content and role of product/service profitability analysis in the Malaysian companies.

6.6 Research hypotheses

In chapter 4 (sections 4.7.1 - 4.7.8) it was pointed out that there are several explanatory / contingent factors, that are likely to influence the design and level of sophistication of costing systems that companies operate. The following is a summary of the directional hypotheses relating to factors influencing cost system design and the corresponding sections where they were advanced and discussed in chapter 4:

- *The greater the proportion of indirect costs within an organization's cost structure, the higher the level of the sophistication of the costing system (section 4.7.1).*
- *The greater the size of an organisation, the higher the level of sophistication of the costing system (section 4.7.2)*
- *The greater the intensity of competition that an organisation faces, the higher the level of sophistication of the costing system (section 4.7.3)*
- *The greater the level of product diversity, the higher the level of sophistication of the costing system (section 4.7.5)*
- *The greater the level of volume diversity, the higher the level of sophistication of the costing system (section 4.7.5)*
- *The greater the extent of the use of JIT techniques, the lower the level of sophistication of the costing system (section 4.7.7)*

- *The greater the level of financial accounting mentality observed the lower the level of sophistication of the costing system (section 4.7.8)*

In addition to the above directional hypotheses the following null hypotheses are tested:

- *The purposes for which the product cost information is used has no influence on the type of cost system maintained by firms (section 4.5)*
- *The business sector in which an organisation operates has no influence on the level of sophistication of the costing system (section 4.7.6)*
- *The competitive strategy adopted by the organisation has no influence on the level of sophistication of the costing system (section 4.7.4)*

6.7 Data collection method

The factors influencing the choice of research methodology were explained in section 6.4. Given the choice of methodology and the contingency theory framework, cross-sectional data derived from a large number of firms is required so that statistical generalisations can be made to test the hypotheses about the likelihood of the contingent factors influencing the chosen characteristics of the product costing system. Thus, it was appropriate to collect data using a mail questionnaire survey involving a relatively large number of companies. Moreover similar studies in Western Europe and the USA (e.g. Ask & Ax, 1992; Drury *et al*, 1993; Drury and Tayles, 2000; Innes & Mitchell, 1995; Lukka & Granlund, 1996; Bjornenak, 1997) were also based on postal mail questionnaire surveys.

The alternative data collection method of relying on case studies methods involving the collection of 'in-depth' data from one or a small number of firms was rejected on the grounds that such methods do not support the research methodology, particularly in enabling statistical generalisations to be made. Such methods are considered more appropriate for interpretive and critical research and areas of research where theory is not well-formulated. In particular, case studies are more appropriate as a tool for generating ideas and hypotheses, with the aim of them being subject to empirical testing involving large scale statistical studies at a later stage.

Moser & Kalton (1989, pp 256-258), argue that despite the disadvantage of a possible low response rate in mail questionnaires, its merits are strong enough to compensate for the disadvantages. The authors stress that mail questionnaires are generally cheaper and more suitable when there are financial resource constraints. Furthermore, when the population to be covered is widely and thinly spread, the postal questionnaire becomes the fastest way of reaching the respondents. Mail questionnaires also avoid the problems associated with interviews, such as interviewer errors which may undermine the reliability and the validity of the survey results. Postal questionnaire surveys are also appropriate in situations where some consultation is needed among members of the organisation to answer certain questions. Sekaran (1992, p 200) explains that:

A questionnaire is an efficient data-collection mechanism when the researcher knows exactly what is required and how to measure the variables of interest.

The limitations of mail questionnaires (Moser and Kalton, 1989) are their inflexibility, the uncertainty in getting the right person to answer the questionnaire, the inability to obtain observational data and also the possibility of getting a low response rate (Sekaran, 1992; Moser & Kalton, 1989) should also be taken into account. The final, and probably the most important, limitation of postal questionnaires is that it may be difficult to obtain an adequate response rate (de Vaus, 1990, p 99; Moser and Kalton, 1989, p 262; Newell, 1999, p 96).

If the response rate is low non-response bias can occur because the returned questionnaires may not be representative of the original sample drawn. In addition, it is possible that the number of questionnaire returned may not be sufficient to carry out statistical tests.

Bearing in mind the potential advantages and disadvantages, and also considering the population to be studied in Malaysia and the nature of the study, it was decided that the mail questionnaire would be the most suitable mode of data collection.

To minimise the effects of the limitations of questionnaire surveys personal interviews were also carried out with approximately 10% of the respondents to clarify their responses to the final version of the questionnaire. Approximately, a further 5% of the respondents were contacted through the electronic mail or the telephone for response clarifications to the final version of the questionnaire. To overcome the problem of a low response rate, self-addressed, stamped return envelopes were provided. Follow-up letters, telephone calls and e-mails were made about two weeks after initially posting the questionnaire. A second follow-up letter, telephone call and e-mail were sent to non-respondents, two weeks after the first reminder. Covering letters together with the questionnaire were sent to the respondents, assuring them of the confidentiality of their responses and the use of aggregated responses for the research output.

6.8 Pre-tests and pilot surveys

Many writers have discussed the importance of pre-tests and pilot surveys. Moser and Kalton (1989) and Sproull (1988) have identified the need to undertake pre-tests relating to the research method, research instruments and their suitability. Sarantakos (1993, p 278) summarises the need for such an exercise as 'to discover possible weaknesses, inadequacies, ambiguities and problems in all aspects of the research, so that they can be corrected before the actual data collection takes place'.

Several versions of the questionnaire were prepared prior to final mailing. The first version was prepared in March 1999. The pre-testing stage involved sending a draft of the questionnaire to my supervisor, Professor Colin Drury at the University of Huddersfield. An amended version of the questionnaire was prepared based on his comments on the wording and presentation of the questions. The amended version was given to some of my colleagues at Universiti Teknologi MARA and other academicians in different Universities and colleges in Malaysia to obtain their opinions on the questionnaire. The questionnaire was also given to six practitioners to obtain the non-academician's view on the content and clarity of the questions. The general comment was that the questionnaire was well designed to capture the nature of the cost system design in Malaysian companies. The practitioners indicated interest in the research after seeing the objectives of the study. Although they expressed concern about the length of the questionnaire, they felt that since the objectives of the study would be beneficial for firms, respondents may complete the questionnaire.

An amended version of the questionnaire was piloted by mailing it to a random sample of 50 companies selected randomly from the Federation of Malaysian Manufacturing and Service Companies database. The pilot questionnaire was accompanied by a covering letter which asked the respondents to complete the questionnaire, comment on any ambiguities, omissions and suggest possible areas of improvement. The covering letters were, wherever possible, personally addressed to the financial controllers/head of finance. Where the names were unavailable, the letters were generally addressed to the financial controller/head of finance.

Five completed questionnaires were returned. The general comment was on the length of the questionnaire and the respondents stated that it took them more

than 30 minutes to complete the questionnaire. To increase the response rate, telephone calls were made and follow-up letters and e-mail messages were sent. Many did not respond to these follow-up calls. Those who responded were unwilling to take part in such surveys as they felt that it is not their company policy to reveal any company information to third parties. Although it was stressed that confidentiality will be maintained they were not interested. However, the responses from those completing the pilot questionnaire suggested that they understood the questions and two of them expressed an interest in receiving the final report. The responses provide some support for the validity of the questionnaire as no comments or suggestions were given for any alterations.

The next stage involved a six-week visit to the University of Huddersfield in February 2000. Based on feedback and consultations with my supervisor the final version of the questionnaire was prepared during this period. Because of the comments relating to the length of the questionnaire, efforts were made to reduce the number of questions. The final version (see Appendix 1) resulted in a 15-page questionnaire.

6.9 The final version of the questionnaire

As mentioned earlier, to avoid the limitation of a low response rate, self-addressed, pre-paid envelopes were provided for the replies. To encourage respondents to complete the questionnaire, the cover letter accompanying the questionnaire (see Appendix 2) explained the objectives of the research study. In addition, the respondents were assured of receiving a copy of the final research findings. To make the questionnaire more 'user-friendly', respondents were also asked to answer only those questions that were relevant to their organisation. Therefore the responses to individual questions may not be equivalent to the total number of completed questionnaires.

The questionnaires were personally addressed to the group financial controller or the head of finance. If personal names were not available, then it was generally

addressed to the group financial controller or the head of finance. When it was possible to identify management accountants specifically then the questionnaires were addressed to these management accountants. It is difficult, however, to personally identify management accountants in many Malaysian companies. This is because in many of the Malaysian companies there is no segregation between management and financial accountants. In many instances the accountant undertakes both management and financial accounting duties. Therefore most of the questionnaires were addressed to the group financial controller or the head of finance but in the covering letter recipients who had been wrongly identified were requested to pass it to the relevant person. This was to ensure that persons with appropriate knowledge on the product costing system were the ones who completed the questionnaire.

During the reminder stage it became apparent that some of recipients preferred the covering letter to be addressed to the managing director or the Chief Executive Officer (CEO) because they were not willing to disclose any company information without their prior approval. In such circumstances a second covering letter was sent to the managing director or the CEO. These letters were personalised if their names were known.

6.10 The content of the final version of the questionnaire

Many of the questions used in this questionnaire were the close-ended questions whereby respondents were given a set of responses and were asked to choose the one that most closely describes their attribute or attitudes. In addition, based on the suggestion by Hussey and Hussey (1997), in instances where there may be lost information if the set of responses do not include all possibilities, the item titled 'other, please specify' was included to derive further information. The various types of questions that were included in the questionnaire are listed below:

- a) attitudinal questions using the :-

- i. 7-point Likert scale with the following label, 'strongly disagree to strongly agree'. (Questions B4, B9, B10, C1, E1, E2, E4, F6, G1,)
- ii. semantic differential scale with bipolar attributes indicated at the extremes of a 7-point scale with the following labels, 'Totally integrated - Totally independent'; 'Never - Frequently'; 'Highly standardised - Totally customised'; 'Low - Extremely Intense'. (Questions B3, B5, E5, E6)

b) rating questions (e.g. Questions B2, B6, B7, D9, D10, F3, H2) using itemised rating scales with appropriate labels such as: 'Not very accurate - Extremely accurate'; 'Not at all satisfied - Extremely satisfied'; 'Not at all important - Vitally important'; 'Little variation - Considerable variation'. Sekaran (1992, p.169) explains that such scales offer considerable flexibility in anchoring the scales to suit specific purposes while tapping a concept, and hence is helpful for drawing useful interpretive conclusions from the data. The middle point was labeled by an adjective in order to represent a neutral or moderate opinion. This technique has also been widely used by other researchers (e.g. Drury and Tayles, 2000; Joseph *et al*, 1996; Krumwiede, 1998). Furthermore the approach allows responses to be classified into high, moderate and low categories that may be useful in performing statistical analysis.

c) Ranking questions whereby respondents were asked to rank a set of items given according to the level of importance. (Question H4)

d) Dichotomous-alternative questions whereby the respondents were asked to choose one of two alternatives; determinant-choice questions where the respondents were asked to choose one response from among several possible alternatives. These questions were used to get direct answers from the respondents. (Questions A3, A4, A7, A8, A10, D1, D12, D13, F5, H3)

e) Multiple choice questions where the respondents were asked to choose a response from a set of possible responses. An additional label 'other, please specify' was included to some of these multiple-choice questions in order not to lose out on any valuable information. (Questions A1, A5, B1, B8, C2, D2, D3, D5, D8, D11, H5)

The final version of the questionnaire contained eight different sections. Section A dealt with general company information. Questions A1 and A2 were included to identify the main business of the company. This was necessary to classify the companies by the various business sectors for ascertaining whether the responses differed. Question A3 sought to identify if the company was part of a group structure. Question A4 asked the respondents if their companies were listed in the stock exchange in order to ascertain whether the responses between listed and unlisted companies differed. The size of the company was measured by the sales turnover of the company using Question A5. This information was gathered to ascertain whether observed practices differed according to the size of the company. To obtain information on the size of the group, Question A6 focused on the sales revenue of the organisational unit as a percentage of total group turnover. Question A7 was designed to determine the respondents' location in the organisational structure. Questions A8 - A10 relate to the ownership structure of the organisation. These questions were set to enable practices of foreign and locally owned companies to be compared.

Section B of the questionnaire deals with the product/service environment and contained questions relating to most of the contingent variables that were included in the contingency theory framework. Question B1 was designed to identify the number of different products or services the cost system assign costs to. Question B2 sought to measure volume diversity by collecting data on the extent of variation in the sales volume between the top 20% of the best selling items and the bottom 20% of the lowest selling items. Product diversity was measured by Question B3 by collecting data on the extent of standardised or customised products and services marketed by the organisation. Question B4, adapted from Krumwiede (1998), contained four sub-sections relating to the complexity of manufacturing or service provision in the organisation.

Questions B5-B8 were adapted from Drury and Tayles (2000) and gathered data relating to the competitive environment and cost structures faced by the responding organisations. Question B9 with its sub-sections, obtained information on the quality initiatives adopted by the organisations. Krumwiede stated that companies that have implemented TQM may have already performed much of the process analysis needed for ABC. Also other studies by Shields (1995) and Foster and Swenson (1997) had identified a relationship between quality objectives and ABC success. Therefore this question is used to identify the relationship between quality initiatives and the sophistication of the indirect cost assignment to products/services. Question B10 was used to obtain information on the organisation's information technology system. This question was used to measure the flexibility with which cost information can be extracted for the various purposes for which the cost information is used. It also tries to measure the relationship between the existing IT in the organisation and the sophistication of the cost system design. Both these Questions B9 and B10 are adapted from Krumwiede (1998).

Section C focuses only on manufacturing organisations and contains two questions. Question C1 with its sub-sections determines the lean production initiatives within the organisation and it is adapted from Krumwiede (1998). This question was included to see if there is a link between lean production practices and the adoption of a sophisticated indirect cost assignment system (i.e. one of the contingent variables applicable only to manufacturing companies). A study by Anderson (1995) and Cooper (1994) in the United States revealed a link between the ABC and lean production practices.

Question C2 relates to the fourth objective specified in section 6.5. This question gathers information on how non-manufacturing costs are dealt with in product costs for decision-making. Little information is available on the treatment of non-manufacturing costs from previous research. The question is also used to ascertain if there is any relationship between the financial accounting mentality

prevalent in the organisation and the treatment of the non-manufacturing cost for decision-making.

Section D deals with characteristics of the product costing system and questions in this section were used to provide alternative measures of the dependent variable (i.e. the sophistication of the product costing system) within the contingency theory framework specified in Figure 4.1. Question D1 identified the significance of stock valuation for financial reporting purposes in the organisations in order to ascertain whether the importance of stock valuation influences the cost accumulation system. Question D2 ascertained whether companies maintain a single cost database for different purposes or maintain separate databases for different purposes whilst Questions D3 and D4 focused on how long the cost system had been maintained in the organisations. Questions D1-D4 were adapted from Drury and Tayles (1998). Question D5 was designed to ascertain how indirect costs are accumulated and assigned to products or services for decision making. This question also provides a broad indication on the sophistication of the indirect cost accumulation process. Questions D6-D8 collected data for measuring the sophistication of the indirect cost assignment process in the organisations. These questions were adapted from Drury and Tayles (1999). The opinions of respondents on the accuracy and the degree of satisfaction of their organisation's costing system were derived from Questions D9 and D10. These questions also provided surrogate measures relating to the sophistication of the costing systems of the responding organisations. Question D11-D13, adapted from Drury and Tayles (1999), focused on the extent of usage of activity-based costing (ABC) in Malaysian companies.

Section E examines the relationship between management and financial accounting information. The literature (Prakash and Rappaport, 1977; Kaplan, 1984; Johnson & Kaplan, 1987) has highlighted the possibility that a financial accounting mentality exists whereby costing systems that were designed

primarily for meeting financial accounting requirements are being used for decision-making. Questions E1 and E2 were designed to examine the extent of dominance of financial accounting on management accounting decision-making. Question E3 is used to determine the influence of group accounting rules on the internal accounting systems and published external financial statements. To gather supplementary information on the influence of financial accounting on internal management accounting systems, Question E4 was deployed. Questions E5 examines the extent of integration between the published financial statements and the internal accounting reports whereas Question E6 concentrates on whether external accounting standards affect internal management accounting systems. The questions in this section have been derived from Joseph *et al* (1996) and provide the opportunity to ascertain whether their UK findings also apply to Malaysian companies that operate within a different institutional and socio-economic environment.

Section F contains questions on product/service cost information used for decision-making purposes. The level of importance of cost information for various types of decision-making is examined in question F1. Questions F2-F4 focus on the use of cost-plus pricing and its importance. Question F5 seeks to ascertain what cost information is used for different types of decisions. Question F6, derived from Krumwiede (1998) aims to determine the importance of cost information by examining its importance relative to qualitative and strategic aspects.

Section G containing one question G1, with sub-sections, was included to examine the performance of the organisation 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. Section H relates to questions on profitability analysis and the questions from this section are used to address the final objective listed in section 6.5. These questions were adapted from the study by Drury and Tayles (2000). Question H1

determines the frequency of routine profitability analysis by products/services or by customer or customer categories. Question H2 examines the importance of routine periodic profitability analysis for decision-making and question H3 gathers information on the costs that are assigned to products or services within the routine periodic profitability analysis. The purpose of Question H4 is to ascertain what information is extracted from the profitability analysis for decision-making. Respondents were asked to identify the most important and the second most important profitability measure for signaling the need to make a variety of decisions. Finally, Question H5 asked the respondents to indicate if they used profitability analysis information directly for decision-making or as a guide for signaling the need for undertaking a more detailed analysis.

The final section of the questionnaire gathered information about the respondents, such as the length of time they had been qualified and whether a future meeting would be possible. This question on the length of period of qualification was asked to determine if the respondents had enough experience and knowledge to answer the questionnaire. The final question on the future meeting was given to ascertain if the respondents were interested in the study and provided useful feedback on respondents who may participate in further research.

The following Table 6.3 summarises the dependent variable (cost system design), the potential explanatory (contingent) variables described in contingency framework model (see Figure 4.1) and the relevant questions used to measure the constructs relating to these variables.

Table 6.3: Dependent and the contingent (explanatory) independent variables measured by the research and the relevant questions used

Dependent Variable	Construct Measured	Question
1. Cost system design	a) Level of sophistication:- <ul style="list-style-type: none"> • Indirect cost assignment • Number of cost pools used • Number of cost drivers used • Level of accuracy • Level of satisfaction b) Types of costs assigned	D5 D6 D7 D9 D10 F5, H3
Independent/Potential Explanatory Variables		
1.Purposes of product/service cost information	Number of cost databases used	D2
2. Cost Structure of the firm	Percentage of indirect costs to total cost structure	B8
3. Size of Firm	Sales turnover	A5
4. Competitive environment	Intensity of competition, price competition etc.	B5, B6 , B7
5. Competitive strategy	<ul style="list-style-type: none"> • Range of products - standardised or customised • Complexity of manufacturing or service provision 	B3 B4
6. Product Diversity	<ul style="list-style-type: none"> • Number of products/services cost system assign costs to • Range of products - standardised or customised • Complexity of manufacturing or service provision 	B1 B3 B4 a,b,d
7. Product volume diversity	<ul style="list-style-type: none"> • Variation in sales volume • Deviations in product/service volumes or lot sizes 	B2 B4 c
8. Type of Organisation	Business Sector	A1 & A2
9. JIT usage	Lean production initiatives	C1 a,b,c,d,e,f
10. Financial Accounting Mentality	<ul style="list-style-type: none"> • Dominance of product cost information for stock valuation • Design of product costing system • Influence of group accounting rules on firm's internal and external financial statements • Relationship between internal accounting and external financial statements • Extent of integration of internal and external financial statements • Influence of externally imposed accounting standards on management accounting 	E1 E2 E3 E4 a,b,c,d,e,f,g,h E5 E6

6.11 The population and sample selection

The population identified for this study is the Malaysian manufacturing and non-manufacturing profit organisations with reported annual sales turnover in excess

of 50 million ringgit (approximately £10 million) for their last financial year. Because the research was concerned with the nature and content of established formal costing systems, smaller companies and not-for-profit organisations were not incorporated since past research suggests that most of these companies are unlikely to have established costing systems. The population also included listed and non-listed companies and also Malaysian and foreign owned companies to see if there are any associations between firms classified under these categories and the sophistication level of the cost system design. A distinguishing feature of the research is that both manufacturing and service companies are included. Previous research, except for Drury and Tayles (2000), has tended to focus excessively on manufacturing organisations and ignore service companies, despite the fact that the service sector has outgrown the manufacturing sector in most economies.

The next task was to decide on the sample design. Moser and Kalton (1989, p 154) explain that one of the decisive factors in the sample design is the nature of the sampling frames available and every aspect of design is influenced by the sampling frame. However, they also state that the requirements for an ideal sampling frame are stringent ones and no actual frame meets them all. Therefore, it is for the sample designer to be aware of what frames are available and how far these frames enable the designer to sample the population completely, accurately and conveniently (pp 157-158).

Considering the sample criteria it was necessary to identify a database, which could be used as the appropriate sampling frame. Since manufacturing as well as non-manufacturing companies were to be included the FMM Directory of Malaysian Industries (2000) was found to be suitable for manufacturing companies. It provided details such as the sales turnover, number of employees, directors' names and the finance persons' names. In addition, this directory also had 159 service industries included.

The Corporate Handbook – Kuala Lumpur Stock Exchange (KLSE 1999) was also used. This handbook has two volumes, one on the Main Board companies and the other on the Second Board companies. These handbooks contained manufacturing, as well as non-manufacturing and service companies, and also provided the appropriate information for selecting listed companies (i.e. details of sales turnover, number of employees, directors' names, finance persons' names and the industry sector). In choosing agricultural industries it was decided to concentrate on the oil palm industry as it is the major agricultural sector in Malaysia. Hence, the Directory of the Malaysian Oil Palm Plantation Companies and the Directory of the Malaysian Palm Oil Processing Sector both published by the Palm Oil Registration & Licensing Authority (1999) were used to identify oil palm related companies. The Times Trade Directory was also used to further select service and non-manufacturing companies. All these directories included foreign companies.

One of the major aims of the research was to compare the results of the manufacturing and service sectors and examine the costing systems of plantation companies (because this is a major industry within the Malaysian economy). A simple random sampling technique was used to select the subjects. As the population size of manufacturing and service companies were quite similar and larger as compared to the plantation companies, equal numbers of the manufacturing and service companies were chosen. The population size of the plantation companies was small and therefore all of the large plantation companies were selected. This process resulted in the selection of a sample consisting of 330 manufacturing companies, 330 non-manufacturing companies and 40 plantation companies, giving a total sample of 700 companies.

6.12 The respondents and the response rate

In common with previous studies in this area (e.g. Bjornenak, 1997; Drury and Tayles, 2000) this study aimed to use management accountants as the respondents because they are likely to be the most suitable people to understand the cost systems design and also have a technical understanding of the technical nature of the questionnaire content. It was difficult to identify management accountants specifically and therefore the questionnaires were addressed to the group financial controller or the head of finance. However, when the initial communications with the responding organisation suggested that the accompanying letter should be addressed to the Managing Director or the Chief Executive Officer, a request was made to the Managing Director or the Chief Executive Officer to pass the questionnaire to the most appropriate person in the organisation.

The respondents' job designations were checked carefully to ensure that they are suitable to answer the questions before the responses were included into the analysis. Table 6.4 classifies the responses according to their job titles.

Table 6.4: Responses according to job titles

<i>Job Title</i>	<i>Frequency</i>	<i>Percentage %</i>
Accountant	30	23.6
Accounts /Finance Executives	16	12.5
Assistant Director Human Resource	1	0.8
Assistant Finance / Accounts Manager	10	7.9
Chief Operating Officer/General Manager	2	1.6
Company Secretary	1	0.8
Director / General Manager of Finance	5	3.9
Finance / Accounting Managers	23	18.1
Financial Controller / Chief Accountant	11	8.7
Group / Senior Accountant	9	7.1
Management Accountant	2	1.6
Other Managers	10	7.9
Plantation Advisor	1	0.8
Vice Chairman/Managing/Executive Directors	6	4.7

Table 6.4 indicates that 83.4% of the respondents were concerned with accounts or finance. Although the remaining 16.6% of the respondents were not employed in the accounting/finance function, they had been with the organisation for a long period and were aware of the costing system in their organisations.

A total of 700 final questionnaires were mailed in the first week of May 2000 and follow-up letters, or e-mails whenever the e-mail address was known, were sent one month later. Three weeks later a follow-up telephone call was made to a random sample of approximately 30% of the non-respondents. Whenever possible, a contact person in the organisation was identified through whom a further request could be made. With all these 'progress chasing' activities the total returns were 289 consisting of :

- 24 returned due to the firm no longer existing or the respondent having left the company
- 114 returned uncompleted giving a reason for the non-response
- 16 partially completed
- 8 unintelligible and unusable
- 127 usable

The common reason for non-completion of the questionnaire was the lack of time due to the respondents busy work schedule. Another frequent reason given was the company policy of not disclosing any information.

The response rate using the following formula recommended by de Vaus' (1991, p 107) is:

$$\text{Response rate} = \text{Number returned} / \text{N in sample} - (\text{Ineligible} + \text{Unreachable})$$
$$151 / [700 - \{24 + 114\}] = 26.86 \%$$

Another way to calculate the response rate is to take into account only the returned completed questionnaires (127) and to exclude the unreachable (24) and unusable (24) with no consideration of those that have refused to complete the questionnaire. Given these assumptions the response rate is 19.48% [response rate = $127 / (700 - (24 + 24))$]. This response rate is considered to be satisfactory as it is equivalent to or higher than response rates in other similar studies.

6.13 Non-response error

Non-responses are identified as refusals or non-contacts. Zikmund (1988, p 145) explains that the statistical differences between a survey that includes only those who responded and a survey that also includes those who failed to respond are referred to as a non-response error, which is most acute in mail surveys. Kervin (1992, p 419) also states that non-response is biased when cases with certain characteristics are more likely to be refusals or non-contacts and therefore these non-responses are not randomly distributed within the sample, resulting in certain types of cases being underrepresented.

Non-response errors can affect the generalisation of the research results to the whole population. Therefore it was decided to check for the existence of non-response bias in this research study by comparing the features of the sample with the features of the target population to ascertain if there were any significant differences (Zikmund, 1988, p 145). The responses and non-responses relating to the demographic variables (such as the business sector, size, and the listing status of the firms) were compared using the non-parametric Mann-Whitney test. The results (Appendix 3) indicated that there were no significant differences in the responses between these two groups ($p\text{-value} > 0.05$) thus suggesting that the limitation of a non-response bias is unlikely to apply in this study.

6.14 Questionnaire – validity and reliability

De Vaus (1991, p 55) defines validity as 'a measure which measures what it is intended to measure and the use to which the measure is put'. Moser and Kalton (1989, p 355) define validity as "the success of the scale in measuring what it sets out to measure, so that differences between individuals' scores can be taken as representing true differences in the characteristic under study". On reliability, Moser and Kalton (1989, p 355) state that a scale or test is reliable to the extent that repeat measurements made by it under constant conditions will give the same result. A scale that is reliable may not be valid for it could be measuring something other than what it was designed to measure.

Therefore, it is necessary to measure the validity and the reliability of the questionnaires. Unfortunately measuring the validity is not an easy task. As de Vaus (1991) and Moser and Kalton (1989) have stressed, none of the validity measures are entirely satisfactory and they have their limitations. Hence, it was decided to accept the validity of the questionnaire from the feedback of the pilot interviews and the pilot survey. There were no suggestions to improve the questions and the preliminary interviews showed (see Section 6.8) that some of the interviewees were interested in the study. Furthermore, many of the questions used in this questionnaire were adapted from previous studies (Drury and Tayles, 2000; Krumwiedie, 1998; Joseph *et al*, 1996) whereby the validity of the questions was established. The above-mentioned approaches thus provide support for the validity of the current questionnaire.

Bryman and Cramer (1995, pp 70-72) refer to the reliability of a measure as the consistency of that measure. They identify two different aspects of reliability, viz. external and internal reliability. External reliability is concerned with the degree of consistency of a measure over time. On the other hand internal reliability relates to the internal consistency of multiple item scales, i.e. it checks to see whether each scale is measuring a single idea.

It has been suggested (de Vaus, 1991, p 55) that the test-retest method is the best way to check on the external reliability of single questions. However, as Moser and Kalton (1989) have stated there are problems associated with this method of testing. For example, it is a very difficult task to get the same respondent to answer the same questionnaire after a lapse of time. Obtaining the responses for the first time is problematic so it is unlikely that respondents will be prepared to answer the same questions a second time. It was therefore decided that it was not feasible to adopt the formal test-retest method. Nevertheless, a simpler version of the process was conducted using the electronic mail or the telephone. Twelve respondents were identified and they were asked to give their responses for a sample of questions. These twelve respondents were chosen randomly from the different industry sectors. The second responses received from them were all similar thus supporting the reliability of the questionnaire.

The internal consistency of measure was tested using the inter-item consistency reliability coefficient Cronbach's alpha. Cronbach's alpha is a reliability coefficient to test the consistency of respondents' responses to all the items that are independent measures of the same concept. Sekaran (1992) and Foster and Swenson (1997) state that multiple questions used to measure the same concept have an advantage of capturing more of a construct's multi-dimensionality than individual questions.

The multiple items in Question B4 relating to the construct of 'complexity of manufacturing or service provision' were tested for their internal consistency. Sub-questions B4(b) and B4(d) were negatively worded intentionally to make sure respondents were alert when answering the questionnaire and not mechanically tick the answers. These questions were reverse coded for further analysis and to test the Cronbach Alpha using the SPSS. The output showed a Cronbach Alpha of 0.8358 and a standardised item alpha of 0.8348 that indicates a high reliability of internal consistency.

Questions D9 and D10 relating to the constructs 'accuracy and satisfaction' of the indirect cost accumulation and assignment procedure were also tested for their internal reliability. The SPSS output revealed a very high Cronbach Alpha of 0.9097 and a standardised item alpha of 0.9101 thus suggesting high internal consistency of the measures. Question C1 with its sub-sections is a multiple question measuring the manufacturing companies' use of lean production initiatives within their business unit. The Cronbach Alpha was 0.7538 and the standardised item alpha was 0.7544. Sekaran (1992) suggests that a Cronbach Alpha in the range of 0.7 is acceptable. Multiple questions E4 examining the relationship between internal accounting and published external financial statements indicated a Cronbach Alpha of 0.6644. When sub-question E4(f) was deleted the Cronbach Alpha was 0.7016.

Based on the above tests it appears that the questions used for this study are reasonably valid and the multiple questions used to measure a same concept are reasonably reliable. Composite scores were used for all of the questions where the alpha score exceeded 0.7. However the reliability co-efficient alpha, for the multiple item question F6 was not measured because it is not intended to merge their responses to produce composite scores.

6.15 Statistical analysis used in analysing the data

Data analysis can be undertaken using either parametric tests or non-parametric tests. The terms parametric and non-parametric refer to the two main categories of statistical procedures. The distinguishing feature between these two main categories is the underlying assumptions about the data to be analysed.

Traditionally the parametric tests can be performed only if the following assumptions (Zikmund, 1988, p 475; Siegel and Castellan, 1988, p 33; Puri, 1996, p 3) are met:

1. the data are interval- or ratio-scaled

2. the sample size is large
3. the data in the study are drawn from populations with normal (bell-shaped) distributions and / or normal sampling distribution
4. the selection of any firm (or respondent) is independent (i.e. the selection of any firm from the population to be included in the sample must not bias or affect the inclusion of any other firms)
5. when differences or measures of statistical association are being analysed between two or more samples, the variances (or standard deviations) of these samples do not differ significantly

As for the non-parametric tests, such stringent assumptions are not made. Furthermore Hollander and Wolfe (1973, p 1) and Siegel and Castellan (1988, pp 35-36) have stated that the interpretation of a non-parametric test is often more straightforward than the interpretation of parametric tests. In addition, the non-parametric tests have considerable advantages in terms of efficiency and validity when the assumption of normality is not satisfied and these tests are only slightly less efficient than parametric tests when the underlying population is normal (Lehmann and D'abrera, 1975, p viii; Hollander and Wolfe, 1973, p 1). Based on this discussion, it was decided to mainly use the non-parametric tests in performing the data analysis in this study.

However, authors (Hedderson, 1991, p 119; Puri, 1996, p 4) have emphasised that the parametric tests are usually robust techniques and therefore are unaffected by small deviations from the strict criteria mentioned above. Also, Bryman and Cramer (1999, p 59) have stated that there is a trend in the direction of the more liberal treatment of multiple-item scales as having the qualities of interval variables. In addition to this, many management accounting researchers (Shields, 1995; Guilding, 1999; Hoque, 2000; Hoque and James, 2000) have used the parametric test, multiple regression, even when the variables used were measured on an ordinal scale. Based on the above justification for the use of a parametric test, the multiple regression analysis was also used as an alternative

measure to test the hypotheses on the relationship between the dependent variable and the independent variables as this is a more powerful test. The justification for this is that there is no non-parametric counterpart. The general principle that has been applied for the statistical analysis is that where there is a non-parametric equivalent to the parametric test the non-parametric test has been used. However, where a non-parametric equivalent does not exist (i.e. only for the multiple regression analysis) the parametric test has been used.

6.16 Summary / Conclusion

This chapter provided a brief review of the literature relating to the theory of how knowledge is acquired (epistemology) and explained the factors that influence the alternative methodological approaches that are used in accounting research. The aim was to provide a detailed discussion on the reasons for the methodology adopted in conducting the current research. Next, the research problem was defined and the research objectives were identified. This was followed with the identification of the contingent variables and the relevant questions that were used to measure these variables. The different hypotheses that will be tested in chapter 8 were also summarised followed by a description of the sampling techniques that were used.

To achieve the aims of the study a postal questionnaire was used to gather the data. However, efforts were taken to reduce the inherent limitation, the low response rate, associated with the mail questionnaire survey. This was achieved by mailing a comprehensive covering letter together with the questionnaire and also requesting the recipients to answer only the areas relevant to them in the questionnaire. An effective 'progress chasing' through telephone calls, personal visits, e-mails and through contact persons was also carried out to increase response rates. Finally a pre-paid self-addressed envelope was included for the respondents to facilitate questionnaire return. Furthermore, conducting several pre-testing stages and a pilot study ensured the validity of the questionnaire.

Finally, the statistical tests that will be employed to analyse the data in the following two chapters were described.

Chapter 7

DATA ANALYSIS

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7.9.1 The frequency and importance of profitability analysis

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7.10 Summary / Conclusion

Chapter 7

DATA ANALYSIS

The aims of this chapter are as follows:

1. To provide a general description of the questionnaire responses;
2. To present the findings relating to the seven objectives listed in section 1.2 in chapter 1 (and repeated in section 6.5 of chapter 6).

Rather than presenting the findings in the order of the listed research objectives it was considered preferable to summarise the findings by systematically working through the questionnaire. Therefore, after the introduction, the chapter begins with presenting the important findings relating to section A. This is followed by the presentation of the findings for section B, and so on. Section 7.2 and 7.3 presents relevant information relating to the respondents and their companies. A brief summary of the responses relating to the major contingency factors is presented in section 7.4. Objectives 1 – 6 of the study listed in section 1.2 are addressed in the following sections:

- Section 7.5 – Production initiatives and the treatment of non-manufacturing costs in manufacturing organisations (Examines objective 4 - To investigate the treatment of non-manufacturing costs in manufacturing companies);
- Section 7.6 – Product/service cost information (Focuses on objective 1 - To examine the extent to which firms use a single database from which different costs are extracted for different purposes or whether separate databases are used for obtaining different cost information; Objective 2 - To investigate the level of sophistication of the cost system design maintained by Malaysian companies, and objective 5 - To examine the extent of usage of ABC systems in Malaysian companies);
- Section 7.7 - Relationship between internal (management) and external (financial) accounting information (Examines objective 3 - To investigate if a financial accounting mentality is prevalent in the Malaysian companies);
- Section 7.8 – Product/service cost information for decision-making (Examines objective 1 - To explore the extent to which different cost information is used for different purposes), and

- Section 7.9 – Profitability analysis (focuses on objective 6 - To examine the nature, content and role of product/service profitability analysis in the Malaysian companies).

The overriding objective of the study (to explore the influence of potential explanatory variables on the design of product costing systems in Malaysian companies using a contingency theory framework) will be addressed in the next chapter.

7.1 Introduction

As Drury and Tayles (2000) have commented, most of the previous product costing surveys have concentrated on manufacturing organisations only and these surveys have described rather than explained product-costing practices. Most of the surveys (except for Drury and Tayles, 2000; Bjornenak, 1997; Abernathy, 2001) conducted have also not analysed the relationship between the potential explanatory variables including the purposes for which the product/service cost information is used, and the cost system design (see chapter 5). Furthermore, the following issues relating to profitability analysis has only been examined in one previous study:

1. the importance of it as a guide in decision-making;
2. whether the product profitability analysis is used directly for decision-making or used as an attention-directing device to signal the need for special studies;
3. the types of costs used to analyse the product profitability.

Therefore this study aims to provide insights into these issues.

7.2 Details of the respondents

The respondents' details in terms of their location in the organisation, their post-qualifying details and their willingness to meet to discuss issues arising from the questionnaire were derived from Section A and the final section of the questionnaire. It was found that 38% of the respondents were located at the group head office and 19% at the divisional head office. The majority of the respondents (64%) had been qualified for more than 5 years. Only 12% were

not qualified accountants but they had long working experience with the organisation and were aware of their organisation's costing procedures. However, only 37% of the respondents were willing to meet to discuss the issues raised by the questionnaire but about 52% of them stated in the comments that they would like to receive a copy of the research findings. The reason that they were not willing to meet was because most of them were very busy with their work schedule. Nevertheless, the interest shown in receiving a copy of the research findings suggests that this research study may be of interest to them.

Responses (127) and non-responses (573) relating to the business sector, turnover and listing status of the companies were compared using the Mann-Whitney non-parametric test. The results (Appendix 3) of the tests showed that the null hypothesis could not be rejected at the 5% level [2-tailed p value: manufacturing (1.00); non-manufacturing including oil palm plantations (0.284); turnover (0.978); listing (0.152)] thus indicating that there was no evidence of response bias.

7.3 General company information

Table 7.1 shows that responses consist of 36% manufacturing, 48% non-manufacturing and 16% plantation and other companies. The annual sales turnover was used to measure the size of the company and the results showed that approximately 47% of the companies had an annual sales turnover of between RM50 million and RM150 million (approximately equivalent to £10 million-£30 million). Further analysis indicated that 85.8% of the companies were part of a group structure and, among these companies, approximately 34% reported that sales revenue comprised 0-5% of the total group turnover and a further 35% indicated that sales exceeded 30% of the total group turnover. The responses consisted of 65% companies listed in the Kuala Lumpur Stock Exchange (KLSE). Since the sample was made up of larger companies, the number of listed companies is significantly more than the unlisted companies. In terms of the ownership structure of the organisation and the location of the head office, it was found that 70% of the companies were

Malaysian owned and 30% of the responses had their head office located overseas.

Table 7.1: Information on the respondents' business sector and annual sales turnover - (Questions A1 and A5)

	Number of Cases (N)	Percentage (%)
<i>Business Sector</i>		
Manufacturing	46	36
Service	29	23
Financial & Commercial	11	8
Retail	9	7
Conglomerate	6	5
Wholesale	6	5
Other (including 7 plantation companies)	<u>20</u>	<u>16</u>
	<u>127</u>	<u>100</u>
<i>Average Turnover</i>		
Less than RM 150 million	59	47
RM 151m – RM 300m	21	17
RM 301 m – RM 450 m	12	9
RM 451m – RM 600 m	13	10
RM 601 m – RM 1200 m	10	8
RM 1201 m – RM 1800 m	5	4
Over RM 1800 m	<u>7</u>	<u>6</u>
	<u>127</u>	<u>100</u>

7.4 Product/service environment data

Section B of the questionnaire collected data relating mainly to the contingent factors that have been identified in chapter 4 as being the determinants of organisations' product costing systems. The questions in this section focussed on the number of products/services costed, volume diversity, product diversity and the competitive environment. The responses are presented within the copy of the final version of the questionnaire (shown in Appendix 1). The following sub-sections provide a brief summary of the responses.

7.4.1 Product/services marketed, product/volume diversity and the competitive environment

Writings (Kaplan 1984,1985; Johnson & Kaplan, 1987; Cooper & Kaplan, 1987) have shown that most organisations in the USA market many products, rather

than a single or few products typically assumed in many textbooks.

Organisations are experiencing a myriad of changes in the form of diversity and complexity of products, processes and services. The responses from this study show that there is considerable variation in the number of products/services costed in the Malaysian companies. The responses to Question B1 indicate that 55% of the companies cost 10 or fewer products or services over a typical year compared with 28% that cost over 40 products or services. Moreover, regarding the range of products/services marketed by the organisation, Question B3 indicates that about 31% of the companies dealt with products/services that are approximately 50% standardised and 50% customised. A further 21% are dealing with customised and highly customised products and 48% are concerned with standardised and highly standardised products/services. Furthermore about 50% of the respondents agreed or strongly agreed that the products/services marketed by their organisation are subject to product diversity (see Question B4 {a}) and volume diversity (see Question B4{c}). This is substantiated by the responses to Question B4{b} which indicate that about 50% of the respondents disagree that most of their products or services require similar resources to design, manufacture (provide) and distribute.

On the level of competition, responses from Questions B5-B7 show that 78% of the companies have faced high/extremely intensive competition for their products/services over the past 5years. A significant minority (30%) of the respondents considered that the customer preference for their product/service has been the same over the past five years whereas approximately 40% considered that the customer preference has become much harder to predict. The high level of competition faced by many organisations and the changing customer preferences suggests that there may be a need for more accurate costing systems to have a competitive advantage.

7.4.2 Cost structures

The response to Question B8 merits a more detailed discussion. This question requested details relating to the cost structure of the responding organisation. The results are presented in Table 7.2. Johnson and Kaplan (1987) have

stressed that with the prevailing improvement in technology and the increase in mechanisation, indirect costs as a percentage of total costs have increased and direct labour costs have decreased. Given this changing cost structure they have argued that for many overhead costs direct labour-based allocation methods are inappropriate. They also argue that most of the service company costs are fixed in the short-term and indirect as compared to manufacturing companies, which can trace direct material and labour costs to individual products. They stress that the indirect costs are of a much smaller proportion of total costs for manufacturing companies (refer to section 4.4.5).

An analysis of the cost structure of Malaysian companies (Table 7.2) shows that, for the manufacturing organisations the average figures as a percentage of total costs are:

Direct materials	65%
Direct labour	11%
Direct non-manufacturing costs	10%
Indirect costs	14%

Similar surveys of manufacturing companies undertaken by Drury *et al* (1993) in the UK, Joye and Blayney (1990) in Australia, Green and Amenkhienan (1992) in the USA, Kerrimans *et al* (1991) in Belgium revealed that the direct cost averaged about 75% and the indirect cost about 25% of the total manufacturing costs. This highlights the fact that manufacturing companies still have a higher percentage of direct costs, as compared to the indirect costs, and suggests that the assertions made by Johnson and Kaplan (1987) that indirect costs are now the dominant costs may have been overstated.

An analysis of the cost structure of Malaysian non-manufacturing companies indicated that direct costs averaged 71% and indirect costs 29% of total costs. The Mann-Whitney test was applied to see if there was a significant difference in the cost structure between manufacturing and non-manufacturing companies. The non-manufacturing companies consisted of service, financial and commercial, retail and wholesale companies. The results showed that

there was a significant difference in the cost structure between manufacturing and non-manufacturing companies (p values: direct costs [0.009]; indirect costs [0.024]). It can also be seen from Table 7.2 that all the different categories of non-manufacturing organisations have similar cost structures. The null hypothesis was tested using the Kruskal-Wallis non-parametric test and the results revealed that there was no significant difference in the cost structures between the three different categories of non-manufacturing companies at the 5% level (p value: direct costs (0.808); indirect costs (0.706);).

The recent survey findings by Drury and Tayles (2000) on the cost structure of UK companies revealed that manufacturing and non-manufacturing companies excluding financial and commercial companies, had quite similar direct and indirect cost structure averaging around 70% for direct costs and 30% for indirect costs. However their findings showed that there was a significant difference in cost structures between financial and commercial organisations and the remaining organisations at the 5% level.

This implies that the cost structure of financial and commercial organisations are different from the manufacturing organisations, in that, they have higher indirect costs as compared to their direct cost proportion.

Table 7.2 : Analysis of cost structures by business sectors (% of total costs) - Question B8

<i>Cost Structure of firm:</i>				
Business Type	% Av.Direct Costs	% Std Deviation	% Av. Ind.Costs	% Std Deviation
Manufacturing (N=46) ^a	86	8.57	14	8.57
Service (N=29)	67	23.55	33	23.55
Financial & Commercial (N=11)	77	10.79	23	10.79
Retail (N=9)	68	27.06	32	27.06
Conglomerate (N=6)	85	12.19	15	12.19
Wholesale (N=6)	73	22.51	27	22.51
Other (N=20) ^b	72	23.17	28	23.17

Note:

^a Manufacturing Organisation : Average costs - Direct Materials 65%; Direct Labour 11%; Direct Non-manufacturing costs 10%; Indirect Costs 14%;

^b 7 plantation companies : Average costs - Direct costs 78%; Indirect costs 22%;

7.5 Production initiatives and treatment of non-manufacturing costs in manufacturing organisations

Section C of the questionnaire contains two questions that are specific to manufacturing organisations. The responses to Question C1 were used to provide information on the extent of JIT and lean production initiatives, one of the contingent factors (see Table 6.3 in chapter 6). The responses indicate that more than 50% of the manufacturing organisations have adopted lean production initiatives such as reduced set-up times and following a just-in-time system for the materials.

Question C2 relates to the fifth objective of the study listed in section 1.1 of Chapter 1 (i.e. to investigate the treatment of non-manufacturing costs in manufacturing organisations). The responses to Question C2 are summarised in Table 7.3. This table indicates that approximately 50% of the companies do not allocate selling, distribution and administration costs to their products. They allocate only the manufacturing stock valuation costs to the products. Where non-manufacturing costs are allocated most of the companies use product

sales revenues as the basis of allocation. Only a small proportion of companies allocated non-manufacturing costs using cause-and-effect cost drivers. The majority of the firms used arbitrary allocation bases for assigning the non-manufacturing costs to products. Among the firms that responded to allocating non-manufacturing costs to products, it is observed that:

- 24 firms (96%) were using arbitrary allocation bases for allocating the selling costs, while only 1 firm (4%) used cause-and-effect allocation bases;
- 21 firms (72%) were using the arbitrary allocation bases for allocating the distribution costs, while 8 firms (28%) were using cause-and-effect allocation bases;
- 15 firms (83%) were using arbitrary allocation bases for allocating the administration costs, while 3 firms (17%) were using cause-and-effect allocation bases.

The above listing extracted from Table 7.3 provides some support for Johnson and Kaplan's (1987) assertion (chapter 2, section 2.5) relating to the existence of a financial accounting mentality since approximately 50% of the majority of manufacturing companies appear to be using stock valuation costs for decision-making.

Table 7.3: Treatment of non-manufacturing costs - (Question C2)

	Selling Costs(N=56)	Distribution Costs(N=55)	Administration Costs(N=56)
	%	%	%
Not allocated to products	55.4	47.3	67.9
Allocated on basis of manufacturing cost of each product	7.1	12.7	10.7
Allocated on the basis of selling price of each product	33.9	23.6	12.5
Cost driver identified for each type of non-manufacturing cost	1.8	14.5	5.4
Other	1.8	1.8	3.6

7.6 Product/service cost system information

Information on the product/service cost system was collected from Section D of the questionnaire. Questions D2 relates to the first objective listed in section 1.2 of chapter 1. This question examined whether a single database or separate databases were used for extracting cost information for decision-making. The remaining questions relate to the level of sophistication of the product costing system (including ABC). Investigating the level of sophistication of the design of product costing systems and the extent of ABC usage in Malaysian companies are two of the objectives listed in section 1.2 in Chapter 1. These issues are examined in the following sub-sections.

7.6.1 The use of single or separate databases for stock valuation and decision-making

It was stated in chapter 4 (section 4.5), that the cost information requirement varies with the purpose for which the cost information is used. It was noted that the accuracy of the cost information was different for stock valuation and decision-making purposes, the latter needing a more accurate cost information. The different accuracy requirements can be dealt with by maintaining separate cost databases for decision-making and stock valuation.

The need to have more than one cost system to cater for the different needs of the product/service cost information was discussed by both Kaplan (1988) and Cooper (1988). Questions D1 and D2 were used to identify the number of manufacturing companies that need a cost accumulation system for stock valuation purposes. The total number of responses to Questions D1 and D2 were 120 and 121 respectively. However Question A1 indicated that there are only 46 manufacturing companies and also Section C of the questionnaire devoted to manufacturing concerns only, showed about 55 responses. The discrepancy in the number of responses for Questions A1 and Section C may be due to the responses 'other' in Question A1. These respondents may be involved in some form of manufacturing and therefore may have answered Section C. Furthermore the higher number of responses for Question D1 indicating the significance of stock valuation could have been due to many of

the respondents to D1 and D2 (e.g. retailers and wholesalers) carrying purchased stocks and the purchase price representing stock valuation. Such responding companies will not need a cost accumulation system for assigning indirect costs for stock valuation purposes. Thus stock valuations will consist of only direct costs and all direct costs will be accurately traced with either simplistic or sophisticated systems. Also all direct costs are likely to be relevant for decision-making. Therefore these non-manufacturing companies are unlikely to require separate systems for stock valuation and decision-making.

Because the need for different cost systems is likely to be applicable to manufacturing companies, only the 46 manufacturing companies, as indicated in Question A1 (Table 7.2) were used to analyse the responses to Questions D2.

The survey findings (see Question D2 in Appendix 1) indicated that out of the 46 manufacturing firms, 31 (67%) of the companies used a single cost database that was used for both stock valuation and decision-making. Among these 31 firms, 48% (15 firms) were not adjusting the costs extracted from this single cost database for decision-making. However the other 52% (16 firms) maintained a single database but adjusted the information extracted for decision-making purposes. Therefore, although these companies used a single database, flexibility was applied in extracting the data to cater for the different needs. A further 12 manufacturing organisations (26%) that assigned costs for stock valuation maintained separate databases for stock valuation and decision-making. The remaining 3 firms (7%) responded as 'other' and did not provide any details.

The above analysis highlights that 28 of the manufacturing firms (61%) are either using separate databases, or are extracting information from a single data base, which is further adjusted for its purpose and this suggests that many manufacturing firms do use different cost information for inventory valuation and decision-making.

The Kruskal-Wallis test was applied to see if the size of the firms had any influence on the number of data bases maintained. The size of the firms was measured based on the turnover of the firms. The 7-point Likert scale for the turnover was classified into the following three categories:

Turnover of less than RM 150m : small firms

Turnover of RM 151m - RM 600m : medium firms

Turnover of over RM 600m : large firms

The results showed that there was no significant relationship between the size of firm and the number of cost databases maintained (chi-square value:0.610; p-value:0.737).

7.6.2 Number of cost pools and the different types of cost drivers used

Question D5 aimed to provide some insights into the sophistication of the costing systems in terms of assigning indirect costs and also the extent to which direct costing is used. The responses to Question D5 (N=124) on the accumulation and assignment of indirect costs to products or services show that 22% of the organisations operate a direct costing system and assign only direct costs to products or services. Only 9 (7.2%) of the respondents have indicated that they are using the most sophisticated approach specified in Question D5 for indirect cost assignment and desegregating the departments into cost centres and establishing separate cost centre overhead rates. Departmental overhead rates were used by 55% of the respondents. As there are variations in the indirect cost accumulation and assignment procedures of the firms, the relationship of the explanatory variables with the accumulation and the assignment procedures listed in Question D5 will be investigated in the following chapter (see chapter 8, section 8.10).

Question D6 focused on the number of cost pools that organisations used in the first stage of the overhead assignment process. The responses to this question indicate that the majority of the organisations are using relatively unsophisticated costing systems that may not accurately assign indirect costs to products or services. The number of cost pools and second stage cost

drivers employed is used to determine the sophistication of the indirect cost assignment system. Referring to sections 4.6.1 and 4.6.2, it was observed that there is a need to have more cost pools and cost drivers to enhance the accuracy of the reported product or service costs. Based on the responses to Question D6 it is apparent that 59% of the companies use less than 6 cost pools and only 7% of them use more than 20 cost pools. About 16% (18 respondents) stated that they were using a single cost pool and hence a single (blanket) overhead absorption rate. In other words, they were using a very unsophisticated costing system and not applying the two stage assignment procedure for indirect costs. This is consistent with the responses to Question D5, whereby 18 respondents (14.4%) also have pointed out that a single overhead rate was established for the whole of the business unit.

The current findings indicate that the percentage usage of blanket overhead rate is lower as compared to the previous studies (refer to chapter 5, section 5.5) conducted in the USA, UK, Ireland, Australia and India. However it is higher than the Scandinavian and the Greek studies and also the latest UK study by Drury and Tayles (2000). It is interesting to note that 16% of the large companies while 30% of the smaller companies studied by Drury *et al* (1993) had used a blanket rate. A frequency distribution of the 18 firms using the blanket rate (Question D5 {1}) in this study showed the following results based on the size of the firms (as categorised above):

- Less than RM150m :72% ;
- RM151m - RM 600m :11% ;
- More than RM600m : 17%;

This suggests that the majority of the Malaysian firms using the single rate are small firms. This finding is consistent with Drury *et al*'s (1993) findings, whereby the usage of blanket rates were higher in smaller firms as compared to larger firms. As was noted in chapter 5, section 5.6, other studies (Davies and Sweeting, 1993; Drury and Tayles, 1996; Joshi, 1998; Cobb *et al*, 1992) showed that the size of firms did have an influence on the choice of the cost system.

As for the overhead recovery rates used, the responses to Question D7 indicate that 36% of the 110 firms responding are using a single cost driver (i.e. only one type of overhead recovery rate). Also 76% are using less than 4 different types of recovery rates. Only 6.3% of the companies are using more than 6 different types of cost drivers. Kaplan and Cooper (1998, p 15) 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. According to Kaplan and Cooper (1998), a simple ABC system is one that has 30-50 cost pools and many second stage cost drivers.

Therefore a cross tabulation of the number of cost pools by the number of second stage cost drivers (see Table 7.4) was used to see if the respondents using higher number of cost pools were also using a higher number of second stage cost drivers. The aim was to provide further insights relating to the sophistication of the respondents' cost systems.

Table 7.4: Cross tabulation of the number of cost pools by the number of different types of cost drivers - (Questions D6 and D7)

		Number of different types of Overhead Recovery Rates						
	1	2	3	4	5	7-10	Over 10	Total
Number of Cost Pools								
1	18							18
2-3		8	4					12
4-5	12	8	11	1	3			35
6-10	6	4	4	2	8	2		26
11-20	1	2	1	1	3	1	2	11
21-30	1	2	1	1				5
31-50	1					1		2
Over 50						1		1
Total	39	24	21	5	14	5	2	110

From the Table 7.4 it can be seen that 19 firms are using more than 10 cost pools. Amongst these firms, only 8 firms are using more than 4 cost drivers. Although the information presented in Table 7.4 suggests that the majority of firms use a small number of cost pools and a small number of different types of

cost drivers it should be noted (Drury and Tayles, 2000) that such unsophisticated systems may not report inaccurate costs in organisations where indirect costs are insignificant. Therefore the influence of the cost structure of the firm on the sophistication of the cost system design will be examined in the following chapter (refer to section 8. 4).

The responses to Question D8 are summarised in Table 7.5. This table shows the average usage rates for the different categories of overhead rates used by the 77 responding companies. The highest average usage rate was for direct labour-based methods, being 34%. Thus, direct labour continues to be the predominant method despite the strong criticisms by Kaplan and Cooper on the use of such rates in situations where direct labour constitutes a small proportion of the total cost structure. In this study it was found that direct labour makes up only about 10% of the total cost structure (Refer to Question B8 in the Questionnaire - Appendix 1). Table 7.5 also indicates that the average usage for activity-based overhead rates was 11%. The average usage rate for rates other than those specified in Table 7.5 was 9%. Within this category all of the respondents specified that they arbitrarily apportioned the indirect costs to products/services on the turnover basis.

Table 7.5: Average percentage usage of overhead rates - (Question D8)

<i>Overhead rates:</i>	<i>Average percentage usage by all firms (N=77)</i>
1. Direct labour cost based rate	10.0
2. Direct labour hour based rate	24.0
3. Machine hour based rate	11.0
4. Material cost based rate	14.0
5. Units produced based rate	16.0
6. Production time based rate	5.0
7. Activity based rates	11.0
8. Other	9.0
Total	100.0

7.6.3 Respondents views on their satisfaction and accuracy of the costing systems

The responses from Questions D5 – D8 suggest that the majority of the firms are using volume based labour rates and unsophisticated cost assignment systems and thus such costs assigned may not be sufficiently accurate for providing attention-directing information or information that is used directly for decision-making. Despite the observed unsophisticated costing systems only a small proportion of the respondents were dissatisfied with their costing systems, or considered that the system did not accurately assign costs to products or services. Questions D9 and D10 attempted to collect information on the accuracy and satisfaction of the cost system design for decision-making purposes. A 7-point Likert scale (1- Not very accurate to 7- Extremely accurate) was used and the mean score for accuracy was 4.91 with a standard deviation of 1.11 and for satisfaction 5.01 with a standard deviation of 1.22. The 'Not applicable N/A' responses were excluded from this analysis.

Table 7.6 reports the results of the mean responses and the strength of opinion on accuracy and satisfaction by displaying the % rating with the two strongest scores at either end of the scale. From this analysis it is observed that generally the organisations were satisfied with their cost systems and considered that their cost systems accurately assigned costs to products/services. It should be noted, however, that the respondents may be responsible for designing or redesigning costing systems. Therefore they may be reluctant to indicate that their costing systems are inaccurate. Hence the accuracy /satisfaction in costs may be overstated.

Table 7.6: Respondents' views on the accuracy of the cost system and the satisfaction with the accuracy of the cost system- (Questions D9 and D10)

	N	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
Rating for Accuracy	101	4.91	1.11	2.0	36.7
Rating for Satisfaction	99	5.01	1.22	3.0	44.4

The Mann-Whitney test was used to ascertain if the satisfaction and the accuracy levels are the same for all of the potential combinations described in Question D2 (i.e. respondents using the same cost database with and without adjustment for stock valuation and decision-making and respondents using separate cost databases for the two purposes). All the results (p-values more than 0.05) indicated that there is no difference in the satisfaction or accuracy level for firms having a single database or separate databases. The analysis suggests that firms having a single data base, with no subsequent adjustment for decision making consider that the cost information for their financial accounting stock valuation needs as being suitable and accurate for decision-making purposes also. Given the above findings that most costing systems appear to be very unsophisticated the findings suggest that a financial accounting mentality may exist in these firms.

Overall the responses to Questions D9 and D10 are not consistent with Drury and Tayles' (2000) finding whereby a significant number of their respondents considered that their cost systems were not particularly accurate or satisfactory for decision-making although the number of second stage cost drivers used were quite similar to this study. This may reflect the wider publicity given in the UK to the criticisms of traditional costing systems and claim that such systems report distorted product costs.

7.6.4 Activity-based costing usage

The fifth objective listed in chapter 1 (section 1.2) was to examine the extent to which Malaysian companies use ABC systems. Question D11 collected data on the organisation's experience with activity-based costing (ABC) and the sub-sections in this question analysed the experience into the following categories as shown in Table 7.7: -

1. ABC Adopters
2. ABC Implementation Being Considered
3. Interest Shown for ABC
4. Partial Implementation
5. Rejecting ABC

Table 7.7: Categorisation of firms based on their experience with Activity-Based Costing - (Question D11)

<i>Question</i>	<i>Assertion</i>	<i>Analysis into Category</i>
D11 (1)	Currently using ABC to cost products/services	ABC Adopters
D11(2) D11(3)	Intending to use ABC to cost products/services Currently investigating using ABC to cost products/services	ABC Implementation being considered
D11(4)	Intending to investigate using ABC to cost products/services	Interest shown for ABC
D11(5)	Rejecting ABC, but established a system of activity analysis or cost driver analysis	Partial Implementation
D11(6) D11(7) D11 (Voluntary Response)	Implemented ABC and subsequently abandoned it Investigated using ABC and rejected it Not Using	Rejecting ABC

Table 7.8 shows that only 6.5% of all the organisations in this study have adopted ABC for product costing. This was identified based on the first categorisation shown in Table 7.7. A further 11% of the firms have adopted a partial system of ABC involving activity or cost driver analysis. This implies that these organisations may be using ABC only for cost management purposes. It is also apparent from Table 7.8 that the financial and commercial firms have a higher percentage of ABC adoption as compared to the manufacturing and the service organisations. In contrast to the literature on service industries being more suitable candidates for ABC usage (refer to chapter 4, section 4.7.6), the manufacturing organisations in this study showed a slightly higher adoption rate compared with the service organisations. It was also found that 29% (N=36) of the total 123 respondents volunteered information on the non-usage of the ABC system as the question did not provide for a non-usage subsection.

Of these 36 voluntary responses, about 30% of the respondents stated that they are not using ABC because they considered that their current costing

systems were satisfactory. However, approximately 20% indicated that they were not aware of an ABC system and about 15% of them stated that they did not have the expertise to install an ABC system. The remaining 35% of the 36 non-users did not provide any reasons. Nevertheless, the survey findings do show that companies are interested (as categorised in the 3rd row of Table 7.7) in ABC as 33% of the total respondents wish to investigate using ABC. This is similar to previous survey findings (chapter 5, section 5.6), which indicate the interest in ABC amongst the organisations studied.

It can be seen from Table 7.8 that there is a high adoption rate, about 37.5% amongst the financial and commercial companies. The adoption rate for manufacturing companies is only 4% and for the service companies it is only 3%. However when the service, financial and commercial companies are combined it is noted that 11% of this combination of industries are adopters of ABC. Generally it is seen from the findings that ABC adoption is poor for most of the business sectors except for organisations in the financial and commercial sector. Among the 7 plantation companies answering this question, none of them were ABC adopters. However 5 out of these 7 companies stated that 'ABC implementation is being considered' (as shown in the 2nd row of Table 7.7).

Table 7.8: Organisations' experience with Activity-Based Costing (Question A1 and D11)

	ABC Adopted	Partial Implementation	ABC Implementation being considered	Rejecting ABC	Interest to Investigate ABC
Manufacturing N=46	4.3	17.4	17.4	30.5	30.4
Service ¹ N=29	3.4	10.4	17.3	34.4	34.5
Financial & Commercial ¹ N=8	37.5	12.5	12.5	-	37.5
Retail N=9	-	-	33.4	22.2	44.4
Conglomerate N=6	-	16.7		50.0	33.3
Wholesale N=6	-	-	16.7	66.6	16.7
Others ² N= 19	10.5	-	15.9	36.8	36.8
All Respondents N= 123	6.5	10.6	17.1	32.5	33.3

- 1- The Service and Financial & Commercial companies combined showed an adoption rate of 11%.
- 2- Out of the 19 'others', 7 of the respondents are from the plantation companies. Out of these 7 companies, 5 of them are considering using ABC system, while 2 of them are not using the ABC system.

7.7 Relationship between internal (management) and external (financial) accounting information

This section focuses on the third objective listed in section 1.2 (see chapter 1) – to investigate if a financial accounting mentality is prevalent in the Malaysian companies. The criticism by Kaplan (1984) that the internal management accounting function has become subservient to the external financial reporting function in US firms has brought about much interest among researchers even outside the US. Furthermore, Johnson and Kaplan's (1987) criticisms of the dominance of financial accounting over management accounting have created the need for empirical evidence to support or refute their comments. Studies by Drury *et al* (1993) in the UK and Emore and Ness (1991) in the USA revealed that firms do use stock valuation information produced for financial accounting directly for decision-making purposes. Other studies undertaken in Finland

(Granlund and Lukka, 1997), Sweden (Ask and Ax, 1992) and the UK (Friedman and Lyne, 1995) have indicated a preference by firms for having a single cost system that can be used for both financial accounting and management accounting purposes. However Hopper *et al's* (1992) pilot study and Joseph *et al's* (1996) study showed that there was no clear indication of financial accounting dominating management accounting (refer to chapter 5, section 5.7).

Bruns *et al* (1996) state that it is possible for financial and management accounting information to be recorded in a single database provided that the data is selected, analysed, aggregated and reported according to the needs of the information. Based on an examination of the number of cost databases used in this study, it was pointed out in section 7.6.1 that 31 out of the 46 manufacturing companies were using a single database. Further analysis indicated that 15 of the 31 firms (i.e. 33% of all manufacturing firms) were not adjusting the information extracted for decision-making. This implies that these firms were using financial accounting information directly for decision-making. However 16 of the 31 single database firms (i.e. 35% of all manufacturing firms) adjusted the information extracted from the single database for decision-making purposes thus implying that financial accounting information is not being used directly for decision-making. The term 'adjusting the information that is extracted from a single database' must be interpreted with caution since it is possible that stock valuation costs are used with non-manufacturing costs added or that some of the manufacturing fixed costs are 'stripped out' for decision-making purposes. Finally, 32% of all manufacturing firms used separate databases for stock valuation and decision-making thus implying that different information was accumulated for stock valuation and decision-making.

The questions in Section E of the questionnaire were used to derive additional insights into the relationship between the information that is used for financial and management accounting. Questions E1 and E2 sought to examine the relationship between product costs used for stock valuation and product costs used for decision-making. Therefore these questions were applicable only to the 46 responses from manufacturing companies.

Table 7.9 shows the responses of the 46 manufacturing firms (refer to section 7.6.1) for Questions E1 and E2 (on a 7-point Likert scale with 1 being 'Strongly disagree' and 7 being 'Strongly agree'). The results showed that the mean for Question E1 is 3.65 with 28.2% of the respondents specifying a score of 1 or 2 and 19.5% a score of 6 or 7. The mean for Question E2 is 2.93 with 41.3% of the respondents specifying a score of 1 or 2 and 6.5% a score of 6 or 7. However the Mann-Whitney test performed showed that there is no significant difference (p-value: >0.05) in the responses to Questions E1 and E2, between the firms maintaining a single cost database and firms maintaining separate databases. Given that the mean scores for both questions were less than the mid-point of the 7-point scale (4 = neither agree nor disagree) and towards the disagreement end of the scale the responses, generally, do not provide evidence to support the existence of a financial accounting mentality in the manufacturing organisations.

Table 7.9: Responses from manufacturing firms to Questions E1 and E2

	N	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
E1. The need to produce product cost information to meet financial accounting stock valuation requirements dominates the need to produce product cost information for decision making purposes in your organisation	46	3.65	1.80	28.2	19.5
E2. The product costing system used for decision making is designed mainly to provide information for published external financial accounting statements	46	2.93	1.57	41.3	6.5

7.7.1 Respondents' opinions on the relationship between internal and external accounting

The remaining questions in Section E focus on more general questions that seek to examine the relationship between financial and management accounting rather than being specific to manufacturing organisations. Therefore all of the questionnaire replies are used to analyse the responses to the questions in this section. E4 had 8 sub-sections and the respondents were

requested to indicate their opinions on the general relationship between internal and external accounting on a 7-point Likert scale of 1(Strongly disagree) to 7(Strongly agree). The responses from row (a) in Table 7.10 reveal a mean score (4.53) above the mid-point with 25.9% scoring 6 and 7 (Strongly Agree), as compared to 11% scoring 1 and 2 (Strongly Disagree), to the statement that 'external financial accounting standards do have an influence on management decisions'. The mean score was 4.26 with 24.2% scoring 6 and 7 (Strongly Agree) and 18.1% scoring 1 and 2 (Strongly Disagree) for the assertion in row (b) that internal accounting systems are designed primarily to provide information for published financial statements. The responses for these two assertions indicate the possibility of a financial accounting mentality being prevalent in many Malaysian companies. These findings contrast with Joseph *et al*'s findings, which showed that there was stronger disagreement to the above two assertions. The contrasting findings between the current Malaysian study and Joseph *et al*'s study may be due to the difference in the respondents' roles in both these studies. As was mentioned in chapter 6, section 6.9, the respondents in this study were fulfilling both financial and management accounting roles whereas Joseph *et al*'s study focussed on CIMA members who are more likely to be employed solely within the management accounting function.

However, it should be noted that the mean scores were around the mid-point of the 7-point scale on the suggestions that external auditors have significant influence on companies' choices of internal accounting policies (row c) and on the design of internal accounting systems (row d). Both these assertions had a 29.6% and 27.5% respectively scoring at 1 and 2 (Strongly Disagree) and 10.4% and 8.6% respectively scoring at 6 and 7 (Strongly Agree) indicating the tendency towards the disagreement side. These findings are similar to Joseph *et al*'s study.

On the influence of external financial reporting on external users (row e) the mean score was 4.49 indicating some agreement to the proposal that companies can influence the market perception of their financial performance and position through their choice of accounting policies. On the other hand, the

mean score of 2.97 with 46.5% scoring 1 and 2 (Strongly Disagree) and 9.5% scoring 6 and 7 (Strongly Agree) suggests there tends to be fairly strong disagreement (row f) to the assertion that companies on occasions change their accounting policies simply to influence stock market perceptions of their performance. Interviews relating to this statement with approximately 15 respondents indicated that it was considered to be against the Government policy enforced through provisions of the Malaysian Companies' Act and Income Tax Act and also through regulatory bodies such as the Securities Commission and the Kuala Lumpur Stock Exchange (KLSE), to alter their accounting policies just to influence the stock market perception. In Malaysia the KLSE plays a vital role in the monitoring of public listed companies *vis-a-vis* the listing requirements. Companies are now required to have quarterly reporting of financial statements which are available to the public through the KLSE website. Financial reporting, disclosures and corporate governance are closely monitored for compliance by KLSE and any non-compliance are imposed with severe penalties or even suspension (The Accountants' Manual, 1998).

Furthermore the mean score of 4.25 (row g) to the assertion that investors can usually see through attempts to use accounting policies simply to improve the published financial statements shows that there is some agreement by the respondents to this statement. The responses to the assertion that companies on occasions change their accounting policies simply to influence stock market perceptions of performance (row f) shows a mean of 2.97 indicating a strong disagreement. This suggests that the respondents tend to consider that since investors can usually see through attempts to use accounting policies simply to improve the published financial statements it is not in the interests of the responding companies to manipulate accounting policies to influence stock market perceptions of performance. The results from rows (f) and (g) suggest that the respondents consider that companies do not manipulate accounting policies to influence stock market perceptions of performance although they tend to agree (row e) that accounting policies can influence the market perception of companies. This may be due to the presence of the Malaysian

Acts and the regulatory controls or that they do not want to admit to unethical practices.

Finally, the strongest agreement rating mean score of 5.02 with 40.9% scoring 6 and 7 (Strongly Agree) and 9.5% scoring 1 and 2 (Strongly Disagree) related to the statement that management decisions to allocate resources to particular activities are based primarily on internal accounting reports (see row h). These responses would seem to support the view that management accounting is not subservient to financial accounting. However, it is possible that internal accounting reports may still be based primarily on information required for external financial reporting even though the responses to this question may give the illusion that management accounting is not subservient to financial accounting. In other words, the responses may simply measure the success with which external requirements have become integrated with information gathering and reporting within organisations, and part of management thinking on appropriate information for decisions (Burns *et al*, 1992)

The validity check using the principal component analysis showed that the 8 items loaded on to three factors. Question E4h was recoded because high scores for questions E4 (a,b,c,d,e,f,g) support the financial accounting mentality whereas the reverse applies with question E4h. The factor loadings were rotated using the varimax rotation. Three main factors accounting for about 63% of the total variance were extracted. This factor analysis indicates that similar responses were made on the relationship between internal accounting, published financial statements, and decision making in respect of the following three factors : -

- a) external standards and internal reports {Questions (a,b,c,d,and e)}
- b) influence of accounting policies on the financial performance{Questions (f and g)}
- c) management decisions and internal reports (Question h)

Factor 1(external standards and internal reports) with 5 items explains 33.26% of the total variance. Furthermore the reliability test showed that there is a high Cronbach Alpha of 0.7210.This implies the internal consistency of the five measures E4 (a,b,c,d,e). As for factor 2 the reliability test showed a very low

Cronbach alpha of 0.1121 implying that the two questions are not measuring the same construct.

The findings are quite similar to the findings of Joseph *et al* (1996) except for the assertion that companies on occasions change their accounting policies to influence stock market perceptions of performance where there was stronger agreement by their respondents. The contrasting findings on this assertion may be due to the effect of the regulatory controls present in the Malaysian environment.

Table 7.10: Relationship between internal accounting and published external financial statements - (Question E4)

	N	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
a) Externally imposed accounting standards for published financial statements influence management decisions	127	4.53	1.53	11.0	25.9
b) Internal accounting systems are designed primarily to provide information for published financial statements	127	4.26	1.64	18.1	24.2
c) External auditors have significant influence on companies' choices of internal accounting policies	125	3.56	1.60	29.6	10.4
d) External auditors have considerable influence on the design of internal accounting systems	127	3.65	1.49	27.5	8.6
e) Companies can influence the market perception of their financial performance and position through their choice of accounting policies	126	4.49	1.58	12.7	26.2
f) Companies on occasions change their accounting policies simply to influence stock market perceptions of performance	127	2.97	1.78	46.5	9.4
g) Investors can usually see through attempts to use accounting simply to improve the published financial statements	127	4.25	1.57	15.0	22.8
h) Management decisions to allocate resources to particular activities are based primarily on internal accounting reports	127	5.02	1.44	9.5	40.9

7.7.2 Integration of internal and external accounting reports

Question E5 (a & b) were incorporated to gather information relating to (a) the integration of the company's internal and external accounting reports and (b) the integration of the data capture systems used to provide information for external and internal accounting reports. A 7-point Likert scale was used with 1 as 'Totally Integrated' and 7 as 'Totally Independent'. About 60% of the

respondents answered more towards integrated for both the questions. Table 7.11 shows the general tendency towards the integrated side of the scale (i.e. 1 or 2) for both the questions (mean = 2.99 for E5a and 2.96 for E5b). The Spearman's Rank Order Correlation administered on the responses for these two questions indicated a significant (p-value of 0.000) and a high positive correlation of 0.734 thus concluding that integrated published financial statements and internal accounting reports are associated with integrated data capture systems for external and internal reports.

Table 7.11: Extent of integration of the internal and external information system (Question E5)

Extent of integration of the organisation's:

	N	Mean	Standard Deviation	% 1 or 2	% 6 or 7
a) Published financial statements and internal accounting reports	127	2.99	1.63	43.3	7.8
b) Data capture systems used to provide information for preparing the published financial statements and the management reports	127	2.96	1.63	44.1	8.7

7.7.3 Influence of group accounting rules

Question E3 was used to collect data on the influence of group accounting rules on the internal and external accounting policies. As Joseph *et al* (1996) stated, the reason for including these questions was to check on Hopper *et al's* (1992) pilot study findings that personnel in group head offices encouraged organisational units to devise their own systems.

Table 7.12 presents the responses excluding the responses, which were not part of a group with separate accounting units. It can be seen that 89.0% consider that group accounting rules do influence the design of the internal accounting systems while 85.0% indicated that accounting policies followed in the published external financial statements are determined by group accounting

rules. In relation to Malaysian companies these findings confirm Joseph *et al* (1996) findings and do not support Hopper *et al*'s (1992) report.

Table 7.12: Influence of group accounting rules on the internal and external accounting systems - (Question E3)

	Number of Cases (N)	%
b) Group accounting rules determine both internal accounting systems and the accounting policies followed in the published external financial statements	80	74.0
c) Group accounting rules determine internal accounting systems but not the accounting policies followed in the published external financial statements	16	15.0
d) Group accounting rules determine the accounting policies followed in the published external financial statements, but not the internal accounting systems	12	11.0
	108	100

7.7.4 Influence of external accounting standards on internal accounting systems

Question E6 examined the effect of externally imposed accounting standards on the internal systems operated within the organisation. Table 7.13 shows the two strongest scores at either end of the 7-point scale (1- Never and 7- Frequently). The results show a mean score of more than 3.7 for all three assertions implying that there are mixed responses to the opinion on the influence of externally imposed accounting standards on the company's internal information systems, contents of reports to top management and decisions taken in the company. A correlation matrix also showed that there is very significant (p-value:0.000) high positive correlation (+ 0.68 between E6a and E6b; +0.645 between E6a and E6c; +0.672 between E6b and E6c) between the responses of the subsections. However the means are close to the mid-point of the 7-point scale thus providing insufficient evidence to support or refute any of the statements.

Table 7.13: Influence of externally imposed accounting standards on management accounting - (Question E6)

Frequency with which externally imposed accounting standards lead to changes in:

	N	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
Your company's internal information system	127	3.88	1.38	16.5	10.2
The content of reports to top management	127	3.76	1.52	24.1	11.8
Decisions taken in your company	125	3.93	1.51	16.8	13.6

7.7.5 An overview of the responses relating to the relationship between internal and external accounting

The findings from this section on the relationship between financial accounting and management accounting, within a Malaysian environment, have disclosed mixed opinions. There is no clear evidence of the general belief that financial accounting needs dominate management accounting needs. The extent of integration of internal and external reports and the data capture systems (see Question E5a and E5b) suggests that financial accounting may influence management accounting decision-making. The responses to these questions and Question E3 (influence of group accounting rules) also suggest that organisations prefer to integrate their financial and management accounting systems.

The tendency towards supporting the statement in Question E4 row (a) on external accounting standards having an influence on management decisions differs with the responses to Question E6 which shows a tendency towards the influence of the externally imposed accounting standards on the internal management systems. These contradicting responses do not allow generalisations to be made on the influence of external financial accounting standards on internal management systems.

The relatively strong agreement to Question E4 (h) on the management decisions to allocate resources based on internal accounting reports suggests that the respondents consider that external accounting does not dominate internal decision-making. Nevertheless, the high agreement scores to Question E4 (rows a, b and e) do point out that financial accounting does have an influence on the management accounting system.

Overall the very mixed responses to most of the questions in this Section do show that there is a 50/50 agreement to the dominance of internal accounting on external accounting. However this may be true for some companies and not for others.

7.7.6 An analysis of the responses by listed and unlisted companies

The Mann-Whitney test was further applied to see if there are any significant differences in the responses for all the questions in Section E, between the respondents from listed and unlisted companies. The results indicated that there were no significant differences between these two groups of respondents for all the questions except for Question E4 (d) at the 5% level.

For Question E4 (d) on the influence of external auditors on the design of internal accounting systems, the respondents from the listed companies had a mean of 3.43 compared with a mean of 4.07 for the unlisted companies' respondents (based on the 7-point Likert scale with 1 as 'Strongly Disagree' and 7 as 'Strongly Agree'). This suggests that the respondents from the listed companies tend to disagree more with the assertion that external auditors have considerable influence on the design of internal accounting systems. This may be due to the listed companies, generally being larger companies, having more resources and the expertise of qualified accountants to design appropriate internal accounting systems. In contrast, unlisted companies may have less expertise to design an appropriate internal accounting system and therefore may depend more on the advice of external auditors.

The Mann-Whitney test performed indicated that there is a significant difference (p-value: 0.000) between the listing status of the companies and the size of the companies (measured by the turnover of the companies). About 56% of the listed companies and about 80% of the unlisted companies have a turnover of RM300 million or less and around 14% of the listed companies are larger companies having a turnover of RM1201 and above, whereas only 2% of the unlisted companies have a turnover of between RM 1201 and RM1800. None of the unlisted companies had a turnover of more than RM 1800 whereas 9% of listed companies had an annual sales turnover exceeding RM 1800. This analysis suggests that the majority of the unlisted companies are smaller companies as compared to the listed companies.

Finally, it should be noted that an attempt was made to identify firms exhibiting a financial accounting mentality (by selecting firms who had responded to scores of 5 or more for the questions in Section E 1,2 and all of the questions in E4. The final result showed that there are only 6 firms that had consistently responded to scores of 5 or more to these questions. A comparison was made with firms not exhibiting a financial accounting mentality (by selecting firms that had consistently responded to scores of 3 or less for the Questions E1, 2, and 4). The final selection indicated that there are only 2 firms, which had consistently responded to scores of 3 or less for the Questions E1, 2, and 4. Since the number of firms was too small meaningful generalisations cannot be made. Therefore a similar procedure as above was followed for key questions (E1, E2 and E4b) that related to a financial accounting mentality. The final results showed (Table 7.14) that there are 16 firms exhibiting a financial accounting mentality and 21 firms not exhibiting a financial accounting mentality. The comparison of these two categories of firms showed the following observations:

Table 7.14: Listing status, size and ownership structure of firms exhibiting a financial accounting mentality and firms not exhibiting a financial accounting mentality

	Firms exhibiting a financial accounting mentality N=16 (43%)	Firms not exhibiting a financial accounting mentality N=21 (57%)
<i>Listing status:</i>		
Listed (N=25)	36%	64%
Not Listed (N=12)	58%	42%
<i>Size (based on turnover):</i>		
Less than RM150m (N=17)	35%	65%
151m - RM600m (N=12)	67%	33%
More than RM600m (N=8)	25%	75%
<i>Ownership:</i>		
50% and above Malaysian owned (N=30)	50%	50%
50% and above foreign owned (N=7)	14%	86%

A chi-square test indicated that there was no significant difference between the responses of the listed and unlisted companies. For size and ownership it was not possible to undertake any statistical tests because the small number of responses for some of the rows resulted in an infringement of the minimum cell requirements of the chi-square test.

7.8 Product/service cost information for decision-making purposes

The first objective of the study listed in section 1.2 of chapter 1 was to explore the extent to which different cost information is used for different purposes. Issues relating to this objective were examined in Section F of the questionnaire. This section focuses on questions relating to:

1. The importance of cost information for different types of decisions;
2. The use of different cost information for different types of decisions;
3. The use and importance of cost data in the responding organisations.

7.8.1 The importance of cost information for different types of decisions

Question F1 was used to determine the importance of product/service cost information for the different kinds of decisions relevant to the organisation. From Table 7.15 it can be seen that there is a general strong agreement of the importance of product/service cost information for each of the different types of decisions. Table 7.15 also indicates that cost reduction was ranked highest and make or buy and product mix decisions were ranked lowest in terms of the importance of cost information for decision-making.

Despite the arguments made in section 4.3 (iii) relating to the paramount importance of cost information for cost-plus pricing, cost information for this type of decision was ranked fourth in the list of the seven specified decisions. However, the responses to Question F1 were derived from all respondents, including those that rarely used cost-plus pricing, and this may explain its low ranking. To provide a more appropriate indication of the importance of cost information for cost-plus pricing the responses from those respondents (from Questions F2, F3 and F4) who indicated that derived cost-plus selling price is important in determining the final selling price were analysed as shown in the following paragraph.

Table 7.15: Importance of product / service cost information for decision making (Question F1)

Importance of product/service cost information for the following decisions:	N	Rank	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
Cost Reduction	126	1	6.02	1.22	2.4	76.2
Improving product/service processes	122	2	5.69	1.29	3.3	63.1
Determining whether the cost of production or the provision of service is below the established selling price	122	2	5.69	1.30	2.4	62.3
Determining cost-plus selling prices	123	4	5.22	1.92	13.8	58.5
Modifying product/service design	123	5	5.08	1.56	7.4	44.7
Make or Buy	106	6	4.96	1.85	14.1	49.1
Product Mix	110	7	4.85	1.86	16.4	44.5

Questions F2–F4 focused on the use of cost-plus pricing by the organisations. Of the 122 companies that responded to Question F2, 74% stated that they use or sometimes use cost-plus pricing for sales to external customers. Table 7.16 indicates that 54% of these respondents assigned a score of 6 or 7 on a 7-point Likert scale ranging from 1 as 'Of little importance' to 7 as 'Of vital importance' in terms of the importance of cost-plus pricing in determining the final selling price. The frequency distribution of the respondents scoring 6 or 7 (cost plus pricing is of importance or of vital importance) for Question F3, shows that 82.3% of them have indicated that product/service cost information is important or vitally important (for Question F1d) in determining cost-plus selling prices (scoring 6 and 7 in the Likert scale). The Spearman's Rank Order Correlation indicates that there is a significant modest positive correlation between these two questions (Spearman correlation 0.447; p-value: 0.000), implying the importance of product/service cost information for firms considering the derived cost-plus selling price as important in determining the final selling price.

Table 7.16: Importance of derived cost-plus selling price in determining the final selling price - (Question F3)

	N	Mean	Standard Deviation	% rating 1 or 2	% rating 6 or 7
Importance of derived cost-plus selling price in determining the final selling price	94	5.23	1.66	9.6	54.3

The correlation matrix (Table 7.17) for the 7 different decisions in Question F1 indicated that there is a significant low / moderate positive correlation between the various pairs of responses. It is seen from the Table 7.17 that responses from firms concerned with decisions on modifying product/service design, improving production/service processes and product mix are moderately associated having a positive correlation of between 0.470 and 0.548 This implies that firms considering product cost information to be important for modifying product service design also feel that product cost information is important for improving product/service processes and product mix decisions. This may be due to the relationship between these decisions. Firms

considering modifying product/service design may need to improve the product service processes and also may need to alter the product mix to cater for the modified product/service design.

Responses to decisions on determining whether the cost of production or the provision of service is below the established selling price and make or buy also shows a moderate positive association of above 0.55 and less than 0.60. Here again these decisions are related as both the decisions require comparisons with an externally derived purchase or selling price.

Finally, the responses to the make or buy decisions and the product mix decisions showed a higher positive association of 0.611. This may be because of the relationship between these two questions. The cost of making or buying will to a certain extent influence the product mix decisions.

Table 7.17 : Correlation matrix of the importance of product/service cost information for the different types of decisions - (Question F1)
Spearman correlation coefficient

Decisions	F1a - Cost Reduction	F1b - Modifying product/service design	F1c - Improving product/service processes	F1d - Determining cost-plus selling prices	F1e- Is the cost of production/service below established selling price	F1f- Make or buy	F1g - Product mix
F1a	1.000	0.381**	0.538**	0.190*	0.392**	0.244*	0.303**
F1b	0.381**	1.000	0.548**	0.334**	0.365**	0.512**	0.544**
F1c	0.538**	0.548**	1.000	0.347**	0.534**	0.353**	0.470**
F1d	0.190*	0.334**	0.347**	1.000	0.502**	0.490**	0.460**
F1e	0.392**	0.365**	0.534**	0.502**	1.000	0.558**	0.461**
F1f	0.244*	0.512**	0.353**	0.490**	0.558**	1.000	0.611**
F1g	0.303**	0.544**	0.470**	0.460**	0.461**	0.611**	1.000

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

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

7.8.2 The use of different cost information for different types of decisions

Conventional wisdom suggests that only decision relevant costs are used for decision-making and fixed costs are considered to be irrelevant for decision making unless they are specific to the particular decision. Contemporary debates on the fixed costs (Kaplan, 1985; Cooper and Kaplan, 1987) suggest that all costs become variable in the long run. In particular, it is important to incorporate those joint fixed costs that fluctuate in the long-term according to the demand for them (section 3.2, chapter 3).

Question F5 was used to determine if organisations use different costs for different types of decisions. The results are presented in Table 7.18. It can be seen from this table that, apart from cost-plus pricing and cost reduction decisions, cost assignment is broadly similar for the different types of decisions. Approximately 40% of the firms assign *only* direct costs, 30% assign direct costs and indirect costs using allocation bases based on cause-and-effect relationships and, besides assigning direct and cause-and-effect indirect costs, a further 30% assign indirect costs where no cause and effect allocation bases can be established. These findings do not imply that firms have established appropriate cause-and-effect cost drivers/allocation bases but merely report the different categories of costs that are assigned for different type of decisions.

Table 7.18: Costs assigned to products / services for decision-making (Question F5)

Type of Decision	(1) Direct costs only	(2) Direct costs plus indirect Costs where allocation bases can be identified	(3) Col. (2) plus indirect costs where allocation bases cannot be identified
a) Make or Buy	44%	32%	24%
b) Discontinuation	43%	42%	15%
c) Product Mix	41%	39%	20%
d) Determining cost-plus selling price	10%	4%	86%
e) Determining whether the cost of production /service provided is below established selling price	23%	42%	35%
f) Cost reduction	18%	37%	45%
g) Modifying product/service design	43%	34%	23%
h) Improving product/service processes	32%	41%	27%

For cost-plus pricing and cost reduction decisions the following costs were assigned:

Type of decision	Direct costs only	Direct costs plus only cause-and-effect allocations of indirect costs	Direct costs plus cause-and-effect and non-cause-and-effect allocations
Cost-plus-pricing	10%	4%	86%
Cost reduction	18%	37%	45%

The rationale for the assignment for different types of costs for cost-plus pricing compared with other types of decisions was explained in chapter 4, sections 4.4 iii and 4.5 and will not be repeated here. However, it should be noted that the above findings strongly support this rationale. For cost reduction decisions firms may believe that in the long-term they can influence all categories of indirect costs or seek to increase the cost driver allocation

rates (by including all types of indirect costs) because they are using cost drivers for behavioural reasons (see chapter 4, section 4.6.2.1 c).

A correlation matrix of the sub-questions of F5 is shown in Table 7.19 The costs for each decision-making is categorised into the following: -

- 1 - Direct costs only
- 2 - Direct costs plus indirect costs with identifiable allocation bases
- 3 - Direct costs plus indirect costs with identifiable bases plus indirect costs with arbitrary allocation bases

The correlation matrix indicates a significant positive association between the different costs assigned for most of the different types of decisions. However the decisions cost plus pricing and cost reduction, seems to have a low positive correlation, thereby supporting the above analysis that the costs assigned for making these decisions may not be similar to the costs assigned for the other types of decisions. A chi-square test was also undertaken to see if the differences are significant. The non-parametric test was done by comparing the responses in Table 7.18 for (d) with the responses for a,b,c,e,g,h and similarly the responses for (f) were compared with a,b,c,e,g,h. The results indicated a significant difference between the responses for (d) and the responses for (c, e and g) with a significance value of less than 0.01 and for the responses for (a and b) with a significance value of less than 0.1. As for the responses for (f), the cost reduction decision-making, the chi-square results indicated that there is a significant difference (significance value of less than 0.01) from the responses for all the other decisions. These results also support the analysis that the costs assigned for making these decisions (cost-plus selling price and cost reduction) may not be similar to the costs assigned for the other types of decisions.

**Table 7.19: Correlation matrix - Different costs used for different decision-making - (Question F5)
(Spearman correlation coefficient)**

Costs 123 ^a	F5a- Make or buy	F5b- Disconti- nuation	F5c- Product mix	F5d- Cost-plus selling price	F5e- Is cost of production /service below established selling price	F5f - Cost reduction	F5g - Modifying product/ service design	F5h- Improving product/service processes
F5a	1.000	0.522**	0.420**	0.100	0.436**	0.360**	0.363**	0.323**
F5b	0.522**	1.000	0.467**	0.148	0.197	0.091	0.429**	0.502**
F5c	0.420**	0.467**	1.000	0.407**	0.367**	0.335**	0.507**	0.554**
F5d	0.100	0.148	0.407**	1.000	0.184	0.210	0.354**	0.355**
F5e	0.436**	0.197	0.367**	0.184	1.000	0.425**	0.227	0.253**
F5f	0.360**	0.091	0.335**	0.210	0.425**	1.000	0.265**	0.329**
F5g	0.363**	0.429**	0.507**	0.354**	0.227	0.265**	1.000	0.743**
F5h	0.323**	0.502**	0.554**	0.355**	0.253	0.329**	0.743**	1.000

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed);

a - Costs categorised as: 1 - Direct costs only; 2 - Direct costs plus indirect costs with identifiable allocation bases; 3 - Direct costs plus indirect costs with identifiable bases plus indirect costs with arbitrary allocation bases

Table 7.18 also shows that approximately 30% of the firms are incorporating those indirect costs where allocation bases cannot be identified for other types of decisions (i.e. excluding rows d and f in Question F5). In other words, facility-sustaining costs are being allocated and this may result in distorted product/service costs for decision-making purposes. Nevertheless, it has to be pointed out here that the level of cost distortion depends on the cost structure of the firm. As was mentioned in section 4.7.1, firms with an insignificant proportion of indirect costs may not produce distorted product/service cost information.

7.8.3 The use and importance of cost data in the responding organisations

Question F6 was used to indicate the extent of agreement on the use of cost data. Approximately 50% of the respondents entered a score of 6 or 7 (agree and strongly agree) in the 7-point Likert scale for Question F6 (c) on the use of cost data for pricing product / service decisions (refer to Table 7.20). The correlation matrix for question F3 on the importance of cost-plus pricing in determining the final selling price and Question F6c on the use of cost data for pricing product/service decisions showed a significant positive correlation (correlation co-efficient: 0.439; p-value:0.000). This implies that firms considering derived cost-plus selling price as important or vitally important are more likely to have been the respondents who have responded to the scores of 6 and 7 in Question F6 (c).

Table 7.20 : Use of cost data within the business unit - (Question F6)

<i>Extent to which you agree/disagree with the following statements relating to the use of cost data within your business unit:</i>	N	Mean	Rank	Standard Deviation	% rating 1 or 2	% rating 6 or 7
b) Operating cost data is extremely important because of our cost reduction efforts.	127	5.72	1	1.21	3.2	68.5
a) The costs of products or services must be highly reliable to compete in our markets.	126	5.54	2	1.61	7.2	61.1
e) Most of the decisions specified in (d) are based on 'strategic reasons' rather than cost issues.	127	5.12	3	1.52	14.2	50.4
c) Cost information is the most important factor in pricing products/service decisions.	126	5.08	4	1.82	13.5	49.2
d) The organisation performs many special cost studies relating to product/service introduction, discontinuation, redesign, mix or cost reduction decisions.	126	4.29	5	1.75	49.6	18.9

The correlation matrix for the sub-questions of F6 as shown in Table 7.21 indicates a significant low/moderate positive correlation between most of the responses. It is also observed that the association between the responses to Questions F6 (a), (b) and (c) with F6 (d) show a significant but lower positive correlation. This may be due to the firms considering strategic reasons rather than cost issues as important for product/service introduction, redesign, discontinuation, mix or cost reduction decisions. As such, although the firms consider cost data important for decisions, they may not be performing special cost studies because of the importance given to strategic reasons in making decisions. This is further supported by the significant high negative correlation of (-0.784) between Questions F6 (d) and F6 (e) suggesting that firms

considering strategic reasons to be important do not perform special cost studies.

Table 7.21: Correlation Matrix: The use of cost data within the business unit (Question F6) - Spearman correlation coefficient

	F6 a - Costs of product/ service must be highly reliable	F6 b - Cost data extremely important for cost reduction efforts	F6 c - Cost information is the most important factor in pricing decisions	F6 d - Organisation performs special studies relating to decision - making	F6e - Decisions are based on 'strategic reasons' rather than cost issues
F6 (a)	1.0000				
F6 (b)	0.576 **	1.0000			
F6 (c)	0.506**	0.531**	1.0000		
F6 (d)	0.207*	0.349**	0.215*	1.0000	
F6 (e)	- 0.112	- 0.182*	- 0.173	- 0.784**	1.0000

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

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

Table 7.20 indicates that operating cost data is extremely important for cost reduction efforts and had the highest mean ranking on the agreement scale. The second most important ranking was that *cost data must be highly reliable* to compete in the markets. The third most important ranking was that cost information is the most important factor in pricing products/services decisions for firms that use the cost plus pricing. However, it should also be noted that 50.4% of the respondents strongly agreed with the statement that decisions are based on 'strategic reasons' rather than cost issues (F6e). In agreement to this, the responses to Question F6(d) showed that only 18.9% of the respondents strongly agree that special cost studies are performed relating to certain decisions.

7.9 Profitability analysis

The final objective of the study listed in section 1.2 of Chapter 1 related to examining the nature, content and role of product/service profitability analysis in Malaysian companies. Issues relating to this objective were examined in Section H of the questionnaire. In particular, the questions in this section focused on:

1. The frequency and importance of profitability analysis;
2. Cost information incorporated in routine profitability analysis reporting;
3. The importance of different profitability measures for attention-directing purposes.

7.9.1 The frequency and importance of profitability analysis

Question H1 examined the frequency of routine profitability analysis for both product/service and customer profitability analysis. The responses indicated that 73% of the organisations analysed profits by products and services on a monthly basis compared with 40% by customer categories. Only 5% of the respondents did not routinely analyse profits by product/services categories compared with 32% by customer categories. It is apparent that organisations analyse profits by both product and service and customer categories at frequent intervals with one year being the maximum reporting period in respect of 95.3% for products/services and 68% for customer categories. This is in line with the general strong agreement relating to the importance of periodic profitability analysis in signalling the need to make key decisions (Question H2) with 59% of the responses indicating a score of 6 and 7 (Important and Vitally Important). On the role played by profitability analysis (Question H5), there is a 50/50 split in the responses on the use for direct decision-making and use as attention-directing information for signalling the need for more detailed analysis to be undertaken.

7.9.2 Cost information incorporated in routine profitability analysis reporting

Question H3 (a, b and c) focused on the cost information that is used for profitability analysis. Respondents were given three categories of costs: direct costs, indirect costs where various allocation bases can be identified that are the causes of the costs varying in the long term, and indirect costs where it is not possible to identify allocation bases. The responses indicate that within the profitability analysis:

- 28.6% assign only direct costs;
- 23% assign direct costs plus only those indirect costs where cause-and-effect allocation bases can be identified;
- 48.4% assigned direct costs and indirect costs using both cause-and-effect and arbitrary allocation bases.

The study by Drury and Tayles (2000) indicated that 14% of the UK companies assigned only direct costs to cost objects for profitability analysis, 7% assigned direct costs plus only those indirect costs where cause-and-effect allocation bases can be identified and 79% assigned direct costs and indirect costs using both cause-and-effect and arbitrary allocation bases. However, their findings indicated that 56% of the respondents in the latter category had the potential to use the cost information in a flexible manner (i.e. they could distinguish between the two categories of indirect costs and hence had the potential to use cost information in a flexible manner).

The findings in the current study show that a higher percentage (23 %) of the Malaysian firms, as compared to the UK firms (7%) in Drury and Tayles' study, are assigning direct costs plus only those indirect costs where allocation bases can be identified. Also 48.4% of the Malaysian firms are assigning direct costs plus indirect costs using both cost and effect and arbitrary allocation bases as compared to 79% in the Drury and Tayles' study.

The Malaysian firms, as was stated above (section 7.8, paragraph 8) may not be using appropriate cause-and-effect cost drivers/allocation bases but are merely reporting on the different categories of costs used in the profitability

analysis. The responses to Question D5 (Appendix 1) show that the majority of the Malaysian firms are using the departmental overhead rates which may not be appropriate cause and effect allocation bases. Therefore it may be possible that not all of the 23% of the respondents are using appropriate cost and effect allocation bases, implying that some of these 23% of the firms could be actually using the arbitrary allocation bases. Therefore the differences observed in the current Malaysian study and the UK study might be a superficial difference as far as the indirect cost allocation is concerned.

As for the use of direct costs only, the Malaysian firms show a higher percentage as compared to the UK firms. The responses from Question D5 also point out that about 22% of the Malaysian firms consider indirect costs as period costs and write them off to the profit and loss account. The reason may be that the indirect cost structure of these Malaysian firms is insignificant within the total cost structure. The frequency distribution for these firms (i.e. the 22%) and the remaining 78% of firms showed the following information regarding the cost structure: -

Indirect Cost Structure	Firms not assigning indirect costs	Firms assigning indirect costs
Less than 15%	55%	39%
More than 15% but less than 50%	41%	50%
50% and more than 50%	4%	11%

The listing above shows that the indirect cost structure of the firms not assigning indirect costs to cost objects is slightly lower than the firms assigning the indirect costs to cost objects.

As Question H3 suggested that different categories of costs are used for profitability analysis, it was decided to investigate which of the alternative profitability measures were used by the organisations. Question H4 was used for this purpose and the respondents were asked to rank the profitability measures used in their organisation as the most important measure and the second most important measure. Table 7.22 indicates that 48.8% of the

organisations used contribution margin (sales less direct costs) as the most important measure. As for the incorporation of indirect costs, 16.5% of the respondents used item (b) of H4 as the most important measure, and a further 17.3% used it as the second most important measure. This suggests that these organisations are not using a profitability analysis measure that includes arbitrary apportionment of indirect costs. As for arbitrary apportionment the summation of rows(c) and (d) of Table 7.24 indicate that 33.9% used a profitability measure that included arbitrary indirect cost allocations as the most important measure and a further 48% as the second most important measure.

It can be seen from Table 7.22 that 23.6% (N=30) of the respondents used only one profitability measure. Contribution margin only was used by 9 of the 30 respondents, thus representing 7% of the total responses (9 out of 127). A further 3% (4 out of 127) used a single profitability analysis measure consisting of indirect costs assigned to products/services based on the cause and effect allocation bases. The findings also show that 13% (16 out of 127) of all of the respondents relied solely on a profitability measure that included arbitrary allocations of indirect costs (summation of rows c and d).

Comparing Table 7.22 with Table 7.18 provides further evidence of different financial information being used for different types of decisions. A significantly greater proportion of the respondents (approximately 50%) regard contribution as the most important measure for routine profitability analysis whereas 10% and 18% respectively relied on direct costing for cost-plus pricing and cost reduction decisions.

The similar study by Drury and Tayles (2000) reported that 38% (as compared to 23.6% in this study) of their respondents were using a single profitability measure. Their study also indicated that 16% (30 out of 187) of their respondents used only the contribution analysis as the profitability measure as compared to the 7% who used the contribution analysis as the only profitability measure in this study. As for the use of a profitability measure

incorporating arbitrary indirect cost allocation, the findings from Drury and Tayles study (17%) were quite similar to the current study (13%). Overall the findings from this study are quite similar to the findings of Drury and Tayles as per the most important measure used, because about 50% of the respondents from both the studies indicated that they are using the contribution analysis as the most important profitability measure and about 30% of them are using the bottom line net profit as the most important measure.

As for the inclusion of indirect costs using arbitrary allocation bases (row c), the current study shows that about 8% of the respondents are using it as the most important measure that is quite similar to the 11% in Drury and Tayles' study. Hence it is observed from this study, that a significant number of firms are still relying on the arbitrary allocation of indirect costs for profitability analysis (summation of rows c and d). As Drury and Tayles (2000) state, relying on only one profitability measure such as the contribution analysis and ignoring the indirect costs, or relying solely on a measure that uses arbitrary indirect cost allocations, is questionable.

Table 7.22: Importance of profitability analysis measures for decision making- (Question H4)

	Most Important measure % N=127	Second most important measure % N=127	Using a single measure % N=30
a) Revenues less direct costs (Contribution)	62 (48.8%)	13 (10.2%)	9 (30.0%)
b) Contribution less indirect costs with identifiable allocation bases	21 (16.5%)	22 (17.3%)	4 (13.0%)
c) Row (b) less indirect costs with arbitrary allocation bases	10 (7.9%)	14 (11.0%)	6 (20.0%)
d) Bottom line net profit (sales less all costs)	33 (26.0%)	47 (37.0%)	10 (33.0%)
e) Single profitability measure used	-	30 (23.6%)	
f) Other	1 (0.8%)	1 (0.8%)	1 (3.0%)
	127 (100.0%)	127 (100.0%)	30 (100.0%)

7.10 Summary / Conclusion

The major findings that have been reported in this chapter are as follows:

- There is a significant difference in the cost structure between manufacturing and non-manufacturing companies. The proportion of direct costs is significantly higher than indirect costs for manufacturing compared with non-manufacturing companies.
- Questionable methods are used by manufacturing companies to assign indirect costs for decision-making. Approximately 50% do not assign non-manufacturing costs to their products and most of the remaining companies tend to allocate non-manufacturing costs using arbitrary methods.
- The evidence suggested that most of the companies use unsophisticated product costing systems involving a small number of cost centres, single cost drivers and extensive use of labour-based allocation methods. Despite the observed unsophisticated systems, the majority of the firms are satisfied with their costing systems and consider that their systems do assign the indirect costs accurately to products / services.
- Overall the adoption rate for ABC systems is extremely low. The financial and commercial firms have the highest adoption rate.
- There was insufficient evidence to support the view that a financial accounting mentality is prevalent amongst Malaysian companies;
- Different cost information is used for cost-plus pricing and cost reduction decisions compared with other type of decisions.
- Periodic routine profitability analysis at frequent intervals is extensively used with approximately 50% of the organisations considering profitability the most important measure. Thus, contribution analysis is used more

extensively for profitability analysis compared with cost-plus pricing and cost reduction decisions.

Although the above summary of the finding reveals that the majority of the Malaysian companies are using unsophisticated cost systems, there are variations in the level of sophistication maintained in practice in the Malaysian companies. Therefore there is a need to attempt to explain these variations. In chapter 1 (sections 1.3.3 and 1.5) and chapter 6 (section 6.4), the need to apply the contingency theory framework for the current research was discussed. Subsequently in chapter 4, sections 4.7.1 to 4.7.8, certain contingent variables were identified to have a possible influence on the cost system sophistication. Based on the contingency theory framework and the contingent variables identified, the following chapter will attempt to examine the impact of these contingent variables on the sophistication of the cost system maintained in the Malaysian companies.

Chapter 8

THE INFLUENCE OF POTENTIAL EXPLANATORY VARIABLES

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Chapter 8

THE INFLUENCE OF POTENTIAL EXPLANATORY VARIABLES

This chapter 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 (see Figure 4.1 and section 4.7 in chapter 4). In other words, each of the nine hypotheses formulated in chapter 4 relating to the contingent factors shown in Figure 4.1 are tested.

As indicated in chapter 1 (section 1.5.2) a major problem with applying the contingency framework relates to defining the characteristics of the accounting information system and measuring the contingent variables. It was pointed out that virtually all of the previous research has concentrated on aspects of accounting control systems. A distinguishing feature of the current research is that it focuses on aspects of the product costing systems and uses the level of sophistication for assigning indirect costs to products/services to represent the important aspects of the product costing system.

Because established measures of the level of cost system sophistication do not exist proxy measures must be established. In this chapter six alternative measures are identified and discussed. A justification is provided for the choice of a preferred measure. This preferred measure consists of a combination of the number of cost pools and cost drivers. Each of the hypotheses relating to the nine contingent variables is tested using the chosen level of sophistication and the findings are presented in sections 8.4 – 8.10. In addition, an explanation of how the measures for each of the contingent variables have been derived is explained in sections 8.4 – 8.10.

To test whether the findings are sensitive to the alternative measures of capturing the characteristics of the product costing system the hypotheses for the nine contingent variables are also re-examined using the alternative measures of cost system sophistication. To avoid undue repetition only the significant items are reported on an exception reporting basis in section 8.11.

Various statistical methods can be employed for ascertaining whether there is any statistically significant relationship between the contingent factors and the selected aspects of the product costing systems. They involve:

1. examining differences between the scores between two or more categories of levels of sophistication;
2. measuring the strength of relationship between measurements of a contingent variable and the level of sophistication using correlation, and
3. using a multiple regression model to analyse the relationship between a dependent variable (i.e. the level of sophistication) and contingent variables. This method enables the impact of the chosen variable to be examined with the remaining eight other contingent variables in the model controlled (i.e. partialled out).

Given that the chosen method of measuring the level of cost system sophistication involves the identification of only three categories of sophistication method 1 above is used for the analysis in sections 8.4 – 8.10. Some of the alternative methods of measuring the levels of cost system sophistication involve 7-point Likert scales and in these circumstances correlation is generally considered to be the most appropriate statistical measure. Therefore, the results using the alternative measures of level of cost system sophistication reported in section 8.11 are reported mainly in terms of correlation coefficients. Finally, in order to use higher powered statistical methods the chosen measure of cost system sophistication is adapted to approximate an interval scale and the relationships between the level of sophistication and the contingent variables are

re-examined using multiple regression analysis. The results for all of the alternative measures of sophistication are contrasted in Table 8.15 in terms of their level of significance.

8.1 Introduction

Based on the literature review the following contingent factors were identified in chapter 4 (sections 4.7.1 – 4.7.8) as potential explanatory variables that influence the design of product costing systems:

- the cost composition of the firm;
- product diversity;
- volume diversity;
- size of the firm;
- the competitive environment;
- the competitive strategy of the firm;
- the type of organisation;
- implementation of manufacturing techniques (e.g. Just-In-Time Systems); and
- the financial accounting mentality prevalent in the firm

The effect of the above potential explanatory variables on the level of sophistication of the product costing system are examined in sections 8.4 - 8.10.

8.2 Measuring cost system sophistication

Costing systems fall on a continuum ranging from simplistic to sophisticated. Common features of simplistic systems include the use of a small number of first stage cost pools and number and variety of second stage cost drivers, the extensive use of arbitrary allocations and low levels of accuracy. At the other end of the continuum sophisticated costing systems are associated with the use of many cost pools, number and variety of cost drivers and high levels of accuracy.

Measuring the level of cost system sophistication presents a major problem since established measures do not exist. Therefore, it was necessary to establish proxy measures of sophistication. Information was collected enabling five different potential measures of sophistication to be established. They were:

1. The number of cost centres/cost pools used (Question D6);
2. The number of different types of cost drivers/allocation bases used (Question D7);
3. The responses to Question D5 classifying costing systems by the use of blanket overhead rates, departmental rates, cost centre rates and a direct costing system.
4. The respondents' self-rating in terms of their assessment of the level of accuracy (Question D9) and perceived satisfaction of the costing system (Question D10).
5. A combination of (1) and (2) relying on the researcher's judgement to classify cost systems by the level of cost sophistication;

8.2.1 Classifying the level of sophistication by the number of cost centres/cost pools

The rationale for the first measure (number of cost pools measured by Question D6) was explained in section 4.6.1. It was pointed out that when activities are heterogeneous, using a single cost pool or fewer cost pools may result in cost distortions. This is because of the difficulty in identifying the appropriate cost driver/drivers for the single or fewer cost pools that can positively correlate with the consumption of the various activities aggregated together.

8.2.2 Classifying the level of sophistication by the number of different types of second-stage cost drivers used

An explanation of the relationship between the number and different types of cost drivers with the level of reported product cost accuracy was presented in sections 4.6.2 and 4.6.2.1. It was pointed out that increasing the number of different types

of second stage cost drivers should normally result in an increase in the accuracy of the reported product costs. Furthermore, it was also noted that using the appropriate type of cost driver (transaction based or duration based) could also increase the level of accuracy needed. Using transaction-based drivers where the variation in the amount of resources required by individual product/services is high can result in distorted product/service costs. Therefore duration-based drivers may be more appropriate in such circumstances. Kaplan and Cooper (1998) have stated that greater number of different types of cost drivers is a major feature of ABC systems.

8.2.3 Classifying the level of sophistication by blanket, departmental, cost centre rates and direct costing systems

The third measure (derived from Question D5) involves distinguishing between costing systems that use a single blanket overhead rate, departmental rates, cost centre rates and direct costing systems that do not assign indirect costs to cost objects. Blanket overhead rates represent the most simplistic costing systems since they involve establishing a single cost pool and overhead rate for the business unit as a whole. In other words, they do not involve the application of the two stage allocation process for assigning indirect costs to products/services. More sophisticated systems require the establishment of separate departmental overhead rates and sophistication can be further increased by establishing separate cost pools at the cost centre level. With this latter approach separate overhead rates are established for smaller segments below the department level. A distinguishing feature of the third measure of sophistication is that it also includes costing systems that do not assign indirect costs to cost objects. The incorporation of a direct costing category enables the results to be analysed in terms of examining whether any of the potential explanatory variables influence the adoption of direct costing systems. These aspects are discussed in section 8.10.

The disadvantage of the third measure is that it does not capture the number of cost pools or the number and variety of second stage cost drivers. For example, an organisation may establish only a small number of cost pools and use only one type of cost driver (e.g. direct labour hours). Such a system would be relatively unsophisticated but would be classified as sophisticated based on the categories identified within Question D5. The major advantage of this measure is simplicity since it was expected that the respondents would have little difficulty in identifying which of the four of the costing system categories was applicable to their organisation.

8.2.4 Classifying the level of sophistication by the respondents' self-rating measure

The fourth measure was to ask the respondents to self-rate their costing systems in terms of accuracy and satisfaction. The respondents were asked in Question D9 to specify on a 7-point scale ranging from 'Not very accurate' to 'Extremely accurate' how accurate they thought their costing systems were in assigning indirect costs for decision-making. This measure assumes that more sophisticated systems generate more accurate costs and that this will be reflected in the responses to Question D9.

However, costing systems may not accurately assign indirect cost to cost objects but still report costs which are sufficiently accurate for decision-making. For example, if indirect costs represent only a small proportion of total costs unsophisticated systems may not report distorted costs. Therefore the respondents may consider that their cost systems may report reasonable accurate product costs. In these circumstances the respondents may be satisfied with their systems even though they do not accurately assign the relatively small amount of indirect costs to cost objects.

To capture such aspects the respondents were asked in Question D10 to indicate how satisfied they were with the accuracy of their costing systems for assigning indirect costs for decision-making. An 8-point scale was used ranging

from 1 - 'Not at all satisfied' to 7 - 'Extremely satisfied' and 8- as 'Not Applicable'. To ascertain whether Questions D9 and D10 were measuring the same constructs a correlation test was undertaken. The correlation coefficient (Spearman rho = 0.834; p-value = 0.000) indicates a significantly high positive correlation thus implying that firms assigning costs accurately are satisfied with their costing system. Given the high level of association between the questions, the responses to Questions D9 and D10 were aggregated and the average score was used as the fourth measure of the level of cost system sophistication.

8.2.5 Classifying the level of sophistication by a combination of the number of cost pools and the number of different types of second-stage cost drivers used

Relying only on either the number of first stage cost pools or the number of different types of cost drivers used only partially captures those aspects that determine the sophistication of the costing system. As was noted in section 4.6, Cooper (1989) and Kaplan and Cooper (1998) have pointed out that the accuracy, and hence the sophistication of the cost system depends on the increasing number of cost pools and different types of second stage cost drivers. Thus, the fifth measure combines the responses relating to the number of cost pools (Question D6) and the number of different types of second-stage cost drivers (Question D7). It also involves the researcher's self-judgement, using an approach similar to that adopted by Drury and Tayles (2000), to categorise the costing systems as follows:

- (i) unsophisticated systems
- (ii) systems of a low sophistication level
- (iii) sophisticated systems

The information contained in Table 8.1 is used to classify the sophistication of the firms' costing systems. The unsophisticated systems are represented by those within the shaded area in the upper left-hand corner of Table 8.1. They consist of

those costing systems with 5 or less cost pools and less than three second stage cost drivers plus those with 6-10 cost pools and one second stage cost driver. The sophisticated costing systems are represented by those within the shaded area in the lower right hand corner of Table 8.1. They consist of those costing systems with more than 10 cost pools and 5 or more second stage cost drivers. All of the remaining systems shown in the unshaded area of Table 8.1 are classified within the second category (i.e. systems of a low sophistication level). They tend to relate mainly to systems with many cost pools and a small number of different types of second stage cost drivers.

Consideration was given to classifying ABC adopters as the highest level of sophistication. However, as Drury and Tayles (2000) have stated, problems arise because a firm may consider itself to be an ABC user if it deploys many cost pools but a few volume based cost drivers or if it has a few aggregated cost pools and a few non-volume based cost drivers. An analysis was undertaken in terms of the 8 ABC adopters (as classified in Table 7.7) by the level of cost system sophistication as defined above:

- 1 ABC adopter was classified within the unsophisticated category;
- 3 adopters were classified within the low sophisticated category;
- 4 adopters were classified within the sophisticated category.

Kaplan and Cooper (1998, p. 99) state that even a simple ABC system should use 30-50 cost pools and many different types of cost drivers. Based on this definition, and the above analysis, the claim by 4 of the 8 ABC adopters that their costing systems represent ABC systems is questionable. According to Dugdale and Jones (1997) they are likely to be partial rather than full ABC adopters. Given the above observations it was decided to use the above-mentioned fifth measure to measure the level of cost system sophistication. Therefore it was decided not to use ABC adopters as a measure for the levels of sophistication.

Based on the above definitions the classification by level of cost system sophistication derived from Table 8.1 is as follows:

- 56 firms (50.9%) are classified within the unsophisticated costing system category;
- 46 firms (41.8%) are classified within the low cost system sophistication category;
- 8 firms (7.3%) as classified within the sophisticated cost system category.

At the research design stage it was anticipated that a significant number of costing systems would be classified within the sophisticated category. However, adopting the above criteria only 8 costing systems were classified within this category. The small number of companies within this category restricts the viability of undertaking statistical tests. This issue is discussed in the next section.

Table 8.1: Cross tabulation (number of cost pools with the number of second - stage cost drivers)

Cost Pools	Cost Drivers												
	N	%	N	%	N	%	N	%	N	%			
	1		2		3		4		5		7-10		Over 10
1	18	18 (16)											
2-3	12		8 (7)		4 (4)								
4-5	35	12 (11)	8 (7)		11 (10)	1 (1)	3 (3)						
6-10	26	6 (5.5)	4 (4)		4 (4)	2 (2)	8 (7)	2 (2)					
11-20	11	1 (1)	2 (2)		1 (1)	1 (1)	3 (3)		1 (1)		2 (2)		
21-30	5	1 (1)	2 (2)		1 (1)	1 (1)							
31-50	2	1 (1)									1 (1)		
Over 50	1										1 (1)		
Total	110	39 (35)	24 (22)		21 (19)	5 (5)	14 (13)		5 (5.5)		2 (2)		

Note: The numbers in the parentheses relate to the number of individual observations (N) expressed as a percentage of the total number (110) of observations.

8.2.6 Comparison of the respondents' self-rating measure of sophistication with the measure described in 8.2.5

The respondents' own self-rating (measured in terms of (i) level of accuracy and (ii) level of satisfaction) was compared with the sophistication classification method described in section 8.2.5 to ascertain whether there was any relationship between them. The comparison is shown in Table 8.2. It can be seen from this table that the respondents' views on the accuracy and satisfaction of their costing systems are similar for all three levels of cost system sophistication. This suggests that generally the respondents consider that the assignment of indirect costs by their costing systems is above the moderate level of accuracy for decision-making. Furthermore, approximately 40% rated their costing systems as having high level of accuracy level (scores of 6 or 7) for all three cost system sophistication categories. The responses also indicate that they are satisfied with the assignment process, irrespective of their level of sophistication employed in the assignment process. It should be noted that overall there was a low level of dispersion for the responses relating to the respondents' views on the accuracy and satisfaction of their firms' costing systems. Therefore, it is not surprising that similar accuracy and satisfaction scores were observed for each category of cost system sophistication. This high rating for accuracy and satisfaction may be observed because the respondents are reluctant to admit that their costing systems are inaccurate.

Table 8.2: Level of accuracy and satisfaction and the sophistication categories

Level of Sophistication	Level of Accuracy ¹				Level of Satisfaction ²				
	N ³	Mean	Standard Deviation	% rating 1 and 2	% rating 6 and 7	Mean	Standard Deviation	% rating 1 and 2	% rating 6 and 7
Unsophisticated		5.00	1.11	2.1	39.6	5.13	1.07	2.2	43.5
Low Sophistication		4.80	1.13	2.3	31.8	4.84	1.34	4.6	41.9
Sophisticated		5.14	1.07	-	57.1	5.14	1.46	-	57.2

Notes

¹ An 8-point Likert scale was used (Question D9) with 1 as 'Not very Accurate,' 7 as 'Extremely Accurate' and 8 as 'Not Applicable.' Scores of 8 were excluded from the analysis.

² An 8-point Likert scale used (Question D10) with 1 as 'Not at all Satisfied,' 7 as 'Extremely Satisfied' and 8 as 'Not Applicable.' Scores of 8 were excluded from the analysis.

³ Level of Accuracy:- N= 48 (Unsophisticated); N = 43 (Low Sophistication); N = 7(Sophisticated); Level of Satisfaction:- N= 46 (Unsophisticated); N = 44 (Low Sophistication); N=7(Sophisticated).

8.3 Testing the hypotheses

In section 8.2 five different potential measures of the dependent variable (level of cost system sophistication) were described. Given that two different self-rating measures were identified (accuracy and satisfaction), six potential measures of cost system sophistication can be derived from the data. Based on the discussion in section 8.2 it was considered that the fifth measure was the most appropriate measure of cost system sophistication. Therefore, the discussion in sections 8.4-8.10 presents the findings using only the fifth method of measuring cost system sophistication. However, the findings derived from using alternative measures of cost system sophistication are presented in section 8.12 at the end of the chapter. Given the difficulty of measuring the level of sophistication the use of several alternative measures represents a form of sensitivity analysis to ascertain how sensitive the findings are to alternative measures of sophistication. The interpretation of the findings in respect of these alternative measures is

reported in section 8.11, but only in respect of those findings that are significant at the 5% level. With the exception of the variables, "type of organisation; competitive strategy; and different purposes for which the cost information is used, all the other variables were tested on a directional basis. The statistics presented for the directional hypotheses are one-tailed and the 2-tailed statistics was used for the non-directional hypotheses and the correlation tests.

In section 8.2.5 attention was drawn to the viability of undertaking statistical tests in respect of the three different categories of cost system sophistication. Because there are only eight firms with costing systems classified within the sophisticated category the discussion in sections 8.4–8.10 is based on two sets of analysis:

- a) The analysis by the three sophistication categories using the Kruskal-Wallis test, and
- b) an analysis excluding the sophisticated category. Thus, the hypotheses are repeated based on a comparison of only the responses of firms falling within the low sophisticated and unsophisticated categories using the Mann-Whitney test. In addition, the responses of the eight firms falling within the 'sophisticated' category have been analysed by the potential explanatory factors and, where appropriate, the important distinguishing features are described in section 8.11.

The following sections 8.4 – 8.10 report on the results of the hypotheses tests relating to each of the contingent variables and the sophistication of the product costing system using the fifth method to measure cost system sophistication.

8.4 Cost composition of the firms

Table 8.3 shows the percentage average direct and indirect costs for each of the three levels of sophistication (as identified in Section 8.2.5) in assigning indirect costs. Generally firms with a higher indirect cost composition would be expected

to require a more sophisticated system for assigning indirect costs to products/services so as not to distort the product/service cost information (Refer to Section 4.4.1). Table 8.3 shows that the average indirect costs are slightly higher for firms having the unsophisticated and the low sophistication categories as compared to the sophisticated category. It is also apparent from Table 8.3 that the average indirect costs are lowest for firms within the sophisticated cost system category. This is in the opposite direction to that predicted by the hypothesis.

Cost data is measured on an interval scale. Therefore the parametric tests were conducted to see if there are any significant differences between the cost structure of manufacturing firms and the three levels of sophistication (one-way ANOVA) and the two levels of sophistication (t-test). The Kolmogorov-Smirnov normality test showed the sample is normally distributed (statistic: 0.124; df: 47; Significance: 0.069). The Levene's test also showed a p-value of more than 0.05 thus indicating that there are no significant differences between the variances of the groups thus justifying the use of the parametric tests. However both the results showed a p-value of more than 0.05, indicating that there are no significant differences between the cost structure of the manufacturing firms and the levels of sophistication maintained. Similar tests were conducted for the cost structure of non- manufacturing firms and the levels of sophistication maintained and the results showed that there are no significant differences in the cost structure of firms and the levels of sophistication maintained (p-value >0.05).

It can therefore be concluded that the hypothesis presented in chapter 4 (section 4.7.1) '*The greater the proportion of indirect costs within a firm's cost structures, the higher the level of sophistication of the costing system*' is not supported (P>0.05 one-tailed test).

Table 8.3: Cost structure and the level of sophistication of cost system design

Level of Sophistication	N	Mean (indirect costs as a % of total costs)	% Standard Deviation	% of firms with indirect costs less than 15% of total costs	% of firms with indirect costs greater than 50% of total costs
Unsophisticated	53	22.82	15.43	32% (N=17)	8% (N=4)
Low Sophistication	44	26.63	24.35	43% (N=19)	14% (N=6)
Sophisticated	8	16.29	6.58	75% (N= 6)	-

8.5 Product diversity and volume diversity

Referring to chapter 4, section 4.6.2, product diversity occurs when the products consume the activity resources in different proportions whilst volume diversity refers to the situation when products are manufactured in different batch sizes. The research sought to measure product diversity in a number of different ways. Five questions were used to measure product diversity. They were:

- Question B1 that examined the number of different products/services the cost system assigns costs to. Here it is assumed that firms with more products are likely to have a wider product range and thus greater diversity in the consumption of resources by products.
- Question B3 relating to the standardisation or customisation of the products/services marketed. Here it is assumed that firms marketing standardised products/services are involved with high volume similar products/services, which may require activity resources in similar proportions. Conversely, firms marketing customised products/services are usually involved in dealing with low volume non-similar products/services requiring activity resources in different proportions.
- Question B4 (a,b,d) relating to the resources consumed by products/services attempted to provide more direct measures of product diversity. These three

questions sought to measure product diversity in terms of activity resource consumption.

A reliability test on questions B1, B3, B4 (a, b, d) conducted showed a high Cronbach Alpha value of 0.7098 thus justifying the use of a composite measure for these questions.

Questions B2 and B4 (c) measured volume diversity. This first question focused on the variation in sales volume between the top 20% of the best selling items and the bottom 20% of the lowest selling items. Question B4c was concerned with the deviations in the product/service volumes or lot sizes. A reliability test conducted showed a low Cronbach Alpha of 0.4920 suggesting that these questions are not measuring the same construct. Therefore these two measures are not aggregated. A Cronbach Alpha score in excess of 0.6 (Nunnally, 1978) suggests that the different questions are measuring the same construct. Foster and Swenson (1997) recommend the use of the composite score when :

- there is a need to capture the multi-dimensional aspects in a construct using several different questions or
- there is measurement error in an individual question that is minimised by aggregating individual questions into a composite.

Furthermore, Judd *et al* (1991) state that there will be a substantial element of intuitive judgement involved when an individual responds to a scale, regardless of the precision in the rating instruction or how well trained the individual is. This may result in bias in the ratings to the individual questions. Therefore a composite score may provide a better measurement. Hence in this study a composite score is used whenever evidence suggests multi-item questions are measuring the same construct.

Table 8.4 shows the mean, standard deviation and frequency distributions for each of the above variables for the three categories of sophistication. The scores of '1 and 2' and '6 and 7' are based on the following 7-point Likert-scale:

- Question B2 (1 = Little Variation and 7 = Considerable Variation);
- Question B3 (1 = Highly Standardised and 7 = Totally Customised);
- Question B4 (1 = Strongly Disagree and 7- Strongly Agree).
- For Question B1 relating to the number of products/services the cost system assigns costs to, there were 8 scores altogether. Score 8 was recoded to score 7 which then represented 200 and above products/services. The scores of 1 and 2 refer to 1-10 products/services and the scores of 6 and 7 now refer to 81 and above products/services.

As was stated above a composite score of questions B1, B3 and B4 a,b,d was used to measure product diversity. Questions B4 (b) and B4 (d) were recoded in performing the analysis, because these questions were negatively worded in relation to Question B4 (a).

Table 8.4: Product/volume diversity and the use of different levels of sophistication

<i>Product Diversity</i>					
Composite measure of Questions B1,B3,B4 a, b d	N	Mean	Standard Deviation	% rating 1 and 2	% rating 6 and 7
Unsophisticated systems	56	3.4	1.4	32.3	1.8
Low sophistication systems	46	3.79	1.17	17.3	4.4
Sophisticated systems	8	4.37	1.28	12.5	12.5
<i>Volume Diversity</i>					
B2 Variation in sales volume between the best selling and the lowest selling items:					
Unsophisticated systems	54	4.43	1.96	20.4	31.5
Low Sophistication systems	46	4.74	1.42	4.3	26.1
Sophisticated systems	8	3.88	2.17	25.0	25.0
B4 (c) Major deviations in the products/services volumes or lot sizes					
Unsophisticated systems	56	3.88	1.77	25.0	16.1
Low Sophistication systems	46	4.41	1.76	13.0	30.5
Sophisticated systems	8	3.88	1.81	25.0	-

As for product diversity, the unsophisticated systems and low sophistication systems had a mean of less than 4, whilst the sophisticated systems had means of above 4 suggesting that the firms with unsophisticated systems and low sophistication systems have less product diversity than the firms with the sophisticated systems. However the Kruskal-Wallis and the Mann-Whitney tests applied on this composite score indicated that there are no significant differences in the responses to the measurement of diversity of the products/services within the different levels of sophistication employed, at the 5% level.

It can therefore be concluded that the hypothesis presented in chapter 4 (Section 4.7.5) '*The greater the level of product diversity, the higher the level of sophistication of the costing system*' is not supported ($p > 0.05$ one-tailed test).

As for the volume diversity (Table 8.4) Question B2 on the variation in the top selling and the lowest selling items shows a mean in the range of 3.88 to 4.74 for the three sophistication categories implying that there is little or moderate variation between the three categories of sophistication levels. The other measure for volume diversity on the deviations in the service volumes or lot sizes (Question B4c), also shows a mean range of 3.88 to 4.41, also implying similarity in the service volumes or lot sizes between the three categories of sophistication levels.

The Kruskal-Wallis test applied shows that there are no significant differences between the responses relating to the two measures of volume diversity and the three sophistication levels. The Mann-Whitney test also shows that there are no significant differences between the responses to the measures on volume diversity and the two levels of sophistication (low sophistication and unsophisticated systems).

It can therefore be concluded that the hypothesis presented in chapter 4 (section 4.7.5) 'The greater the level of volume diversity, the higher the level of sophistication of the costing system' is not supported ($p > 0.05$ one-tailed test).

8.6 Size of the firms

It was pointed out in chapter 4, section 4.7.2 that larger firms are more likely candidates for a sophisticated system as compared to smaller firms. Therefore in this section the influence of the size of the firm (based on the turnover of the firms) on the sophistication levels is examined. Table 8.5 displays the findings relating to the size of the firm and the sophistication levels.

Table 8.5: Size of firms and the sophistication levels used

A5.Average turnover	N	Mean ¹	Less than RM150m	RM151m to RM 600m	More than RM600m
Unsophisticated systems	56	2.02	58.9	28.7	12.5
Low sophistication systems	44	2.55	45.5	36.3	18.2
Sophisticated systems	8	5.13	12.5	25.0	62.5

1 - Less than RM150m coded as 1; RM 151m to RM 600m coded as 2 - 4 ; More than RM 600m coded as 5-7

Table 8.5 shows that for the largest category of firms (turnover more than RM600m) 62.5% and 12.5% respectively are classified as operating sophisticated system and unsophisticated systems. As for the smaller firms (turnover less than RM 150m), the corresponding figures are 12.5% and 58.9%. The mean scores of 2.02 for the unsophisticated systems and 5.13 for the sophisticated systems also suggest that smaller firms are likely to be have less sophisticated systems. The Mann-Whitney test was applied and indicated that there was no significant relationship between the size of the firm and the two levels of sophistication (unsophisticated and low level of sophistication). However, the Kruskal-Wallis test indicated a significant difference (p-value:

0.013) between the size of the firm and the three different sophistication levels employed by the firms. This is apparent from Table 8.5 which indicates that the firms classified as having sophisticated costing systems have significantly higher average annual sales turnovers.

It can therefore be concluded that the hypothesis presented in chapter 4 (section 4.7.2) '*The greater the size of an organisation, the higher the level of sophistication of the costing system*' is supported ($p < 0.05$ one-tailed test).

8.7 Competitive environment and competitive strategies used

Table 8.6 shows the relationship between the sophistication levels and the competitive environment and the competitive strategies used by the firms. As was mentioned in section 4.7.3, firms facing intense competition need to cost their products/services more accurately to avoid making poor decisions. Wrong decisions made may be advantageous to competitors resulting in the firm losing out to competitors. This warrants the need for a more sophisticated costing system providing more accurate product/service cost information, for firms facing intense competition.

The competition faced by the firms was measured using the following questions :

- Questions B5 relating to the intensity of competition for the firms' major products/services (with a 7-point Likert-scale of: 1 as 'Low' and 7 as 'Extremely Intense');
- Question B6 relating to the predictability of customer preferences for products/services (on a 7-point Likert-scale with 1 as 'Much easier to predict' and 7 as 'Much harder to predict'). To succeed in business and stay competitive, satisfying customer preferences is paramount. If there are several competitors prevalent in the industry, customers may have a wider range of product/service selection. Therefore their preferences may become

more complicated to assess thus engendering difficulties in predicting the customer preferences.

- B7 relating to the intensity of price competition within the responding firms' industry (on a 7-point Likert-scale with 1 as 'Of negligible Intensity' and 7 as 'Extremely Intensive'). It is assumed that the more intense the price competition, the more competitive the environment is.

All the above three questions attempt to measure the competitive environment of the firms. The reliability test on the internal consistency of the measures shows a Cronbach Alpha of 0.6955 (0.7) which is an acceptable level for the reliability test (Sekaran, 1992), thus suggesting that they are measuring the same construct. Therefore, the scores for these questions were aggregated to get the composite measure.

Table 8.6: Competitive environment and levels of sophistication employed

Composite score of B5,B6,B7	N	Mean	Standard Deviation	% rating 1 and 2	% rating 6 and 7
Level of Sophistication:					
Unsophisticated system	56	4.72	1.22	5.4	25.1
Low Sophistication system	46	5.29	1.18	2.2	54.3
Sophisticated system	8	5.5	1.20	-	62.5

The listings in Table 8.6 suggest that generally firms facing higher competition are falling within the sophisticated cost system category.

The Mann-Whitney test applied on the composite mean score of these measures (B5, B6, B7) and the two sophistication level (unsophisticated and low sophistication levels) shows that there is a significant difference (p-value: 0.007) in the responses. The responses were further analysed using the Kruskal-Wallis test to see the relationship between the competitive environment and the three levels of sophistication. This result (chi-square value: 8.238; p-value: 0.016) together with the Mann-Whitney result, indicate that the competitive environment

of the firm has an influence on the choice of the sophistication levels of cost assignment.

The above analysis therefore accepts ($p < 0.05$ one tailed test) the hypothesis presented in (chapter 4, section 4.7.3):

'The greater the intensity of competition that an organisation faces, the higher the level of sophistication of the costing system'.

The competitive strategies of the firms were mainly categorised under cost leadership and differentiation. The subjective nature of these strategies makes it difficult to measure them directly. Therefore an operational definition based on the standardisation and customisation of the products/services marketed by the firms is used. The rationale for using this operational definition is that, under the cost leadership strategy, the firm aims at producing a limited range of high volume products, i.e. more standardised products. Whereas under the competitive strategy of differentiation the firm is concerned with dealing in customised products/services (refer to chapter 4, section 4.7.4). Therefore Question B3 on standardisation and customisation was used as the measure to identify the relationship between the competitive strategies and the different sophistication levels.

From the earlier discussion at the end of section 8.4 relating to the standardised and customised products/services and the analysis shown in Tables 8.4 above it is concluded that there is no significant relationship between the competitive strategy used and the level of sophistication employed. Therefore the null hypothesis presented in chapter 4, section 4.7.4 *'The competitive strategy adopted by the firm has no influence on the level of sophistication of the costing system'* is accepted ($p\text{-value} > 0.05$ two-tailed test).

8.8 Type of organisation

It was stated in section 4.7.6 that service organisations with their higher proportion of indirect costs as compared to manufacturing and other non-service

organisations, need to assign these indirect costs accurately to avoid service cost distortion. With deregulation and rising competition, measuring service costs inaccurately may result in making the wrong decision and thus losing out to competitors. Therefore it may be necessary for service organisations, by virtue of having a higher proportion of indirect costs to have a sophisticated indirect cost assignment system to compute more accurate service costs. Table 8.7 shows the relationship between the types of organisation and the level of sophistication used.

Table 8.7: Analysis of business sectors by levels of sophistication

Level of Sophistication	Manu- facturing N= 43 %	Service, Financial & Commercial N=34 %	Financial & Commercial N=8 %	Retail, Conglomerate, Wholesale and other ^a N= 33 %
Unsophisticat ed systems	51.2	50.0	37.5	51.5
Low sophistication systems	41.9	41.2	50.0	42.4
Sophisticated systems	7.0	8.8	12.5	6.1

a : Of the total 7 plantation companies, 4 responded to this question and amongst these 4, 75% (3) of them used an unsophisticated system and 25 %(1) used a low sophistication system.

It is seen from Table 8.7 that all the firms irrespective of their business nature are quite similar in terms of the level of cost system sophistication except for the financial and commercial firms. The financial and commercial firms seems to be using more of the sophisticated systems and less of the unsophisticated systems as compared to the other industries. However, the non-parametric Kruskal-Wallis test applied showed that there is no significant relationship between the type of organisation and the levels of sophistication employed to assign the indirect costs to products/services.

The above statistical test supports the null hypothesis formulated in chapter 4, section 4.7.6, '*The business sector in which a firm operates has no influence on the level of sophistication of the costing system*' ($p\text{-value} > 0.05$ two-tailed test).

8.9 Influence of the usage of JIT systems

It was noted in section 2.3.1 that firms adopting a JIT system may measure costs accurately, even with a simplified system, because JIT is likely to result in an increase in the proportion of costs that can be directly associated with products. Therefore it can be hypothesised that JIT firms are more likely to have unsophisticated cost systems as compared to non-JIT firms.

Question C1 with its multiple sub-questions was used to identify JIT firms. One of the aims of a JIT philosophy is to reduce set-up costs and processing time, so that it is possible to produce and deliver individual products just as they are needed (Atkinson *et al* , 1997, p. 371; Drury, 1996, p. 30). Question C1 (a) on the frequency of set-up times seeks to measure this. Question C1 (b) sought to measure whether materials are delivered as needed and Question C1 (d) focused on the elimination of inventories. Both these questions are direct measures of JIT manufacturing practices. Plant layout [examined by Question C1(c)] in terms of flexible manufacturing cells also aims to identify a JIT firm directly. As was stated in section 2.3.1, the cellular manufacturing layout helps in reducing work-in-progress and lead times. Finally, Question C1 (d) relating to defective work and production halted and C1 (e) relating to cross-training and job-rotation also aim to identify JIT firms. Under the cellular manufacturing, all workers are trained to operate all machines on the line and are also required to undertake preventive maintenance and stop production if defective work occurs. The aim is to eliminate wastage.

All the above-mentioned six measures seek to capture the same construct, that is firms operating a JIT manufacturing practice. A 7-point Likert scale was used for all of the questions with 1 anchored as 'Strongly Disagree' and 7 as 'Strongly Agree'. The reliability test shows a high Cronbach Alpha of 0.7520 thus indicating a reasonably high level of internal consistency for the responses to these multiple measures. Therefore the composite score for the six questions relating to measuring the extent of JIT adoption was used.

Table 8.8: JIT systems and the levels of sophistication

Composite score of C1a,b,c,d,e,f	N	Mean	Standard Deviation	% rating 1 and 2	% rating 6 and 7
Unsophisticated systems	26	4.49	1.20	11.4	11.5
Low sophistication systems	22	4.61	0.90	-	18.0
Sophisticated systems	4	4.79	1.07	-	25.0

The Mann-Whitney test applied using the composite measure for the JIT systems showed that there was no significant relationship between JIT systems and the levels of sophistication (unsophisticated and low sophistication) employed. The Kruskal-Wallis test also showed that there was no significant relationship between the three sophistication levels and the use of JIT system.

This implies that that the hypothesis developed in (chapter 4, section 4.7.7) '*The greater the extent of the use of JIT techniques, the lower the level of sophistication of the costing system*' cannot be accepted (p -value > 0.05 one-tailed test).

8.10 Financial accounting mentality prevalent in the firms

The questions in Section E were used to examine whether the responses relating to a financial mentality had any influence in adopting the different categories of sophistication levels. The rationale for this is that firms tending to exhibit a financial accounting mentality are more likely to design their costing systems to meet the requirements of external reporting. Since these requirements can be met with relatively unsophisticated costing systems it is hypothesised that the level of sophistication will be inversely related to the tendency to exhibit a

financial accounting mentality. It was pointed out in Section 4.7.8, that firms exhibiting a financial accounting mentality are prone to adhering to financial accounting requirements rather than adjusting the information for management decision making purposes. As such, maintaining unsophisticated cost systems and computing less accurate costs would suffice for these firms. This implies that firms with a financial accounting mentality are more likely to maintain unsophisticated cost systems as compared to firms not possessing a financial accounting mentality.

Table 8.9 displays the data relating to the relationship between the sophistication levels and the financial accounting mentality prevalent in firms. Questions E1 and E2 were used for this purpose because these questions relate to the respondents' organisations and directly address the issue of financial accounting mentality. The questions were measured using a 7-point Likert scale with 1 as 'Strongly Disagree' and 7 as 'Strongly Agree'. A check on the reliability of these questions indicated a low Cronbach Alpha of 0.5091 implying that these questions are not measuring the same construct. Therefore these questions are not aggregated but are analysed separately.

Questions E1 and E2 in Table 8.9 show that the firms using the different category levels of sophistication have a mean score of less than 4, implying that they are more towards disagreeing that financial accounting dominates management accounting. The strongest disagreement score relates to the unsophisticated costing systems. The Mann-Whitney as well as the Kruskal-Wallis tests applied on both the questions indicated that there is no significant relationship between the sophistication levels and the financial accounting mentality prevalent in the firms. A similar test conducted for the manufacturing firms only (as per Table 7.2) also showed that there is no significant relationship between the sophistication levels and the financial accounting mentality prevalent in manufacturing firms.

The multiple item Question E4 on the respondents' opinions on the eight assertions was also analysed. It should be noted here that these are the respondents' personal opinions and therefore may not necessarily reflect the practices of their companies.

Referring to the principal component analysis done in chapter 7, section 7.7.1, the measures were categorised into the following:

- a) external standards and internal reports {Questions (a,b,c,d, and e)}
- b) influence of accounting policies on the financial performance {Questions (f and g)}
- c) management decisions and internal reports (Question h)

The reliability test showed a high Cronbach Alpha of 0.7210 for questions E4 a,b,c,d,e implying the internal consistency of the five measures and justifying the use of a composite score for these measures.

The composite score of E4 a,b,c,d,e (external standards and internal reports) shows a similar observation for the two levels of sophistication (unsophisticated and low sophisticated systems) suggesting that there is a 50/50 split in the responses. The sophisticated system shows that the responses are slightly inclined towards the financial accounting mentality. However the Kruskal-Wallis test and the Mann-Whitney test conducted showed that the observation was not significant (p -value >0.05) for both the three levels of sophistication and the two levels of sophistication.

As for the second category (the influence of accounting policies on financial performance), the reliability test showed a very low Cronbach Alpha of 0.1121 implying that the two questions are not measuring the same construct. Therefore they were not aggregated but dealt with separately.

All the firms under the three sophistication levels disagree with the assertion that companies on occasions change their accounting policies to improve published

financial statement (E4 f). The firms with the sophisticated systems strongly disagree to the assertion supporting the view that firms change their accounting policies simply to improve the published financial statements. Responses to E4 g indicates that all firms with the different levels of sophistication are more towards agreeing that investors can see through attempts to use accounting policies simply to improve the published financial statements. The Mann-Whitney and Kruskal-Wallis tests applied showed that there is no significant difference between the levels of sophistication and both the assertions.

Also the responses for E4 (h), on the assertion that management decisions to allocate resources to particular activities are based primarily on internal accounting requirements, there is strong agreement amongst all the firms irrespective of the sophistication levels maintained. Finally the non-parametric tests applied on E4h indicated that there is no significant difference between the levels of sophistication and the management decisions. Therefore it can be concluded that the hypothesis developed in (chapter 4, section 4.7.8), *'The greater the level of financial accounting mentality observed the lower the level of sophistication of the costing system'* is not supported ($p > 0.05$ one-tailed test)

Table 8.9: Financial accounting mentality prevalent in firms and the levels of sophistication used

<i>E1. Product cost information for financial accounting purposes dominates product cost information for decision making purposes :</i>	N	Mean	Standard Deviation	% rating 1 and 2	% rating 6 and 7
Unsophisticated system	54	3.96	1.78	25.9	20.4
Low sophistication system	45	3.84	1.74	20.0	27.8
Sophisticated system	8	2.75	1.04	37.5	-
<i>E2. Product costing system used for decision making is designed mainly to provide information for financial accounting statements</i>					
Unsophisticated system	56	3.39	1.65	32.2	9.0
Low sophistication system	46	3.30	1.47	30.4	6.5
Sophisticated system	8	3.00	1.51	37.5	12.5
<i>Composite score of E4 a,b,c,d,e</i>					
Unsophisticated system	56	4.09	1.10	7.2	9.0
Low sophistication system	46	3.98	1.01	8.7	10.8
Sophisticated system	8	4.43	1.37	-	25.0
<i>E4 f Companies on occasions change their accounting policies simply to influence stock market perceptions of performance</i>					
Unsophisticated system	56	3.13	1.94	48.2	14.3
Low sophistication system	46	3.02	1.73	43.4	8.7
Sophisticated system	8	1.88	1.25	62.5	-
<i>E4 g Investors can usually see through attempts to use accounting policies simply to improve the published financial statements</i>					
Unsophisticated system	56	4.13	1.65	17.8	21.4
Low sophistication system	46	4.30	1.49	13.0	21.8
Sophisticated system	8	5.00	1.77	12.5	37.5
<i>E4 h Management decisions to allocate resources to particular activities are based primarily on internal accounting reports</i>					
Unsophisticated system	56	2.86	1.38	41.1	8.9
Low sophistication system	46	2.91	1.49	45.6	8.7
Sophisticated system	8	3.13	1.89	50.0	12.5

8.11 Analysis based on alternative methods of measuring cost system sophistication

Five different methods of cost system sophistication were described in section 8.2 and in sections 8.4-8.10 hypotheses tests were undertaken using the fifth

method of measuring the level of cost system sophistication described in section 8.2.5. Throughout the differences in scores for two or more groups (i.e. different levels of cost sophistication) were examined to test the hypotheses using either the Mann-Whitney or Kruskal-Wallis non-parametric tests except for the variable cost structure whereby the parametric one-way ANOVA and the t-test were used. In this section the hypotheses are examined using the alternative methods of measuring the level of cost system sophistication described in sections 8.2.1-8.2.4.

With the exception of the third method of measuring cost system sophistication (using Question D5) a 7-point ordinal scale has been used for all of the alternative methods. Adopting the approach used in Sections 8.4-8.10 would involve dividing the scores on the 7 point scales into a smaller number of groups and a loss of data. Therefore, correlation measures are used as an alternative method of testing the hypotheses. Correlation is frequently used as a method of testing hypotheses. It is widely recognised that correlation provides a yardstick whereby the intensity or the strength of relationship between a pair of variables can be measured (Bryman and Cramer, 1999, p.176).

A correlation matrix (Table 8.10) has been derived to examine the influence of the potential explanatory variables that are measured on an interval or ordinal scale on each of the three alternative measures of cost system sophistication viz:

1. number of cost pools used (D6)
2. number of cost drivers used (D7)
3. self-rating of level of accuracy and perceived satisfaction (composite measure for D9 and D10 - refer to section 8.2)

In addition, a variant of the fifth method (involving summing the scores for each of the responses to Questions D6 and D7) has also been incorporated within the correlation matrix in order to provide an alternative approach to combining the

responses for the number of cost pools and number of different types of cost drivers.

Only one of the potential explanatory variables (type of organisation) is not measured on an interval or ordinal scale. This variable has been measured using a nominal/categorical scale. Therefore the influence of this explanatory variable is examined using the chi-square test for each of the three above methods of measuring cost system sophistication. In addition, because a categorical 4-point scale is used as the third method of measuring cost system sophistication the Kruskal-Wallis test is used for testing the hypotheses relating to this variable.

Table 8.10: Correlation Matrix - Explanatory variables and the alternative measures of sophistication

		Number of Cost Centres	Number of Cost Drivers	Level of Accuracy and Perceived Satisfaction	Number of cost centres and cost drivers
		D6	D7	Composite measure of D9 and D10	Sum of D6 and D7
Cost Structure	Spearman's Rho Significance (2-tailed) Pearson Correlation Significance (2-tailed)	-0.093 0.344 -0.078 0.428	-0.069 0.485 0.127 0.198	-0.073 0.433 -0.145 0.120	-0.016 0.868 0.039 0.695
Product Diversity ²	Spearman's Rho Significance (2-tailed)	0.017 0.862	0.008 0.932	-0.147 0.107	0.062 0.523
Volume Diversity ³	Spearman's Rho Significance	0.026 0.788	-0.047 0.631	0.036 0.694	-0.003 0.974
Volume Diversity ⁴	Spearman's Rho Significance (2-tailed)	0.103 0.282	0.088 0.360	-0.125 0.173	0.137 0.154
Size of Firm ⁵	Spearman's Rho Significance (2-tailed)	0.305 0.001	0.221 0.022	0.181 0.049	0.288 0.003
Competitive Environment ⁶	Spearman's Rho Significance (2-tailed)	0.111 0.248	0.155 0.105	-0.121 0.185	0.172 0.073
JIT ⁷	Spearman's Rho Significance (2-tailed)	-0.090 0.525	-0.002 0.991	0.341 0.009	-0.024 0.864

*Correlation is significant at the 0.05 level (1-tailed); ** Correlation is significant at the 0.01 level (2-tailed)

- 1 - Total indirect costs in Question B8 used as a measure for the variable "cost structure of firms"
- 2 - Composite score of questions B3, B4(a,b,d) used as the measure for product diversity
- 3 - Question B2 on the variation in the sales volume used as a measure for volume diversity
- 4 - Question B4c on the major deviations in the provision of product/service volume or lot sizes used as the volume diversity measure
- 5 - Question A5 on the average turnover used as a measure for the size of firms
- 6 - Composite score of Questions B5, B6, and B7 used as the measure for competitive environment
- 7 - Question A1 used as a measure for the variable "Type of Organisation"
- 8 - Questions C1 a,b,c,d,e,f used as a measure for the usage of JIT in firms

The results show that there is no significant correlation between the alternative measures of sophistication and most of the explanatory variables. The variable 'competitive strategy' was measured using Question B3 on standardisation and customisation (refer to Section 8.8). The only potential variable that shows a significant association with the cost system design is the size of the firms. Table 8.10 shows that the variable "size of firm" does have a significant positive correlation with the all the different alternative measures of sophistication employed. Size of firms also has a significant influence on the sophistication levels based on the earlier measure of the researcher's self-judgement (refer section 8.4).

Therefore these analyses strongly support the hypothesis (chapter 4, section 4.7.2), *'the greater the size of an organisation, the higher the level of sophistication of the costing system'*.

As for the use of the JIT system and the sophistication levels maintained, the fourth measure of the respondents' self-rating in terms of the level of accuracy and the perceived satisfaction also shows a significant low positive correlation (Spearman's Rho: 0.341), suggesting that the JIT systems are used more by the sophisticated and low sophistication firms. However the other alternative measures and the analysis in (section 8.8, using the researcher's self-judgement for the measure of sophistication) show that there is no significant relationship between the sophistication levels and the JIT system.

As was mentioned above the type of organisation is measured as a categorical variable. Therefore the chi-square test was used to see if there are any significant association between the type of organisation and the sophistication levels using the alternative methods. The results indicated that there is no significant association between these variables (p-value: 0.928).

As for the potential explanatory variable, the financial accounting mentality prevalent in firms, no conclusive results could be obtained as there was a 50/50

split in the responses (refer chapter 7, section 7.7). Therefore this variable is excluded from the correlation matrix.

Because the responses to Question D5 are on a 4-point categorical scale it is inappropriate to use correlation measures. Instead, the p-values for the Kruskal - Wallis test are presented in Table 8.11 based on the analysis by the following four categories of responses to Question D5:

1. a single overhead rate (blanket rate) is used
2. separate departmental overhead rates are used
3. departments further segregated into cost centres and separate cost centre rates used
4. no overhead rates because only direct costs are assigned

Given the small number of responses to D5(c) the Kruskal -Wallis test is repeated based on the responses by categories D5 (a, b and d) for all the explanatory variables excluding the cost structure of the firm and the type of organisation. As was mentioned in (section 8.4), the one-way ANOVA is used for the cost structure which has an interval scale and the chi-square test is performed on the type of organisation which is a categorical nominal scale.

Table 8.11: Potential explanatory variables and the third alternative measure of sophistication [Question D5(a,b,c,d) and Question D5 (a,b,d)]

	Question D5 (a,b,c,d)		Question D5 (a,b,d)	
	Chi-Square value	p-value	Chi-Square value	p-value
<i>Kruskal-Wallis Test:</i>				
Product Diversity ¹	2.523	0.471	2.468	0.291
Volume Diversity ²	0.551	0.908	0.482	0.786
Volume Diversity ³	1.473	0.688	0.670	0.715
Size of Firm ⁴	8.159	0.043	4.457	0.108
Competitive Environment ⁵	5.807	0.121	2.717	0.257
JIT ⁶	3.166	0.367	2.832	0.243
<i>Chi-Square Test :</i>				
Type of Organisation ⁷	32.039	0.126	28.326	0.057
<i>One-Way ANOVA:</i>				
	F-Value	p-value	F-Value	p-value
Cost Structure ⁸	0.951	0.438	1.001	0.395

- 1 - Composite score of questions B3, B4(a,b,d) used as the measure for product diversity
2 - Question B2 on the variation in the sales volume used as a measure for volume diversity
3 - Question B4c on the major deviations in the provision of product/service volume or lot sizes used as the volume diversity measure
4 - Question A5 on the average turnover used as a measure for the size of firms
5 - Composite score of Questions B5,B6,and B7 used as the measure for competitive environment
6 - Questions C1 a,b,c,d,e,f used a s measure for the usage of JIT in firms
7 - Question A1 used as a mesure for the varuable "Type of Organisation"
8 - Total indirect costs in Question B8 used as a measure for the variable "cost structure"

Referring to Table 8.11, the Kruskal-Wallis test shows that the potential explanatory variables product diversity, volume diversity, competitive environment, and the JIT usage do not have a significant relationship with the third alternative measure of sophistication as per question D5 a, b, c, d and D5 a, b, d. The variable 'competitive strategy' was measured using Question B3 on standardisation and customisation (refer to section 8.8). The results show that the size of firm has a significant influence on this alternative measure of sophistication as per Question D5 a, b, c, d. On the contrary, it is interesting to note here that the size of the firm has no significant influence on the three categories D5a, b, d (excluding the sophisticated cost centre rates) of the cost

accumulation and assignment procedure as per D5 a,b,d. This analysis suggests that the size of the firm may have an influence on the more sophisticated system (D5c). The chi-square test performed on the type of organisation showed that there is no significant association between the type of organisation and the third alternative measure of sophistication [D5 a,b,c,d {p-value: 0.126}; and D5 a,b,d {p-value: 0.057}]

The Levene statistics for the cost structure showed a probability of 0.407 for D5 a, b, c, d and 0.387 for D5 a, b, d indicating that the variances are not significantly different. The results of the ANOVA shows that a significant value of 0.438 for D5 a, b, c, d and 0.395 for D5 a, b, d implying that there are no significant differences between the cost structure of the firm and the cost system sophistication maintained (as per the third measure D5 a, b, c, d and D5 a, b, d).

A frequency distribution of the different measures of cost accumulation and assignment based on the type of organisation and the size of the firm is listed below in Table 8.12:

Table 8.12: Relationship between the cost accumulation and assignment procedures and the potential explanatory variables - type of organisation and size of firm

	Single Overhead Rate	Departmental Overhead Rates	Separate Cost Centre Overhead Rates	Only Direct Costs Assigned	Total
<i>Type of Organisation :</i>	N(%)	N(%)	N(%)	N(%)	N(%)
Manufacturing	7(15.2%)	30(65.2%)	4(8.7%)	5(10.9%)	46(100%)
Service, Financial & Commercial	8(18.6%)	23(53.5%)	3(7.0%)	9(20.9%)	43(100%)
Conglomerate	2(25%)	4(50%)	1(12.5%)	1(12.5%)	8(100%)
Retail, Wholesale and Other	1(3.7%)	12(44.4)	1(3.7%)	13(48.2%)	27(100%)
<i>Size of firm:</i>					
Less than RM150m	13(22.0%)	34(57.6%)	3(5.1%)	9(15.3%)	59(100%)
RM151m - RM600m	2(4.8%)	24(57.1%)	3(7.1%)	13(31%)	42(100%)
More than RM600m	3(15%)	9(45%)	3(15%)	5(25%)	20(100%)

The listings in Table 8.12 suggest that the retail, wholesale and other firms are using the direct costing technique more than the other firms. This may be due to indirect costs representing a lower proportion of costs for organisations within this sector. The Mann-Whitney test conducted showed that there is a significant difference between the type of firms and the use of direct costing (p-value: 0.001). As for the sophisticated cost centre rates the usage is low for all the different types of organisations. The departmental overhead rates are used by majority of all the different types of organisations.

The single rate tends to be used by more of the smaller firms as compared to the medium and large firms. As for the more sophisticated separate cost centre rates, more of the larger firms as compared to the smaller firms are using this rate. The most commonly used rate by all the firms irrespective of their size is the traditional departmental rate. This analysis implies that the traditional

departmental rates are still favoured by most firms. However the Mann-Whitney test performed indicated that there is no significant difference in respect of the use of direct costing by size (p-value: 0.408).

8.12 Sophisticated costing systems and the potential explanatory variables

The responses of the 8 firms that have been identified as having sophisticated costing systems were examined to ascertain if there were any distinguishing features in terms of the potential explanatory variables. Overall the sophisticated firms were seen to be large firms mainly in the service, financial and commercial sectors with more product diversity and less indirect cost structure. Given the small number of firms within this category it is difficult to identify significant distinguishing features. Care must therefore be exercised as the distinguishing features may represent only chance observations.

8.13 Testing the hypotheses using multiple regression

So far the hypotheses have been tested by using the following approaches:

1. exploring the differences in the scores between two or more groups (i.e. different levels of cost system sophistication) in respect of different potential explanatory independent variables, and
2. a correlation measure that measures the strength of relationship between a pair of variables (i.e. measures of cost system sophistication and the potential explanatory variables).

For both of these approaches either parametric or non-parametric tests can be used. Because most of the variables are measured on either an ordinal or categorical scale the use of parametric tests would result in the violation of the assumptions that are required for undertaking such tests. Therefore, a conservative approach has initially been adopted and non-parametric tests have been used to ensure that the data does not violate any of the underlying assumptions.

Although it has traditionally been recognised that non-parametric tests are the most appropriate tests when the data is categorical or ordinal there are many statisticians (Bryman and Cramer, 1999, p 59; Noursis, 2000, p 20; Miles and Shevlin, 2001, pp 61-62) who argue that a liberal interpretation of this assumption is to consider that numerical rating questions (i.e. an ordinal scale) as being close enough to interval scales and, therefore, a linear regression model can be used.

Hedderson (1991, p 119) also states that theoretically variables should be normally distributed for a multiple regression analysis but in practice the multiple regression analysis recognised as a robust technique can include non-normally distributed variables, if their deviations from normality are not extreme.

A further assumption for the multiple regression technique is that the residuals have a linear relationship with the predicted dependent variable scores and that the variance of the residuals is the same for all predicted scores. Mild deviations from linearity are not serious while moderate to extreme deviations may lead to serious underestimation of a relationship (Coakes and Steed 1997, p 202). Noursis (2000, p 547) also states that the relationship between the dependent and independent variables should be linear and for each combination of values of the independent variables, the distribution of the dependent variable is normal with a constant variance. The author also emphasises (p 548) the need to ensure the linearity of the dependent and the independent variables before proceeding with the regression analysis. The scatterplot of residuals against predicted values (Figure 8.1) shows an approximate linear relationship between the dependent and the independent variables. The normal plot of regression standardised residuals for the dependent variable also indicates a relatively normal distribution (Figure 8.1).

Furthermore, there are many management accounting researchers (Sheilds, 1995; Guilding, 1999; Hoque, 2000; Hoque and James, 2001) who have used the regression model in order to test hypotheses relating to variables measured on an ordinal scale. Therefore it is considered appropriate to use regression analysis (a parametric test) since there is no non-parametric counterpart and it is an appropriate analysis tool for the data relating to this study.

The multiple regression analysis is used, to examine the change in the dependent variable arising from a change in an independent variable, with the other independent variables in the equation controlled.

The dependent variable (the level of cost system sophistication) is measured by the number of cost pools and the number of different types of cost drivers used. Using either the number of cost pools or the number of different types of second-stage cost drivers on their own provides an incomplete measure of the level of cost system sophistication. Therefore, both the measures number of cost pools and the number of different types of cost drivers are combined to provide an indication of the level of cost system sophistication.

This is done by adding the respective scores for each point on the 8-point scale for the two questions. Thus, a respondent whose costing system has 11-20 cost pools and 7-10 different type of cost drivers would enter a score of 5 on the 8-point scale for the number of cost pools and 7 for the number of cost drivers. Summing these scores gives a score of 12 for the measure of cost system sophistication. Therefore the cost system sophistication is measured on a 15-point scale ranging from 2 (a respondent ticking point 1 for both the cost pool and cost driver questions) to 16 (a respondent ticking point 8 for both questions). This 15-point scale is used to provide an ordinal scale by ranking the level of sophistication in an ascending order from low to high.

An interval scale based on the actual number of cost pools and cost drivers (by asking the respondents to enter the actual number of cost pools and cost drivers employed) could be used. The limitation of this method is when adding the scores for a traditional costing system with 50 cost pools and 1 cost driver would have resulted in a higher cost system sophistication ranking measure than an ABC system with 35 cost pools and 10 different types of cost drivers. Thus, even with the collection of interval data some form of ordinal measurement system for the level of cost system sophistication would be necessary to rank the responses more appropriately.

The independent (predictor) variables are as follows:

- cost composition of the firm ¹
- product diversity of the firm ²
- Volume Diversity³
- Volume Diversity⁴
- Size of Firm⁵
- Competitive Environment⁶ / Competitive strategy⁷
- Type of Organisation⁸
- JIT⁹

1 - Total indirect cost in question B8 used as a measure for the variable "cost structure of firm"

2 - Composite score of questions B1, B3, B4(a,b,d) used as the measure for product diversity

3 - Question B2 on the variation in the sales volume used as a measure of one dimension of volume diversity

4 - Question B4c on the major deviations in the provision of product/service volume or lot sizes used as a measure of a second dimension of volume diversity measure

5 - Question A5 on the average turnover used as a measure for the size of firms

6 - Composite score of Questions B5,B6,and B7 used as the measure for competitive environment

7 - Competitive strategy measured using B3 on standardisation and customisation

8 - Main business as per question A1 grouped into manufacturing, service and financial, retail, conglomerate, wholesale and other categories and dummy variables used.

9 - Questions C1 composite score for a,b,c,d,e,f used as a measure for the usage of JIT in firms

The following model was used to test the hypotheses:

$$\text{Cost System Sophistication} = b_1 + b_2 \text{ Cost Structure} + b_3 \text{ Product Diversity} + b_4 \text{ Volume Diversity} + b_5 \text{ Size} + b_6 \text{ Competitive Environment} + b_7 \text{ Manufacturing}^* + b_8 \text{ Service, Financial and Commercial}^* + b_9 \text{ JIT Usage}$$

* Manufacturing : dummy variable set equal to (1) if company is in the manufacturing industry, otherwise (0)

Service, Financial and Commercial : dummy variable set equal to (1) if company is in the service, financial and commercial industry, otherwise (0)

The third industry sector is combined to give a grouping of retail, conglomerate, wholesale and other to which a dummy variable is not assigned.

The collinearity statistics (tolerance and variance inflation factor -VIF) of the above model is shown in Table 8.13. The table indicates a relatively low VIF and a high tolerance suggesting that there is no problem from multi-collinearity.¹

Table 8.13 : Collinearity statistics of the regression model

Collinearity Statistics		
	Tolerance	VIF
Cost structure	0.696	1.437
Product diversity	0.438	2.281
Volume diversity 1	0.775	1.291
Volume diversity 2	0.612	1.634
Size of firms	0.698	1.433
Level of competition	0.808	1.237
Competitive strategy	0.536	1.866
Service & Financial Industry	0.516	1.936
Manufacturing industry	0.541	1.849
JIT usage	0.841	1.228

¹ A general rule of the thumb is that tolerance values should be close to 1 and the VIF values should be less than 2 (Miles and Shelvin, 2001, p 130)

The multiple regression output showed an insignificant F-value for the model as a whole. Considering the variable "JIT usage" was applicable to manufacturing organisations only, the inclusion of this variable will have resulted in many responses being omitted because of missing data for one of the variables. Furthermore, it is observed that there is no significant relationship between the "usage of JIT" and the other measures of sophistication. Therefore it was decided to omit this variable from the regression model. The results of the revised model indicated a significant (0.006) F value (2.829). Table 8.14 shows the results of the regression analysis for the revised model excluding JIT usage.

The model summary shows an R square of 0.219 (21.9%) implying that the independent variables (excluding the variable "JIT Usage") explain 21.9% of the variance in the dependent variable, the level of sophistication maintained. An examination of the t-values indicates that size of firm (measured by the turnover) and the competitive environment are the only significant ($p < .01$) independent variables. No casewise plots were produced implying that there are no outliers. The scatterplot (Figure 8.1) of residuals against predicted values shows no clear relationship, which is consistent with the assumption of linearity. The normal P-P plot of regression standard also indicates a relatively normal distribution (Figure 8.1). As indicated above the variable size of firm was significant at the 1% level, having a positive relationship with the cost system sophistication. This is consistent with the predicted direction of the directional hypothesis forwarded in chapter 4, section 4.7.2. The level of competition also showed a low positive relationship at the 5% significant level. All the other independent variables did not show any significant relationship.

Table 8.14 :
Multiple regression of sophistication of cost system design with the potential explanatory variables-
Model summary and coefficient

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson		
1	0.468	0.219	0.141	0.59	1.776		
Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.445	0.328		1.356	0.178		
Cost Structure	2.634E-03	0.003	0.081	0.791	0.216	0.811	1.233
Product Diversity	9.956E-02	0.066	0.201	1.517	0.0665	0.489	2.044
Volume Diversity	-1.90E-02	0.036	-0.053	-0.531	0.299	0.872	1.147
Volume Diversity	2.363E-02	0.044	0.064	0.534	0.298	0.595	1.682
Size of Firm	0.119	0.035	0.352	3.456	0.0005	0.826	1.211
Competitive Environment	9.453E-02	0.051	0.188	1.861	0.033	0.846	1.182
Competitive Strategy	-2.86E-02	0.041	-0.080	-0.699	0.486	0.650	1.540
Service & Financial Industry	-6.50E-02	0.156	-0.047	-0.417	0.678	0.682	1.467
Manufacturing industry	7.863E-02	0.148	0.061	0.533	0.595	0.664	1.505

8.14 Relationship between level of cost system sophistication and firm performance

In chapter 1, (Figure 1.2 and section 1.5.2) it was pointed out that ideally research should test whether organisations that achieve a fit between the contingent variables and accounting information system design achieve more effective performance. Also some researchers (e.g. Kennedy and Affleck-Graves, 2001) have examined the impact of ABC techniques on firm performance. The problem with examining the relationship between aspects of cost system design and firm performance is that there are many variables that influence firm performance besides the potential influence of the design of the cost system. Because of the difficulty of holding the 'other' variables constant, hypotheses relating to contingent variables, cost system design and performance have not been formulated. Nevertheless, data was collected on aspects of firm performance and the potential relationship between the different levels of cost system sophistication and firm performance was explored.

The sub-questions within Question G1 were used to measure firm performance. A factor analysis using the principal component analysis showed that the five items in Question G1 loaded on to a single factor, which accounted for 77% of the total variance. Subsequently, the reliability test showed a high Cronbach Alpha of 0.9238, with a standardised item alpha of 0.9260. These tests imply that the sub-questions in G1 are reliable. Therefore a composite score for these five items in G1 was used to see if there is a relationship between the levels of sophistication maintained and the performance measures of the firms. Both the Kruskal-Wallis test (for the three levels of sophistication, p-value: 0.507) and the Mann-Whitney test (for the two levels of sophistication excluding the sophisticated system, p-value: 0.522) indicated that there is no significant relationship between the performance measures and the sophistication levels maintained by firms.

8.15 Summary / Conclusion

In this chapter the main concern was to investigate the hypotheses presented in Chapter 4 regarding the influence of the potential explanatory variables on the sophistication of cost system design maintained by firms. Five different measures were identified for operationalising the dependent variable, "sophistication level of cost system design". The fifth measure on the researcher's self judgement based on the number of cost drivers and cost centres used was identified to be the most appropriate measure and therefore the statistical tests were undertaken based on this measure. However, the other four measures were considered to be alternative measures and were used to obtain alternative results on the influence of the potential explanatory variables on the cost system sophistication maintained by firms. Table 8.15 summarises the results obtained from the different measures of sophistication used.

The table indicates that only the variable "size of firms" has a significant influence on the sophistication of the cost system design (for all the different measures of sophistication). As for the JIT usage, the fourth measure of level of accuracy and perceived satisfaction shows a strong significant influence. However the limitations of using this measure were discussed in section 8.2.4, paragraph 2. The fifth measure, the researcher's self-judgement showed that there is a weak significance between the sophistication level and the competitive environment of the firms.

To confirm the above findings, the hypotheses were further tested using a stronger parametric statistical analysis, the multiple regression technique. The results of this test (Table 8.14) show that the size of the firm has a strong significant influence on the sophistication of the cost system design while the level of competition also shows a significant relationship. This finding is similar to the findings based on the sophistication levels measured using the alternative methods. Therefore, it can be concluded from the overall analysis that the hypothesis *'the greater the size of an organisation, the higher the level of*

sophistication of the costing system' can be accepted. As for the level of competition there seems to be a positive relationship for the cost system design under two alternative measures, therefore supporting the hypothesis '*the greater the intensity of competition that an organisation faces, the higher the level of sophistication of the costing system'*'. However, the overall findings do not provide sufficient evidence to support the hypotheses relating to the remaining potential explanatory variables examined by this research.

Table 8.15 : Summary of the results of the influence of the potential explanatory variables on the different measures of sophistication used

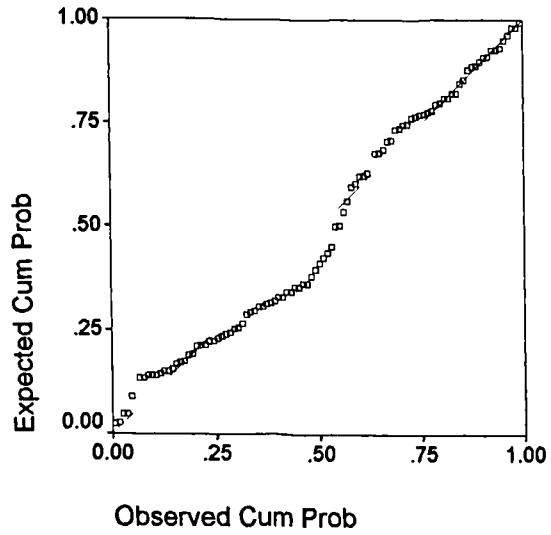
	Number of cost centres	Number of cost drivers	Cost assignment procedure	Level of accuracy and perceived satisfaction	Sum of number of cost centres and cost drivers used	Researcher's Self Judgement
	Measure 1 (Q 6)	Measure 2 (Q7)	Measure 3 (QD5)	Measure 4 (Composite measure of Q9 and Q10)	Measure (Variant of Measure 5) (Sum of Q6 and Q7)	Measure 5 (Crosstab of Q6 and Q7)
Cost structure	NS	NS	NS	NS	NS	NS
Product Diversity	NS	NS	NS	NS	NS	NS
Volume Diversity	NS	NS	NS	NS	NS	NS
Size of firm	S**	S**	S**	S**	S**	S**
Competitive environment	NS	NS	NS	NS	NS	S
Competitive Strategy	NS	NS	NS	NS	NS	NS
Type of Organisation	NS	NS	NS	NS	NS	NS
JIT Usage	NS	NS	NS	S**	NS	NS
Financial Accounting Mentality Prevalent in Firms	#	#	#	#	#	NS

S** - Strong Significance (p < 0.05); S* - Weak Significance (p < 0.1); NS - Not Significant ; # No tests done ;

Figure 8.1

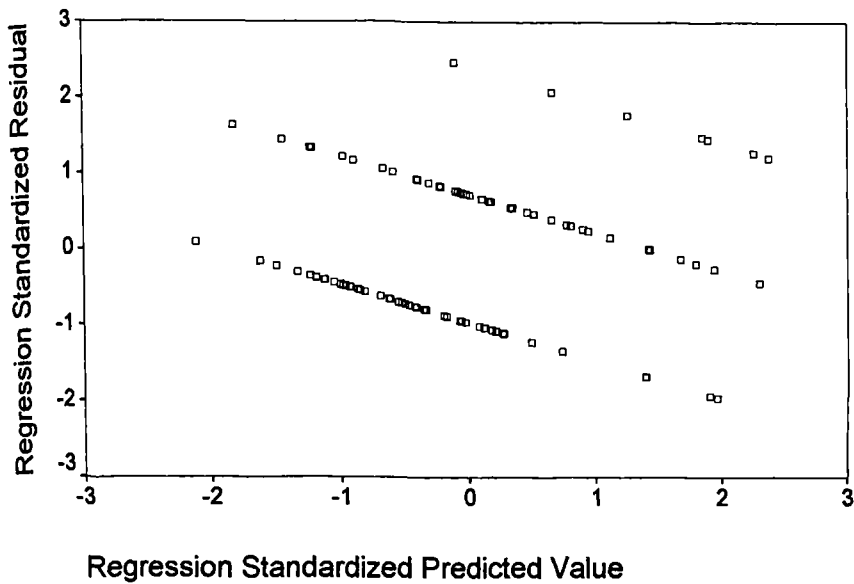
Normal P-P Plot of Regression Sta

Dependent Variable: SOPHISTI



Scatterplot

Dependent Variable: SOPHISTI



Chapter 9

CONCLUSION

9.1 Introduction

9.2 Discussion of the major research findings

9.3 Distinguishing features and contribution of the research

9.4 Limitations of the research findings

9.5 Future research

9.6 Concluding thoughts

Chapter 9

CONCLUSION

This chapter aims to provide an overall view of the study. The chapter starts with a brief discussion of the factors that motivated the study and also the reasons for undertaking the research. The next section provides a summary of the major research findings in relation to the research objectives identified in chapter 1. This is followed by a description of the distinguishing features of the research and the major research findings. The penultimate section identifies the potential limitations of the research and the concluding section discusses possible areas for further research pertaining to this subject.

9.1 Introduction

As was mentioned in chapter 1, the following factors provided the incentive for undertaking the research:

- The paradigm shift in the product/service cost environment and hence the need to study observed product cost system design practices;
- The publicity given to the major criticisms by several authors (Kaplan, Cooper and Kaplan, Johnson and Kaplan) to the limitations of the prevalent product costing systems in providing accurate product/service cost information;
- The concentration of product costing research in Western Europe, USA, Japan and Australia since the early 1990s and the lack of such empirical research in the South East Asian area;
- Financial mentality has attracted much publicity but mainly UK and USA based but there is little information as to whether it applies elsewhere thus providing an impetus to examine the extent to which it is prevalent in Malaysia.
- Cooper (1997) has recognised profitability analysis as an attention-directing mechanism for managers to make better decisions. An Australian study by Chenhall and Langfield-Smith (1998) has also indicated that companies are

expected to be placing relatively greater emphasis on profitability analysis. However, there is a dearth of empirical data on this area. The importance of profitability analysis and the scarcity of research findings in this area prompted the researcher to investigate the use of profitability analysis in the Malaysian firms.

- The calls for further research in product/service costing systems especially on the influence of potential explanatory factors on cost system design.

Based on these factors the current study was conducted in Malaysia (South East Asia) as the researcher originates from this country. In common with most of the previous research in this area the data was collected using a postal questionnaire survey. The reasons for adopting this approach were explained in chapter 6.

9.2 Discussion of the major research findings

The research objectives were formulated based on the research problems identified in chapters 1 and 6. It was pointed out that the over-riding objective was to explore the influence of potential contingent (explanatory) variables which the literature review suggested ought to influence the design of aspects of product costing systems (defined in terms of the level of sophistication) in Malaysian companies. In addition the research also has the following objectives:

To examine the extent to which firms use a single database from which different costs are extracted for different purposes or whether separate databases are used for obtaining different cost information.

1. To explore the extent to which different cost information is used for different purposes.
2. To investigate the level of sophistication of the cost system design maintained by Malaysian companies;

3. To investigate if a financial accounting mentality is prevalent in the Malaysian companies;
4. To investigate the treatment of non-manufacturing costs in manufacturing companies;
5. To examine the extent of usage of ABC systems in the Malaysian companies;
6. To examine the nature, content and role of product/service profitability analysis in the Malaysian companies.

The first objective was achieved by examining the number of cost databases maintained by the firms. The rationale for examining the number of cost databases is that if the firms are using a single cost database without adjusting the information extracted then it implies that the same cost information is being used for the different purposes. Alternatively, if different cost databases are maintained, or if cost information is adjusted when it is extracted from a single cost database, this suggests that different cost information is used for different purposes.

The analysis concentrated on the 46 manufacturing companies (as per Table 7.2) because the three different purposes, stock valuation, decision-making and profitability analysis were important for these 46 firms. The results indicated that 61% of these 46 firms maintained either separate cost databases or were extracting information that was subsequently adjusted from a single cost database thus suggesting that the majority of the firms are using different costs for different purposes. The remaining firms using a single cost database without any subsequent adjustments are basically using financial cost information for all purposes. This implies that these firms may not be using relevant or accurate product cost information for decision-making or profitability analysis.

Regarding the first objective relating to the cost information that is extracted from the costing system for different types of purposes the research indicated that different cost information was used for pricing decisions compared with other

types of decisions. The findings indicated that full costs were extensively used where cost-plus pricing was used as a basis for making pricing decisions. In contrast, for other types of decisions many of costs that were perceived as fixed and requiring arbitrary allocations were not assigned to products/services by many of the organisations. The reason for this could be that for cost-plus pricing decisions, there may be a need to have full cost pricing information to ensure that products recover the costs of resources consumed, plus a fair share of the facility sustaining costs. Alternatively, for the other decisions as the underlying theory suggests, costs with arbitrary allocation bases may not be assigned to avoid product cost distortion. Nevertheless, it should be noted that the firms in this study may not be using appropriate cause and effect allocation bases but are merely reporting on the different categories of costs used in decision-making.

The second objective focused on the level of sophistication of the costing systems maintained by Malaysian companies. As the level of sophistication is a very subjective concept, several different proxy measures were used. One of the approaches involved categorising the sophistication levels by: -

1. unsophisticated systems;
2. systems of a low sophistication level;
3. sophisticated systems.

Using the above classification system 51% of the responding organisations were classified within the unsophisticated category, 42% within the low level of sophistication category and only 7% were classified within the sophisticated category. Drury and Tayles (2000) adopted a similar classification in their study of cost system design within UK companies. They identified 21% of the organisations within the unsophisticated category, 56% within the low sophistication and 23% within the sophisticated category. Relative to the UK, the findings suggest that Malaysian companies tend to have significantly more unsophisticated costing systems. An area of major concern was that the respondents were asked to indicate on a 7-point scale ranging from 'Not very

accurate' to 'Extremely accurate' how accurate they thought their organisation's costing systems were in assigning indirect costs to cost objects. A score of 6 or more was assigned by 37% of Malaysian compared with 13% from the UK respondents even though the latter had a larger proportion of firms that were classified within the sophisticated category. Similar percentages for the perceived accuracy scores were observed for all three categories of sophistication in respect of the Malaysian respondents. Therefore, despite the observed low levels of sophistication many of the Malaysian respondents were satisfied with their costing systems and considered that their costing systems accurately assigned indirect costs to cost objects.

Possible reasons for the different observed levels between the two countries may be due to the simple fact that the UK has a more advanced economy and a greater pool of skilled management accountants to implement and operate more sophisticated systems. Future studies should focus on the influence of supply side relating to the diffusion of more sophisticated costing systems within Malaysia to ascertain whether the lack of skilled management accountants is a factor that inhibits the implementation of more sophisticated systems. Another possible reason for the differences is that one may not be comparing like with like. There was a greater proportion of large companies in the UK survey. When size is taken into account the differences may be minimal. For example, 36% of the UK companies had an annual sales turnover in excess of £300 million whereas only 6% of the Malaysian companies had an annual sales turnover in excess of RM 1800M (equivalent to approximately £360M). Furthermore, 48% of the UK companies with an annual sales turnover exceeding £300 million were classified as having sophisticated costing systems whereas the corresponding figure was only 8% for companies with an annual sales turnover of less than £300 million. A more appropriate comparison would be to compare the differences between the two countries matched by size and industry sector.

An important feature of this research is that it has avoided the difficulties that have been encountered by previous researchers in distinguishing between ABC and traditional costing systems. In particular, previous product costing research has been subject to the weakness of potential costing system misclassification arising from being dependent upon respondents' classification of systems as ABC or non-ABC. Suitable control questions that allow researchers to check respondents' claims that their organizations are operating ABC systems have rarely been incorporated in previous questionnaire surveys. This research used the number of first stage cost pools and different types of second-stage cost drivers to classify the levels of cost system sophistication instead of allowing the respondents to classify their costing systems as ABC or non-ABC. In addition, self-checking questions relating to the different types of cost drivers used were included in the questionnaire.

The third objective was to investigate the prevalence of a financial accounting mentality amongst the Malaysian companies. The overall findings presented in chapter 7 (section 7.7) indicated that there was no clear evidence to justify Johnson and Kaplan's criticisms that financial accounting needs dominate management accounting needs. Part of the questionnaire sought the respondents' views on this issue. There was a divergence of opinions amongst the respondents but no evidence to suggest that Malaysian practicing accountants support the view that that financial accounting needs dominate management accounting needs. In addition, questions relating to company practices did not provide evidence to suggest that a 'financial accounting mentality' actually exists in practice.

The fourth objective relating to the treatment of non-manufacturing overheads in manufacturing companies revealed that the majority of the companies were not allocating non-manufacturing costs to the products. Most firms that assigned non-manufacturing costs to products used arbitrary allocation bases. This finding

reflects the possible existence of a financial accounting mentality amongst the Malaysian manufacturing firms as the majority of them are only allocating the manufacturing costs to their products. It also provides further evidence relating to the widespread use of unsophisticated costing systems since very few companies attempted to assign non-manufacturing costs to products/services using cause-and-effect cost drivers.

Despite the criticisms of classifying costing systems by ABC or traditional systems the fifth objective of the research did seek to ascertain the extent of ABC usage. The respondents were asked a direct question on the use of ABC. The identification of the ABC system by the respondents may be different or incorrect based on the individual respondents' subjective classification. Overall the ABC adoption rate was very low showing that only about 8 (6.5%) of the 123 firms responding to this question had adopted ABC for product costing. The criteria used to classify the level of cost system sophistication resulted in only 4 of the 8 firms being classified within the sophisticated category. Thus, the claim by the other 4 adopters that they are using ABC systems may be questionable.

The ABC usage rates were significantly lower than the usage rates reported in other countries in chapter 5 (see section 5.6). However, since some of these studies have suggested that size is correlated with ABC adoption the usage rates may not be dissimilar when comparisons are made by matching companies with similar size. Attention has already been drawn above to the fact that the sample of Malaysian companies contained companies of significantly smaller proportion of large companies compared with the UK study by Drury and Tayles (2000).

The sixth objective on the nature, content and role of profitability analysis, was examined. It was apparent that routine profitability analysis tended to be the norm. The content of the profitability analysis showed that about 48% of the firms were allocating full costs including those indirect costs involving the use of identifiable cause-and-effect and arbitrary allocation bases. A further 29%

assigned only direct costs to products/services and the remaining 23% of the firms assigned direct costs and only those indirect costs that relied only on cause-and-effect allocation bases. However, the evidence suggested that the firms in the latter category were failing to identify appropriate cause-and-effect allocation bases. It was apparent from analysing the responses that only a minority of the firms (less than 10% of the organisations) were using sophisticated costing systems that relied extensively on cause-and-effect allocations.

An examination of the nature of the profitability analysis pointed out that the majority of the firms analysed profits by product/service and customer categories at frequent intervals as they considered periodic product profitability analysis to be important for decision making. On the role of profitability analysis the findings suggested that there is a 50/50 split in the responses on the use for direct decision making and use as an attention directing information for signalling the need for more detailed analysis to be undertaken.

Although 71% of the organisations assigned indirect costs to products/services within the profitability analysis they do not necessarily base their decisions on reported costs that involve indirect cost allocations. Because flexibility exists to extract different categories of costs from the costing system it is possible to report a hierarchy of profitability measures within the profitability analysis. The respondents were asked to indicate the most important profitability measures used by their organisations for decision-making. There was approximately a 50/50 split between the use of contribution (sales less direct or variable costs) and a profitability measure that incorporates indirect cost allocations.

Even though the firms consider profitability analysis to be important for decision making purposes, the content of the profitability analysis is questionable as a large number of firms are using full costs with arbitrary allocation bases and firms

claiming to use identifiable cause-and-effect bases do not appear to be using appropriate drivers. Thus the effectiveness of the periodic profitability analysis is debatable.

The dominant objective of this research was to apply a contingency theory framework to investigate whether identified contingent variables influenced aspects of the design of product costing systems (defined in terms of the level of sophistication). Various hypotheses were formulated in chapter 4 and summarised in chapter 6 to achieve this objective. The hypotheses were tested using several alternative proxy measures of the level of cost system sophistication and three different statistical approaches. First, differences in the distributions of scores for the three different categories of sophistication (unsophisticated, low sophistication and sophisticated) for each of the contingent (independent) variables were examined to ascertain whether they were statistically significant. The second method involved the use of correlation tests to examine the strength of the relationship between the dependent variable (the level of cost system sophistication) and each of the independent variables. The final method involved the use of multiple regression analysis thus enabling the change in the dependent variable (using the 15-point ranking ordinal measurement scale to measure the level of cost system sophistication) arising from a change in an independent variable to be examined with the other independent variables in the equation controlled.

The results provided strong evidence to indicate that the potential explanatory variable 'size of firm' had a significant influence on the sophistication of the cost system design based on all the various proxies used to measure the sophistication levels and the different statistical tests. In addition, there was some evidence to suggest that the variable 'competitive environment' positively influenced the level of cost system sophistication. The finding relating to the significance of size of firms on the sophistication level of cost systems

maintained is consistent with other findings (Drury and Tayles, 2000; Joshi, 1998; Bjornenak, 1997).

The other identified contingent variables – product diversity, volume diversity, competitive strategy, type of organisation, extent of JIT usage and the existence of a financial accounting mentality were found to have no significant influence on the observed product costing systems.

The fact that a firm's cost structure did not have a significant influence on the level of cost system sophistication merits special attention. Cost structure has been examined in previous surveys to ascertain whether it influenced the adoption/non-adoption of ABC systems. In common with this study the previous studies found that cost structure was not a significant variable. This is surprising, given that the literature suggests that companies with high indirect costs should implement sophisticated ABC systems. It is possible that this, and other studies, have used an inappropriate measure of cost structure. In this study cost structure was measured by indirect costs as a percentage of total costs. An ideal measure would extract the percentage of indirect costs that can be more accurately assigned to cost objects using sophisticated costing systems and which fluctuate in the longer-term according to the demand for them. Thus, a more appropriate measure of cost structure should exclude infrastructure or facility-sustaining costs since there would have to be a dramatic change in activity before the cost of supplying these resources would be affected by changes in demand for them.

9.3 Distinguish features and contribution of the research

The following discussion, which is not in any order of importance, highlights some of the distinguishing features of the research. Virtually all of the previous research relating to product costing has been undertaken in Europe, the USA and Australia. There is a scarcity of empirical management accounting research that has been undertaken in the South East Asian region and no previous

surveys have been undertaken in Malaysia that describe the nature and content of product costing systems. Therefore the study provided new knowledge relating to product costing practices in Malaysia.

The literature review identified only one previous UK study that had attempted to assess the validity of Johnson and Kaplan's criticisms that financial accounting needs dominate management accounting needs it was therefore appropriate to undertake a study in a different geographical region to support or refute previous research. As indicated above the research reinforces support for the findings of the UK study. There was insufficient empirical evidence to support Johnson and Kaplan's criticisms within a Malaysian context.

A significant contribution relating providing new knowledge of management accounting practices in Malaysia was the widespread use of unsophisticated product costing systems. Of particular concern was that a significant majority of respondents considered that their costing systems were satisfactory and reported accurate product costs. The study has thus provided important feedback information to interested parties such as practitioners, professional bodies/associations and those responsible for management accounting education of the need to improve the product costing systems.

Besides addressing issues that have been examined in previous surveys undertaken in other countries the research also addressed issues that have not been examined by previous research. For example, the objectives relating to investigating the level of cost system sophistication, whether different cost information is used for different purposes and the treatment of non-manufacturing costs in relation to decision-making have not been examined in previous studies. Also there is a dearth of knowledge on the nature, content and role of profitability analysis since the literature review identified that only one previous study had

examined this topic. Therefore the research findings relating to these topics can generally be regarded as new knowledge which, assuming that they can be generalised, may be applicable to other countries besides Malaysia.

The most important distinguishing feature of this study relates to aspects about the application of a contingency theory framework to aspects of product costing practices. Although previous studies have adopted a contingency theory approach none of them have made this explicit. Furthermore, apart from one other survey, the previous studies have measured the characteristics of product costing systems as being represented as either ABC or non-ABC systems. The use of only these two categories has restricted the statistical analysis to less powerful techniques. Also the studies have relied on the respondents self-rating their systems as ABC or non-ABC. Attention has been drawn to the lack of a clear definition of what constitutes an ABC system and to evidence relating to concerns 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. The findings have also presented using several different approaches that can be adopted for classifying and measuring the level of cost system sophistication. Sensitivity analysis has also been applied to indicate how sensitive the findings are to the different measures of sophistication. Thus the methods of measuring aspects of the product costing systems and conducting sensitivity analysis represents an approach that is unique to this study.

Also previous research has mainly used single questions to measure the contingent variables whereas this research has used composite scores derived from multiple questions to measure the constructs for those variables where direct measurements are not available. Foster and Swenson (1997) claim that a composite score has the advantage over an individual single question when either (1) the variable being measured contains multiple-dimensional aspects requiring several different questions to capture the multiple-dimensional aspects, or (2) there is measurement error in an individual question that is diversified away in aggregating individual questions into a composite.

Thus, compared with previous studies, the research findings from this study should be subject to less measurement error. Therefore it can be claimed that greater confidence should be attached to the findings of this research. Based on the above discussion it can be concluded that the major contribution of this study is that it has adopted a more refined research method to provide evidence that company size and the intensity of the competitive environment influences aspects of the product costing. However, the remaining identified contingent variables were found to have no influence on the product costing systems.

Given that the researcher carefully selected a random sample of companies and undertook statistical tests to ensure that it was representative of a number of key variables (e.g. size, corporate sector and listing status) a high degree of confidence can be placed on generalising the findings to other firms in Malaysia that have established formal costing systems. Generalising the research findings to other countries is more problematic. However, there may be grounds for generalising the findings to other countries whose populations have similar characteristics in terms of the key variables described. In order to generalise the study to countries with populations that do not have these characteristics it would be necessary replicate the study.

9.4 Limitations of the research findings

As in any mail questionnaire surveys this study also encountered the common problems inherent in such data collection methods. However, every attempt was made to minimise the limitations so as to be able to generalise the findings (chapter 6, section 6.6). Not being able to clarify all of the questionnaire responses or to obtain further explanations on the responses, especially arising from the failure of the respondents to provide an explanation to the response to 'other (please specify)' was a limitation of this study. This limitation could have been overcome by conducting post-questionnaire interviews. Unfortunately, it was not possible to clarify questionable responses by conducting post questionnaire interviews, as many of the respondents were not willing to meet for a personal interview.

Another major problem of conducting post-questionnaire interviews was the time constraint and also the fact that the respondents were in widely dispersed geographical areas, which was a further constraint on conducting the interviews. Nevertheless a few interviews were conducted successfully to clarify some of the responses to Question E4 on the relationship between internal accounting and external accounting. The information on the types of costs used in terms of indirect costs allocation using cause and effect bases would have been more meaningful if interviews had been conducted to discuss on the cause and effect bases used. This is because the respondents may not be aware of an appropriate cause and effect allocation basis and may view arbitrary allocations as representing cause-and-effect allocations. In addition, for areas such as the competitive strategy implemented in firms and the financial accounting mentality prevalent in firms, such post-questionnaire interviews would have provided more meaningful results and analysis. Ideally, more post-questionnaire interviews especially in ambiguous areas should have been conducted to gather a richer set of data and undertake a more meaningful analysis.

It would also have been preferable if the sample had consisted entirely of management accountants who would be in a position to understand the professional and technical aspects of the questionnaire while responding to the questions. In this current study it was not possible to identify only management accountants as was discussed in chapter 6, section 6.9. Therefore, the survey was conducted with respondents mainly from the finance background who may not have had the necessary experience and education to understand all aspects relating to cost system design in their organisations. Ideally, future research should target only management accountants but this may not be possible in less developed organisations that have not established separate management and financial accounting functions.

It should be pointed out here that, it might be more appropriate to focus on users, to get better responses for some questions like satisfaction level and level of competition. However it is an extremely difficult task to target these users separately to get completed questionnaires or conduct interviews. This may be an interesting area for future research, whereby the questions are targeted at different users to get more meaningful responses.

A major problem with research relating to applying the contingency theory framework is finding appropriate measures for the potential contingent variables and aspects of the product costing system (defined as the level of sophistication in assigning indirect costs). For some of the variables objective measures are not available and proxy measures have to be used. Therefore, the observation that no relationship exists between the observed variable and the sophistication of the costing system may be due to the inability to measure the variable or the choice of a poor proxy measure. In this research an attempt has been made to measure the level of sophistication of the costing system in a different way from that used in previous studies (i.e. ABC or a traditional costing system). However, a more refined measure of the level of cost system sophistication should incorporate the type (e.g. transaction, duration, volume and non-volume) as well

as the number of different cost drivers used. The research is also subject to the weakness that it relied on the researcher's self-judgement to derive some of the measures of the level of cost system sophistication.

A further problem in applying the contingency model was that very few firms operated sophisticated costing systems. At the time of preparing the questionnaire it was expected that there would be a wide spread of responses for the different levels of cost system sophistication. However, only eight firms were classified within the sophisticated category for the measurement scale used. Generally, there was a clustering of the costing systems within a narrow range and this inhibited the ability of the statistical tests to identify the influence of the independent variables (i.e. the contingent factors) on the dependent variable (i.e. the characteristics of the product costing system).

Also for contingent variables, such as the competitive strategy maintained by firms and financial accounting mentality prevalent in the firms, surrogate measures had to be used. A major problem relating to the surrogate measure derived from Question E4 concerning financial accounting mentality was that it was based on the personal views of the respondents, rather than their organisations. Therefore the responses may not have reflected their company's practice. Hence, the point made earlier should be borne in mind when interpreting the findings of this study. That is, the absence of any significant relationship between the dependent and independent variables may have been due to the choice of poor proxy measures rather than an absence of relationship.

A further limitation that applies to the contingency framework is that its objective is to provide general theories relying extensively on statistical generalisations for simplifying and understanding the empirical observations. Thus, exceptions are possible but the statistical generalisations do not provide explanations of the exceptions or practices of individual companies. This provides little guidance to practitioners whose product costing system is one of the exceptions.

The contingency model presented in chapter 4 (see Figure 4.1) is very simplistic incorporating only two stages. Ideally, a contingency framework should incorporate a third stage and test whether the relationship between an identified contingent variable and the design of the product costing system has any effect on firm performance. Because many different variables are likely to effect firm performance, besides the sophistication of the product costing system and the difficulty in holding these 'other variables' constant, performance was not incorporated into the model.

Other limitations applying to the framework relate to the fact that many organisations face a diversity of environments in respect of some of the identified contingent variables. For example, if an organisation faces a diversity of competitive environments for its activities with some being subject to low competition and others to intensive competition it is questionable whether a meaningful measure can be established when they are aggregated to the organisational level. In these circumstances a more company situation-specific contingent case study approach focusing on a single company or a small number of companies may be preferable.

In common with most previous studies a simplistic contingency framework was used whereby it examined the relationship between only one contingent variable at a time and the product costing system. The interactions between the variables have not been incorporated into the framework. For example, variables might have a direct effect and indirect effects through other variables on the product costing system. To examine more complex models that incorporate such interactions requires the use of structural equation modelling. However, when applied to accounting research this technique is still in its infancy and it generally requires samples with more than 200 cases for it to be successfully applied (Smith and Langfield-Smith, 2001).

A final limitation is that important contingent variables may not have been identified and thus omitted from the contingency model. For example, organisational variables such as top management support and the adequacy of suitable staff resources may have improved the predictability of the model. Also the impact of national culture and institutional factors have been omitted but since the research did not seek to generalise the findings to other countries their exclusion can be justified.

9.5 Future research

This research study has identified several areas that can be further investigated through future research.

First, there is a need for more detailed studies relating to the types of costs that are used for decision-making. The current study did provide evidence to suggest that firms do extract different costs from the database for different purposes but there is a need to examine this issue in more detail. Future research should focus on the exact types of costs that are extracted to be used for the different purposes. The identification of such costs would provide insights into level of cost system sophistication that is required.

The findings indicated that about 50% of the firms were using profitability analysis as an attention-focusing device for undertaking more detailed special studies. The nature, role and content of the cost information that is used and the role it plays within special studies is also an area of particular interest for future research. In particular, the types of costs included, and the manner in which the deficiencies of arbitrary allocations are taken into account, needs to be investigated.

This study indicated that in the majority of the firms, decisions were also based on 'strategic reasons' besides cost issues. Further studies are required that

investigate the non-financial and strategic issues and the role they play in decision-making.

The current study investigated the effect of the extent of JIT usage on the adoption of cost system sophistication. The results showed no evidence of a relationship between the JIT and cost system design. However, the impact of advanced manufacturing technologies such as flexible manufacturing systems (FMS) on product costing systems should also be examined. Changes in product costing in a FMS setting, in the form of components of direct costs, allocation of indirect costs and period costs have been identified in the FMS literature (Foster and Horngren, 1988; Howell *et al*, 1987). These changes may act as a catalyst for changes in product costing systems. A case study approach would be more suitable for this research as it would provide insights into explaining why particular types of cost systems are adopted and also would reflect on the consequences of having adopted such systems.

Given that the research was conducted in Malaysia which has a different national culture compared to western countries raises the question as to whether the impact of national culture on product costing system design should be investigated. However, Granlund and Lukka provide a strong justification for national culture not affecting product practices at the macro level. They argue that progressive forces in recent years have brought about a recent international convergence of management accounting practices at the macro level whereas differences may exist at the micro level.

They define the macro level as comprising of techniques, concepts and ideas and the micro level as relating to the way that the information is used (e.g. participation or non-participation in budget setting). Given that this research has focused on product costing practices and not on the way the information is used it can be classified within the macro level. In particular, Granlund and Lukka

argue that economic pressures (e.g. increased competition and globalisation of markets), coercive pressures (e.g. harmonisation of financial accounting legislation), normative pressures (e.g. professionalisation of management accountants), mimic pressures and standardisation arising from the adoption of integrated enterprise wide information systems have been the main drivers resulting in the convergence of management accounting systems at the macro level. Thus, it would be appropriate to conduct research to ascertain whether Granlund and Lukka's claims can be justified. Such research would require the same research instrument to be administered in countries with different national cultures with the samples in each country controlled to ensure that they are similar in respect of key demographic variables such as company size and industry features.

Although a number of potential contingent variables were examined in this study, it should be emphasised here that there are other important variables pertaining to organisational culture, human behaviour (such as resistance to change) and the cost benefit analysis that have not been investigated in this study. Firms may not be using appropriate cost systems, even though the circumstances warrant it, due to lack of top management support or due to resistance to change amongst the staff in adopting a new system. Therefore it would add value to future research if variables such as top management support for improving costing systems and the resistance to change from the staff are investigated.

The overall findings in this study did suggest that Malaysian firms generally were using unsophisticated cost systems despite the strong criticisms of using such systems. It was discussed earlier, in chapter 6 that it was not possible to identify management accountants in many of the Malaysian organisations. The financial accountants played the role of management accountants as well. This lack of management accountants, having the technical know-how to implement and operate a more sophisticated costing system could be a cause of the widespread use of unsophisticated systems in Malaysia. Therefore future research should be

conducted to examine how the different roles that accountants are required to undertake influence the sophistication of the product costing system.

As the researcher is based in Malaysia and the study was undertaken to fulfil the requirements of the PhD thesis it is feasible to conduct the survey only in the researcher's home country. A more fruitful approach would have been to extend the sample to various countries in the South East Asian region. This would have enabled a wider spread of cost systems to be captured. In particular, there is a need to include more firms that operate sophisticated systems to ascertain whether the findings differ when the sample encompasses costing systems that fall along the entire range of a continuum rather than being clustered towards the simplistic end (as in the current study). However, PhD time constraints and difficulty in accessing data outside one's own country restricted this approach. Research beyond one's own country is best undertaken by a research team with members of the team located in the target countries.

Most of the research relating to product costing has been survey-based involving cross-sectional studies. Such studies only identify relationships between the studied variables at one point in time. However, they provide little information as to how the observed costing systems and their relationships with specific contingent variables came about, what motives people in organisations had in actually choosing one systems design rather than another and how the systems are actually used. To answer such questions longitudinal case study research is required that draws on a wide range of theoretical frameworks including social theory.

Finally, future research should seek to address the limitations that have been identified in section 9.4 as being applicable to the current research. Despite these limitations, considerable efforts were taken to minimise them so as to obtain meaningful research findings. The efforts taken included a sample selection process that sought to ensure that the sample was representative of the

population in relation to firms having an established cost system. This was necessary as the main focus of this research study was on formal cost system design rather than *ad hoc* costing systems. Efforts were also taken to ensure that the problems inherent in a postal questionnaire are minimised (chapter 6, section 6.7).

The findings from this research study have provided insights into the sophistication levels maintained in Malaysian companies and also has provided an understanding of the influence of certain explanatory variables on the cost system design maintained. In addition, this research study has also provided many additional insights into the areas of cost system design especially in the measurement of the level of sophistication maintained. Therefore, it is hoped that this research will provide useful attention-directing information for future researchers wishing to gain further insights into the issues raised by this study.

9.5 Concluding thoughts

Generally all research has limitations, and even if performed well will leave scope for future work. Nevertheless, this project has attempted to minimise the limitations by taking considerable efforts in the sample collection stage, data collection stage and the data analysis stage, so as to obtain meaningful results. The study has provided new knowledge relating to product costing practices in Malaysia, especially in the areas of cost system sophistication, use of different cost information for different purposes, the treatment of non-manufacturing costs in decision making and the nature, content and role of profitability analysis. Finally this research has provided new insights explicitly on the use of a contingency theory framework for product costing systems. Despite the limitations inherent in this framework, it has provided useful guidance, for exploring the insight that the appropriate costing system can be expected to depend on circumstances. In this study, size and the competitive environment have been identified to be influencing the choice of the cost system design. It should be pointed out here that although all the other contingent variables have

not been found to be significant in this current study, they may be an influencing factor with larger samples and other countries.

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QUESTIONNAIRE

PRODUCT / SERVICE

COST SYSTEM DESIGN

IN

MALAYSIAN COMPANIES

**Universiti
Teknologi MARA**



*University
of Huddersfield*



APPENDIX 1

Section A - General Company Information

Tick one box per question for all the questions given in the questionnaire, unless stated otherwise

A1 Please indicate the main business of your company or organisational unit.

N=127

Manufacturing	Service	Financial & Commercial	Retail	Conglomerate	Wholesale	Other
36%	23%	8%	7%	5%	5%	16%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A2 Please briefly describe below the industry sector / type of business your organisation is operating in.

A3 Please tick the box below which best describes your organisation.

N=127

My company or organisational unit is part of a group structure. 86%

My company or organisational unit is not part of a group structure 14%

A4 Is your company or group listed on any stock exchange?

N=127

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>
65%	35%

A5 Please indicate the average turnover of your company or organisational unit

N=127

Less than RM150m	RM151m – RM300m	RM301m – RM450m	RM451m – RM600m	RM601m – RM1200m	RM1201m – RM1800m	Over RM1800m
47%	17%	9%	10%	8%	4%	6%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Question A6 and A7 relate to the Group of which your reporting unit is a part. Please omit these questions if your reporting unit is not part of a group structure.

A6 Please indicate the sales revenue of your organisational unit as a percentage of total group turnover

N=98

0-5%	6-10%	11-20%	21-30%	31-40%	41-50%	Over 50%
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34%	17%	8%	6%	8%	8%	18%

A7 Where are you located in the organisational structure?

N=111

At group head office <input type="checkbox"/>	At divisional head office <input type="checkbox"/>	At an operating unit <input type="checkbox"/>
38%	19%	43%

A8 What is the ownership structure of your organisation?

N=127

<input type="checkbox"/>	50% and above Foreign owned	<input type="checkbox"/>	50% and above Malaysian owned
32%		68%	

A9 If your answer to A8 is Foreign owned, please indicate the country of ownership

A10 Is the head office in: Malaysia or Overseas

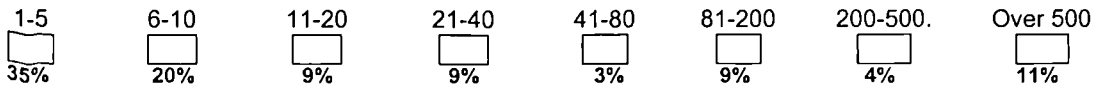
N=122

70% 30%

Section B - Product / Service Environment

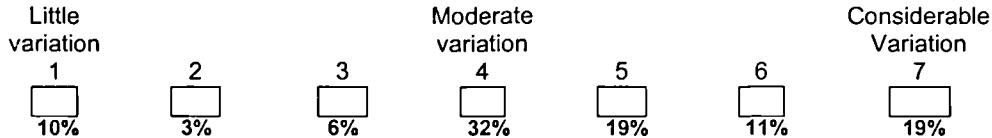
B1 Over a typical year, how many different products or services, does your cost system assign costs to?

N=127



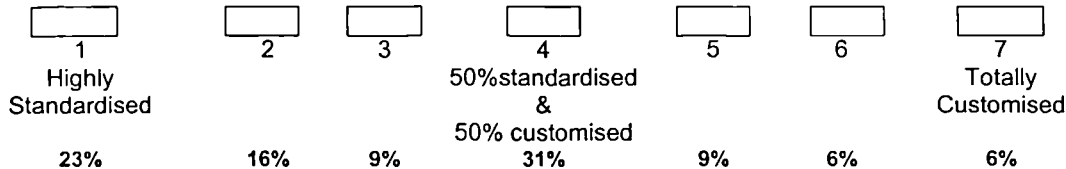
B2 For your product or service please indicate on the scale below how much variation there is in the sales volume between the top 20% of the best selling items and the bottom 20% of the lowest selling items.

N=124

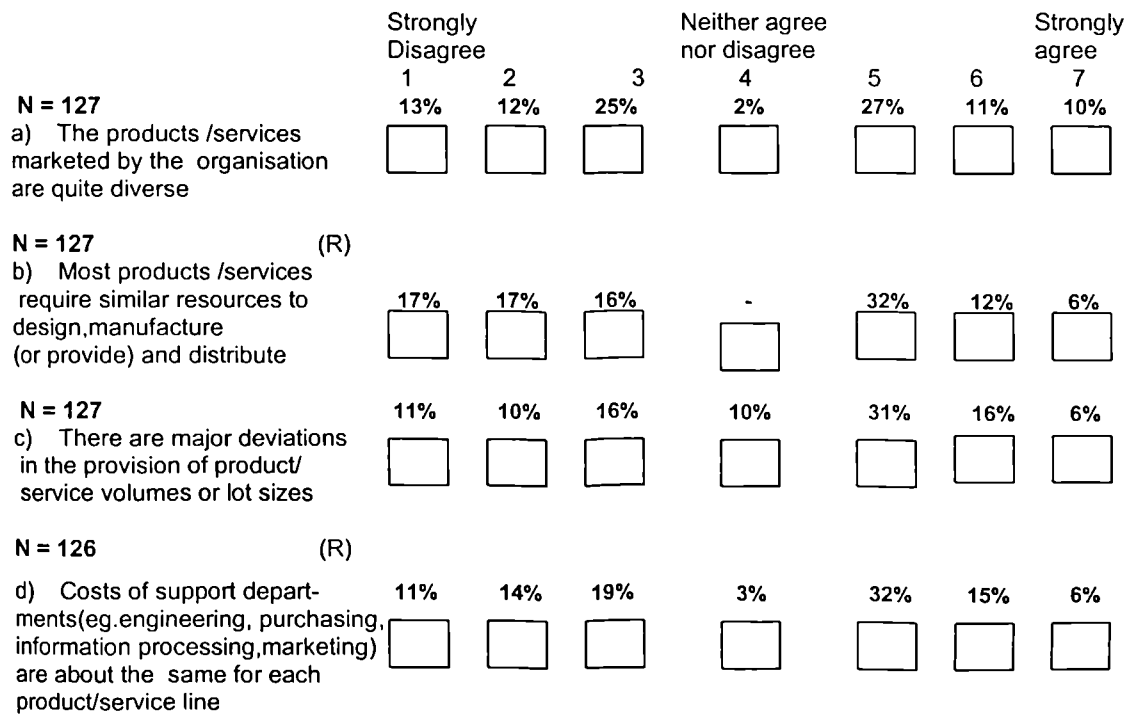


B3 The scale below relates to outputs of products or services ranging from (1) highly standardised to (7) totally customised. Please indicate the point on the scale, which most appropriately describes the whole range of products or services marketed by your organisation.

N=127

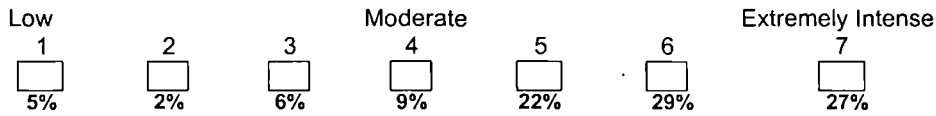


B4 On a scale of 1 (strongly disagree) to 7 (strongly agree) please indicate the extent to which you agree/disagree with the following statements relating to the complexity of manufacturing (or service provision) within your business unit.



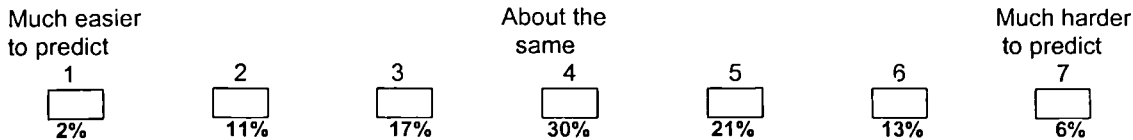
B5 Please indicate on a scale of 1 (low) to 7 (extremely intense) the level of competition for your major product/service for the past 5 years

N=127



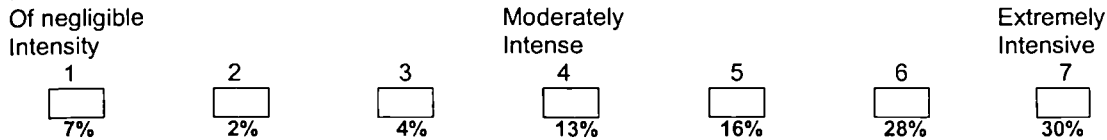
B6 Over the past five years, please indicate on the scale below whether the customer preference for your product/service have become:

N=127



B7 On the scale below please indicate how intensive is price competition within your industry?

N=124



B8 For your organisation please provide an approximate percentage breakdown of your cost structure by entering the percentage in the appropriate spaces below :

Manufacturing Organisation N=46

	%
Materials that can be directly traced to products	65%
Labour that can be directly traced to products	11%
Direct non-manufacturing costs that can be directly traced to products	10%
Production <i>overhead</i> that cannot be directly traced to products	7%
Non-manufacturing <i>overhead</i> that cannot be traced to products	7%

Non-Manufacturing Organisations

Costs that can be directly traced to products/services N=75	72%
Indirect costs that cannot be directly traced to products/services N=76	28%

B9 Regarding the use of quality initiatives within your business unit, please indicate on a scale of 1 (strongly disagree) to 7 (strongly agree) the extent to which you agree or disagree with the following statements :
(For each row tick one column)

	Strongly Disagree			Neither Agree nor Disagree			Strongly agree
	1	2	3	4	5	6	7
a) Statistical process control tools are used frequently N=126	<input type="checkbox"/> 6%	<input type="checkbox"/> 9%	<input type="checkbox"/> 10%	<input type="checkbox"/> 19%	<input type="checkbox"/> 17%	<input type="checkbox"/> 25%	<input type="checkbox"/> 14%
b) Experiments to improve processes are conducted N=126	<input type="checkbox"/> 3%	<input type="checkbox"/> 8%	<input type="checkbox"/> 2%	<input type="checkbox"/> 20%	<input type="checkbox"/> 28%	<input type="checkbox"/> 25%	<input type="checkbox"/> 14%
c) Employee teams are functioning and N=126 have been effective	<input type="checkbox"/> -	<input type="checkbox"/> 2%	<input type="checkbox"/> 4%	<input type="checkbox"/> 15%	<input type="checkbox"/> 28%	<input type="checkbox"/> 38%	<input type="checkbox"/> 13%
d) Benchmarking with other companies is N=124 tracked	<input type="checkbox"/> 1%	<input type="checkbox"/> 4%	<input type="checkbox"/> 7%	<input type="checkbox"/> 20%	<input type="checkbox"/> 22%	<input type="checkbox"/> 31%	<input type="checkbox"/> 15%
e) Workers are rewarded for quality improvement N=125	<input type="checkbox"/> 1%	<input type="checkbox"/> 7%	<input type="checkbox"/> 4%	<input type="checkbox"/> 21%	<input type="checkbox"/> 25%	<input type="checkbox"/> 30%	<input type="checkbox"/> 12%

B10 Regarding your business unit's information technology, please indicate on a scale of 1 (strongly disagree) to 7 (strongly agree) the extent to which you agree or disagree with the following statements :
(For each row tick one column)

	Strongly Disagree			Neither Agree nor Disagree			Strongly agree
	1	2	3	4	5	6	7
N=127 a) The organisation's information systems (e.g. sales, manufacturing, purchasing etc.) are highly integrated with (i.e. accessible by) each other N=127	<input type="checkbox"/> 2%	<input type="checkbox"/> 8%	<input type="checkbox"/> 10%	<input type="checkbox"/> 14%	<input type="checkbox"/> 28%	<input type="checkbox"/> 17%	<input type="checkbox"/> 21%
b) The information system offers user friendly query capability to various users N=127	<input type="checkbox"/> 1%	<input type="checkbox"/> 6%	<input type="checkbox"/> 13%	<input type="checkbox"/> 12%	<input type="checkbox"/> 34%	<input type="checkbox"/> 21%	<input type="checkbox"/> 13%
c) Detailed sales and operating data are available in the information system for the last 12 months N=127	<input type="checkbox"/> 2%	<input type="checkbox"/> 1%	<input type="checkbox"/> 3%	<input type="checkbox"/> 4%	<input type="checkbox"/> 20%	<input type="checkbox"/> 34%	<input type="checkbox"/> 36%
d) A wide array of cost and performance data is available in the system N=125	<input type="checkbox"/> 1%	<input type="checkbox"/> 4%	<input type="checkbox"/> 10%	<input type="checkbox"/> 12%	<input type="checkbox"/> 22%	<input type="checkbox"/> 30%	<input type="checkbox"/> 21%
e) Manufacturing (or service provision) and other operating data in the information system are updated "real-time" rather than periodically N=125	<input type="checkbox"/> 8%	<input type="checkbox"/> 17%	<input type="checkbox"/> 10%	<input type="checkbox"/> 11%	<input type="checkbox"/> 16%	<input type="checkbox"/> 21%	<input type="checkbox"/> 17%

Section C - Manufacturing Organisations

(This section relates to manufacturing business units. If you are involved in manufacturing business units then please answer the following questions; otherwise proceed to Section D)

C1 On a scale of 1 (strongly disagree) to 7 (strongly agree) please indicate the extent to which you agree/disagree with the following statements to the use of lean production initiatives within your business unit

	Strongly Disagree			Neither Agree nor Disagree			Strongly agree
	1	2	3	4	5	6	7
a) Setup times are frequently reduced N=57	<input type="text"/> 2%	<input type="text"/> 2%	<input type="text"/> 9%	<input type="text"/> 26%	<input type="text"/> 31%	<input type="text"/> 25%	<input type="text"/> 5%
b) Materials or component parts are delivered as needed rather than in large batches N=58	<input type="text"/> 7%	<input type="text"/> 9%	<input type="text"/> 12%	<input type="text"/> 9%	<input type="text"/> 22%	<input type="text"/> 29%	<input type="text"/> 12%
c) The plant layout is organised in flexible manufacturing cells N=58	<input type="text"/> 7%	<input type="text"/> 5%	<input type="text"/> 10%	<input type="text"/> 13%	<input type="text"/> 24%	<input type="text"/> 31%	<input type="text"/> 10%
d) Manufacturing practices are being oriented toward the elimination of inventory N= 55	<input type="text"/> 6%	<input type="text"/> 7%	<input type="text"/> 5%	<input type="text"/> 16%	<input type="text"/> 29%	<input type="text"/> 31%	<input type="text"/> 6%
e) Production is automatically halted if defective work is produced N=57	<input type="text"/> 9%	<input type="text"/> 14%	<input type="text"/> 16%	<input type="text"/> 22%	<input type="text"/> 23%	<input type="text"/> 7%	<input type="text"/> 9%
f) Cross-training and job rotation are required N= 58	<input type="text"/> 3%	<input type="text"/> 7%	<input type="text"/> 7%	<input type="text"/> 20%	<input type="text"/> 21%	<input type="text"/> 26%	<input type="text"/> 16%

C2 When preparing product costs for decision making, how are the following non-manufacturing costs normally dealt with. (For each of the non-manufacturing costs listed in columns 1-3 please tick one row per column)

	N=56	N=55	N=56
	1.Selling costs	2.Distribution costs	3. Administration costs
Not allocated to products	<input type="text"/> 56%	<input type="text"/> 47%	<input type="text"/> 68%
Allocated to products on the basis of the manufacturing cost of each product	<input type="text"/> 7%	<input type="text"/> 13%	<input type="text"/> 11%
Allocated to products on the basis of the selling price of each product	<input type="text"/> 34%	<input type="text"/> 24%	<input type="text"/> 13%
The cause (identified as the cost driver) for each type of non-manufacturing overheads cost	<input type="text"/> 2%	<input type="text"/> 15%	<input type="text"/> 5%
Other (please specify below)	<input type="text"/> 2%	<input type="text"/> 2%	<input type="text"/> 4%

Section D - Product / Service Cost System Information

D1 Please indicate whether your organisation traces costs to products, services or customers in order to value Work in Progress or Finished Stock for meeting financial accounting stock valuation and profit measurement requirements:

N=120

Costs are accumulated for stock valuation and their value is <u>significant</u> for financial reporting	Costs are accumulated for stock valuation but their value is <u>insignificant</u> for financial reporting	Costs are not accumulated for stock valuation requirements
73% <input type="checkbox"/>	9% <input type="checkbox"/>	18% <input type="checkbox"/>

D2 How does your operating unit obtain product costs used routinely in decision making?

N=46

1. Information extracted (and not adjusted) from a single cost database that is used for stock valuation 32%
2. Information is extracted from a product costing system that is separate from the single cost data base that is used for stock valuation 26%
3. Information is extracted (but subsequently adjusted) from a single cost database that is used for stock valuation 35%
4. Other (please specify) _____ 7%

D3 How long have you been maintaining your cost system, without any significant changes?

N=122

- | | | | | | |
|--|-----|--|-----|---|-----|
| More than 5 yrs <input type="checkbox"/> | 43% | Over the past 3 yrs <input type="checkbox"/> | 20% | Over the past 1 yr <input type="checkbox"/> | 7% |
| Over the past 4 yrs <input type="checkbox"/> | 3% | Over the past 2 yrs <input type="checkbox"/> | 13% | Within the 1 yr <input type="checkbox"/> | 13% |

D4 If significant changes have been made within the last three years, briefly describe the changes made.

D5 Please indicate which of the following statements best describes how indirect costs are accumulated and assigned to products or services for decision making. (Tick one box only)

N=125

- a) A single overhead (indirect cost) rate is established for the whole of the business unit and this rate is used to allocate indirect costs to all products or services. 14%
- b) Separate *departmental* overhead (indirect cost) rates are established and these rates are used to allocate indirect costs to all products or services 55%
- c) Departments tend to be further disaggregated into cost centres and separate cost centre overhead (indirect cost) rates are established for allocating indirect costs to all products or services 7%
- d) Overhead (indirect cost) rates are not established. Only direct costs are assigned to products or services and indirect costs are treated as a period cost and charged as a lump sum to the profit and loss account. 22%
- e) Other (please specify) _____ 1% _____

D6 The typical procedure for assigning indirect costs to products or services involves a 2 stage process. In the first stage overheads are allocated to cost centres (i.e. cost pools). In the second stage overhead allocation rates (or cost driver rates) are established for each cost centre to assign overheads to products/services. Please indicate below approximately how many separate cost centres (cost pools) are used to assign overheads to products/services. (For example, if your organisation has 5 cost centres all of which use a single allocation rate or separate allocation rates, please tick 5 in the box below to indicate that 5 separate cost centres have been established).

N=111

Number of cost centres (cost pools) which have their own overhead allocation (charge out) rate							
1	2-3	4-5	6-10	11-20	21-30	31- 50	Over 50
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16%	11%	32%	24%	10%	4%	2%	1%

D7 Please indicate below how many **different type of** overhead allocation recovery bases (cost drivers) are used in the second stage of the two stage procedure described in Question D6. (For example, if your organisation has five 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 organisation has 5 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.

N=110

Number of separate overhead recovery methods (cost drivers) used							
1	2	3	4	5	6	7-10	Over 10
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36%	22%	19%	4%	13%	-	4%	2%

D8 In your operating unit, please specify the relative % usage of the following overhead rates to calculate product or service costs for decision-making purposes. For example, if you use only direct labour hours and machine hours and direct labour hours account for 60% and machine hours for 40%, please insert the appropriate percentages in the spaces below:

	% of usage
1. Direct labour cost based rate N=21	10
2. Direct labour hour based rate N=36	24
3. Machine hour based rate N=21	11
4. Material cost based rate N=24	14
5. Units produced based rate N=26	16
6. Production time based rate N=13	5
7. Activity based rates N=21	11
8. Other (please specify) N=17	9
Total	100

D9 Please indicate on a scale of (1) to (7) how accurate you think your cost system is in assigning overheads(indirect costs) to your product or service for decision making purposes. (Please tick box 8 which refers to not applicable if overheads are not assigned to products or services).

N=101

Not very accurate	Moderately accurate				Extremely accurate	N/A	
1	2	3	4	5	6	7	8
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1%	1%	7%	27%	28%	34%	2%	(16.5% X 121)

D10 How satisfied are you with the accuracy of your cost system in assigning overheads(indirect costs) to your products or services for the purpose of making cost reduction, discontinuation, redesign or outsourcing decisions. (Please tick box 8 which refers to not applicable if overheads are not assigned to your products or services).

N=99

Not at all satisfied			Moderately satisfied			Extremely satisfied	N/A
1	2	3	4	5	6	7	8
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2%	1%	6%	24%	22%	40%	4%	(18.2 X 121)

D11 Which of the following describes your operating unit's experience with activity-based costing (ABC)? (Please tick the appropriate box)

N=123

1. Currently using ABC to cost products/services	7%	<input type="checkbox"/>
2. Intending to use ABC to cost products/services	7%	<input type="checkbox"/>
3. Currently investigating using ABC to cost products/services	10%	<input type="checkbox"/>
4. Intending to investigate using ABC to cost products/services	33%	<input type="checkbox"/>
5. Rejecting ABC, but established a system of activity analysis or cost driver analysis	11%	<input type="checkbox"/>
6. Implemented ABC and subsequently abandoned it	-	<input type="checkbox"/>
7. Investigated using ABC and rejected it	3.3%	<input type="checkbox"/>
8. Not Using (voluntary response)	29%	

If you have ticked item (1) to Question D11, please answer the following question:

D12 Are infrastructure costs (such as depreciation, property costs, lighting and heating of the factory or administrative facilities) charged to cost centres and included within the overhead allocation rates that are charged to your products or services for decision making?

	N=36	Yes	No
		<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)		75%	25%

.....

D13 If you have answered YES to Question D12 please indicate if infrastructure costs are categorised separately when extracting information for decision making

	N=28	Yes	No
		<input type="checkbox"/>	<input type="checkbox"/>
		71%	29%

Section E - Relationship Between Internal (management) and External (financial) Accounting Information

E1 The need to produce product cost information to meet financial accounting stock valuation requirements dominates the need to produce product cost information for decision making purposes in your organisation. Please tick an appropriate box within the scale below to indicate the extent to which you agree with this statement:

N= 123

Strongly Disagree			Neither agree nor disagree			Strongly Agree
1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11%	11%	23%	15%	22%	14%	5%

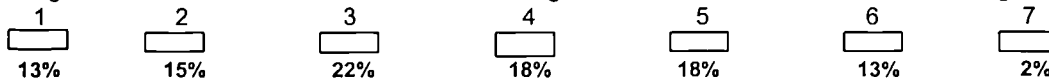
E2 In your operating unit, please indicate within the scale below the extent with which you agree/disagree that the product costing system used for decision making is designed mainly to provide information for published external financial accounting statements

N=127

Strongly Disagree

Neither agree nor disagree

Strongly Agree



E3 Please tick one box to indicate the statement which most closely describes your company or organisational unit :

N=125

- a) My company is not part of a group with separate accounting units. 14%
- b) Group accounting rules determine both internal accounting systems and the accounting policies followed in the published external financial statements 64%
- c) Group accounting rules determine internal accounting systems but not the accounting policies followed in the published external financial statements 13%
- d) Group accounting rules determine the accounting policies followed in the published external financial statements, but not the internal accounting systems 9%

E4 The following statements have been made about the relationship between internal accounting and published external financial statements. Please tick one box on a scale of 1 (strongly disagree) to 7 (strongly agree) to indicate your views on each of the following statements.

	Strongly Disagree		Neutral			Strongly agree	
	1	2	3	4	5	6	7
Externally imposed accounting standards for published financial statements influence management decisions N=127	6%	6%	8%	29%	26%	16%	10%
Internal accounting systems are designed primarily to provide information for published financial statements N=127	6%	12%	13%	20%	25%	17%	7%
External auditors have significant influence on companies' choices of internal accounting policies N=125	10%	19%	19%	22%	19%	6%	5%
External auditors have considerable influence on the design of internal accounting systems N=127	6%	22%	18%	23%	23%	5%	4%
Companies can influence the market perception of their financial performance and position through their choice of accounting policies N=126	7%	6%	9%	23%	29%	18%	9%
Companies on occasions change their accounting policies simply to influence stock market perceptions of performance N=127	32%	15%	12%	21%	11%	6%	3%
Investors can usually see through attempts to use accounting policies simply to improve the published financial statements N=127	8%	7%	12%	26%	24%	18%	5%
Management decisions to allocate resources to particular activities are based primarily on internal accounting reports N=127	13%	28%	32%	16%	2%	7%	2%

E5 Please tick the appropriate box in each row, regarding the extent of integration of your organisation's :

	Totally Integrated		Somewhat Integrated			Totally Independent	
	1	2	3	4	5	6	7
N=127							
a) Published financial statements and internal accounting reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	24%	20%	15%	29%	4%	3%	5%
N=127							
b) Data capture systems used to provide information for preparing the published financial statements and the management reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	24%	20%	20%	18%	9%	7%	2%

E6 The phrase "externally imposed accounting standards" refers to recommendations contained in pronouncements such as Statements of Standard Accounting Practice and Financial Reporting by Malaysian and other bodies. On a scale of 1 (never) to 7 (frequently) please indicate how often externally imposed accounting standards have led to the changes in the items listed in rows 1-3 below :

	Never		Sometimes			Frequently	
	1	2	3	4	5	6	7
- your company's internal information system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N=127	6%	10%	16%	38%	20%	7%	3%
- the content of reports to top management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N=127	6%	18%	17%	26%	21%	8%	4%
- decisions taken in your company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
N=125	6%	10%	21%	29%	20%	7%	7%

F. Product / Service Cost Information for Decision Making Purposes

F1 On a scale of 1 (not at all important) to 7 (vitaly important) please indicate how important is product/service cost information for the following types of decisions in your firm? (Please omit any rows for decisions which are not relevant to your organisation)

	Not at all Important		Moderately Important			Vitaly Important	
	1	2	3	4	5	6	7
a) Cost Reduction	2%	1%	1%	7%	13%	32%	44%
N=126	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Modifying product/service design	3%	4%	7%	19%	22%	24%	21%
N=123	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Improving production/service processes	3%	1%	2%	8%	23%	34%	29%
N=122	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) Determining cost-plus selling prices	9%	5%	3%	13%	12%	25%	33%
N=123	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) determining whether the cost of production or the provision of the service is below the established selling price	2%	1%	3%	10%	22%	30%	32%
N=122	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) Make or Buy decisions	8%	7%	5%	15%	16%	25%	24%
N=106	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) Product mix decisions	9%	7%	4%	13%	22%	25%	20%
N=110	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Questions F2, F3 and F4 relate only to cost information for 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). In some organisations established selling prices will exist and a firm will have little or no influence on the prices of products or services. If cost-plus pricing is not used please tick the appropriate box for Question F2, omit questions F3 and F4 and proceed to question F5

F2 For sales to external customers, is cost-plus pricing used or sometimes used to assist in setting selling prices?

N=122

39% Used 35% Sometimes Used 26% Not Used

F3 Using a scale of 1 to 7, please tick a box below to indicate how important the derived cost-plus selling price is in determining the final selling price.

N=94

Of little importance 1 5% 2 4% 3 2% Moderately important 4 17% 5 17% 6 30% Of vital importance 7 25%

F4 Approximately what percentage of total sales revenue of your organisation is accounted for by external sales of those products /services that are derived from using cost-plus pricing?

N=88

0-10% 8% 11-20% 4% 21-30% 13% 31-40% 4% 41-50% 8% 51-70% 13% over70% 40%

F5 For each of the decisions listed in rows (a) to (h) below please enter 'YES' (by inserting /) or 'NO' (by inserting X) in each box to indicate whether each of the costs listed below are assigned to products/services for decision making:

Please omit any rows for decisions, which are not relevant to your organisation.

Note: Column1 = Direct Costs

Column 2 = Indirect costs where various allocation bases, which cause the costs to vary, can be identified (e.g. Number of purchase orders for assigning the costs of purchasing activities)

Column 3 = Indirect costs where it is not possible to identify allocation bases that are the causes of the costs varying, because costs tend to be fixed over a wide range of activity levels (e.g. lighting and heating of the organisation, depreciation of machinery, property taxes, which are jointly used by the products/services)

		1	2	3
		See note above	See note above	See note above
(a) Make or Buy decisions	N=80	<input type="checkbox"/> 100%	<input type="checkbox"/> 56%	<input type="checkbox"/> 24%
(b) Discontinuation decisions	N=81	<input type="checkbox"/> 100%	<input type="checkbox"/> 57%	<input type="checkbox"/> 15%
(c) Product Mix decisions	N=76	<input type="checkbox"/> 100%	<input type="checkbox"/> 59%	<input type="checkbox"/> 20%
(d) Determining cost-plus selling prices	N=97	<input type="checkbox"/> 100%	<input type="checkbox"/> 88%	<input type="checkbox"/> 86%
(e) Determining whether the cost of production/ service provided is below established selling price decisions	N=109	<input type="checkbox"/> 100%	<input type="checkbox"/> 77%	<input type="checkbox"/> 35%
(f) Cost Reduction decisions	N=115	<input type="checkbox"/> 100%	<input type="checkbox"/> 82%	<input type="checkbox"/> 44%
(g) Modifying product or service design decisions	N=97	<input type="checkbox"/> 100%	<input type="checkbox"/> 57%	<input type="checkbox"/> 23%
(h) Improving product service processes decisions	N=127	<input type="checkbox"/> 100%	<input type="checkbox"/> 68%	<input type="checkbox"/> 27%

F6 On a scale of 1 (strongly disagree) to 7 (strongly agree) please indicate the extent to which you agree/disagree with the following statements relating to the use of cost data within your business unit

	Strongly Disagree		Neither Agree nor Disagree			Strongly agree	
	1	2	3	4	5	6	7
N=126	3%	4%	5%	8%	18%	25%	37%
a) The costs of products or services must be highly reliable to compete in our markets N=127	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Operating cost data is extremely important because of our cost reduction efforts N= 126	1%	2%	2%	8%	18%	43%	26%
c) Cost information is the most important factor in pricing product/service decisions N=126	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) The organisation performs many special cost studies relating to product / service introduction, discontinuation, redesign, mix or cost reduction decisions N=127	4%	10%	8%	10%	19%	20%	29%
e) Most of the decisions specified in (d) above are based on 'strategic reasons' rather than cost issues N=126	6%	44%	24%	-	7%	10%	9%
	2%	13%	9%	2%	24%	27%	24%
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section G - Performance of Your Operating Unit

G1 On a scale of 1 (strongly disagree) to 7 (strongly agree) please rate your unit's overall performance over the last three years.

	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly agree 7
1. Over the past three years our financial performance has been outstanding N=123	6%	7%	8%	25%	28%	13%	13%
2. Over the past three years our financial performance has exceeded our competitors N=123	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Over the past three years our revenue (sales) growth has been outstanding N=122	4%	10%	9%	37%	22%	11%	7%
4. Over the past three years we have been more profitable than our competitors N=123	5%	7%	9%	16%	30%	22%	11%
5. Over the past three years our revenue growth has exceeded our competitors N=123	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7%	9%	7%	42%	15%	16%	4%
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5%	6%	11%	38%	20%	16%	4%
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section H - Profitability Analysis

This section relates only to cost information and profitability analysis routinely produced for decision-making (excluding cost information for setting selling prices).

H1 Please indicate below how frequently your organisation routinely analyses profits by the following categories:

	Monthly	Quarterly	Six monthly	Annually	More than one year	Not routinely analysed
Products or services N= 126	73% <input type="checkbox"/>	13% <input type="checkbox"/>	5% <input type="checkbox"/>	4% <input type="checkbox"/>	- <input type="checkbox"/>	6% <input type="checkbox"/>
Customers or customer categories N= 119	40% <input type="checkbox"/>	3% <input type="checkbox"/>	8% <input type="checkbox"/>	7% <input type="checkbox"/>	- <input type="checkbox"/>	32% <input type="checkbox"/>

H2 How important is the periodic profitability analysis in signalling the need to make key decisions relating to cost reduction, redesigning, outsourcing or discontinuation decisions.

N=127

Not Important	Moderately Important				Vitaly Important	
1	2	3	4	5	6	7
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2%	2%	1%	15%	22%	28%	32%

H3 For routine periodic profitability analysis please specify whether or not the costs listed in (a) to (c) below are traced to your products or services :

(a) Direct costs that can be specifically traced to the products or services

N=126	Costs are traced to the products or services	100%	<input type="checkbox"/>
	Costs are not traced to the products or services	-	<input type="checkbox"/>

(b) Indirect costs where various allocation bases can be identified that are the causes of the costs varying in the long term. Costs falling within this category are therefore assigned to products or services using allocation bases that are the causes of the cost. (Examples of costs falling within this category include number of purchase orders for assigning the costs of purchasing activities, or number of transactions processed for assigning staff costs in a retail or financial services organisation)

N=126	Costs are assigned to the products or services	71%	<input type="checkbox"/>
	Costs are not assigned to the products or services	29%	<input type="checkbox"/>

(c) Indirect costs where it is not possible to identify allocation bases that are the causes of the costs varying because costs tend to be fixed over a wide range of activity levels. Costs are therefore allocated using bases that are not the cause of the costs (Examples of costs falling within this category are infrastructure costs such as costs relating to buildings, machinery and equipment which are used jointly by the cost object).

N= 126	Costs are allocated to the products or services	48%	<input type="checkbox"/>
	Costs are not allocated to the products or services	52%	<input type="checkbox"/>

H4 When interpreting routinely generated profitability analysis information please tick one box to indicate which of the items listed below is the most important profitability measure for signaling the need to make cost reduction, discontinuation, redesign or outsourcing decisions relating to your products or services. If you focus on more than one measure please also tick one box in column 2 to indicate the second most important measure.

	Most Important measure 1 N=127 49%	Second most Important measure 2 N=127 10%
(a) Revenues less direct costs	<input type="checkbox"/>	<input type="checkbox"/>
(b) Row (a) above less indirect costs that have been assigned to products or services using cause and effect allocation bases, as described in Question H3 (item b)	17% <input type="checkbox"/>	17% <input type="checkbox"/>
(c) Row (b) above less those indirect costs where it is not possible to identify allocation bases that are the causes of the costs, as described in question H3 (item c) .	8% <input type="checkbox"/>	11% <input type="checkbox"/>
(d) Bottom line net profit (sales less all costs)	26% <input type="checkbox"/>	37% <input type="checkbox"/>
(e) Not applicable (only one profitability measure is used)	- <input type="checkbox"/>	24% <input type="checkbox"/>
(f) None of the above (instead the measure or measures listed below are used)	1% <input type="checkbox"/>	1% <input type="checkbox"/>

If none of the measures listed above adequately explains which profitability measure is used by your organisation please list the measure (or measures) in the space provided below.

.....

H5 Please indicate how routinely generated periodic profitability analysis is used for decision making purposes?
(Tick the appropriate box)

N=125

- a) Used directly in decision making 50%
- b) Used as an attention directing information for signaling the need for more detailed analysis to be undertaken 48%
- c) Other (please specify) ----- 2%
-
-

RESPONDENT'S DETAILS

Name : _____

Designation : _____

Company Name & Address : _____

Telephone No. / Fax No : _____

E-Mail Address : _____

Please indicate the length of time since you qualified as an accountant.

N=112

<2 years	2-5 years	5-10 years	Over 10 years	Other (please specify)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10%	14%	30%	34%	11.6%

Would it be possible for a meeting to be arranged to discuss some of the issues raised by this questionnaire?

N=120

Meeting possible	<input type="checkbox"/>	Meeting not possible	<input type="checkbox"/>
	37%		63%

Thank you for spending your time to complete the questionnaire. Kindly do give your comments, if any in the space provided below. Should there be any queries please do not hesitate to contact one of us at:

**Professor Colin Drury
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Huddersfield
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**Ms Nagarethnam Sithambaram
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Kelana Jaya
47301 Petaling Jaya
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COMMENTS



UNIVERSITI
TEKNOLOGI
MARA

Date:

Dear Sir/Madam,

PhD Research: PRODUCT/SERVICE COST SYSTEM DESIGN IN MALAYSIAN COMPANIES

I am writing to ask if you would be kind enough to participate in the research on "Product/Service Cost System Design In Malaysian Companies" by completing the questionnaire provided. Product/Service cost system design is an important component of the management accounting system within organisations. The current environment of globalisation and competition also prompts a need to ensure that accurate product/service cost information is computed to have a competitive advantage. As such, the objective of this research study is to identify the following issues:

- i. the systems currently used in Malaysian companies and their level of sophistication;
- ii. the extent to which external financial reporting influences the internal management accounting information needs;
- iii. the extent to which product/service cost information is used for management decision making such as in pricing, outsourcing, redesigning, discontinuation, and cost reduction decisions; and
- iv. the nature of the relationship between certain explanatory variables and the choice of the cost system design.

The result of the study will be of benefit to companies as it will provide an insight to the accuracy of their current practices and enable them to compare their systems with others in the industry. I will be most obliged to send you a copy of the research findings should you require a copy.

I have taken great care in selecting the companies and the respondents suitable for this research study. However if you feel that the questionnaire should have been sent to someone else in the organisation, could you please redirect the questionnaire accordingly and my apologies for any inconvenience caused. The questionnaire may look lengthy, but please be assured that not all of the parts need to be completed by all respondents. You need to respond to areas relevant to your organisation only. If there are any questions you feel that cannot be answered, please feel free to leave it blank or add in your comments.

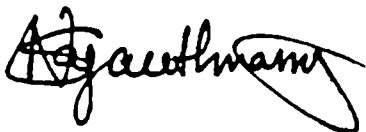
Data collected from this study will be used for my PhD and academic researches only. It may be published in academic or professional journals, and please be assured that confidentiality of all information received will be strictly maintained. The names of individual respondents and their firms will not be released and the information provided will be only reported in aggregate form within summarised tabulations.

Finally, I would like to introduce my supervisor and myself. I am an academic staff at the Faculty of Accountancy, Universiti Teknologi Mara, Shah Alam. Currently I am pursuing the PhD under the supervision of Professor Colin Drury from the University of Huddersfield, UK. Professor Colin Drury is an experienced researcher and the author of several international best selling management accounting textbooks. He has also acted as an advisor on cost management to one of the UK's leading firms of management consultants and has written many articles on management accounting subject. With Professor Colin Drury's supervision, I am confident of producing a quality research report that will be of benefit to academics as well as practitioners. However, I would like to emphasise here that the research objectives can only be achieved with your kind co-operation.

I would like to thank you in advance for spending your valuable time in completing the questionnaire. Should there be any queries please do not hesitate to contact one of us. A space is provided at the end of the questionnaire for your comments. Your comments or suggestions will be most welcome. A prepaid self-addressed envelope is provided for you to return the completed questionnaire.

Thank You.

Yours sincerely,



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Selangor Darul Ehsan
Malaysia
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APPENDIX 3

MANN-WHITNEY TEST – NON-RESPONSE BIAS

Rank

Category	Manufacturing			Non-Manufacturing			Turnover			Listing Status		
	N	Mean Rank	Sum of Ranks	N	Mean Rank	Sum of Ranks	N	Mean Rank	Sum of Ranks	N	Mean Rank	Sum of Ranks
Response	46	142.50	6555.0	81	220.97	17898.50	125	349.07	43633.50	127	330.66	41994.00
Non-response	238	142.50	33915.0	335	205.49	68837.50	573	349.59	200317.50	573	354.90	203356.00
Total	284			416			698			700		

Test Statistics

	Manufacturing	Non-Manufacturing	Turnover	Listing Status
Mann-Whitney U	5474.00	12557.500	35758.500	33866.000
Wilcoxon W	33915.000	68837.500	43633.500	41994.000
Z	0.000	-1.071	-0.028	-1.433
Asymp. Sig. (2-tailed)	1.000	0.284	0.978	0.152