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Management accounting innovations in the UK manufacturing sector : With special emphasis on ABC paradox

Management Accounting Innovations in the UK Manufacturing Sector: With Special Emphasis on "ABC Paradox"

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Abstract

The overall aim of this study was to explore the current status of the UK manufacturing sector in terms of using management accounting innovations (MAIs). Furthermore, by focusing on one set of techniques, Activity Based Techniques, this study aimed to contribute to understanding the predictors of the adoption of management accounting innovations, and thereby, to better understand the more general phenomenon of organisational innovation and management accounting change.

In order to achieve these aims a generic stage-factor model for studying MAI adoption and implementation was developed. This model is based on a heterogeneous theoretical framework that utilised three different theoretical perspectives: institutional, fashion and efficient-choice perspectives. The theoretical framework consisted of six blocks of predictors: institutional push, need pull, innovation attributes, innovator attributes, implementation process attributes and environment attributes. Also, organisational innovation theory and literature was consulted in order to identify prior ABC adoption research limitations and, thereby, address them. The theoretical model was customised to examine ABT adoption and explain the "ABC Paradox": apparently low rates of ABT adoption despite the proclaimed benefits that the technique brings. Eighteen hypotheses were developed and tested to examine the relationship between ABT adoption and the blocks of predictors.

Data was collected by mail questionnaire sent to all medium and large manufacturing companies in the UK having a minimum of one CIMA member with at least 5 years membership (1,456 strategic business units). A response rate of 11% (152 manufacturing business units) was attained utilising Dillman's "Tailored Design Method" of questionnaire design and distribution. The collected data were mainly analysed via a sophisticated three-stage multivariate logistic regression analysis.

The results showed that management accounting innovations are relevant and an important means for change. On average, respondents adopt and use 9-10 MAIs. The ABC paradox is found to be related to certain limitations in previous research. By utilising a wide but explicit definition of ABT in addition to the stage model, it was found that almost 72% of the business units in the sample had experience of ABT.

The adoption rate was approximately 37% (i.e. ABT was either approved and being implemented or in use). The overall usage rate was 28% while the rate for extensive usage of ABT was 11%. Moreover, this study revealed that the majority of ABT users used ABT on an ad hoc basis rather than a systematic planned basis. Previous studies may not be as inconsistent as they appear when the various definitions of ABT (and scope for misunderstanding) and the routes to implementation are taken into account.

In terms of the predictors of ABT adoption, it was found that the key predictors were drawn from three factor blocks: institutional pressures, attributes of ABT and attributes of the innovating company. The final model indicates that adoption of ABT can be predicted by forced-selection, mimetic behaviour, the ease with which ABT results can be demonstrated and management support. Contingency related factors, need-pull and environmental factors, that texts and consultants tend to emphasise when justifying the adoption of ABT are not key predictors of ABT adoption. The absence of both these blocks of factors suggests that traditional contingency models may be under-specified.

لله

رب العالمين

To my family and all whom I love for the sake of Allah.
To the Palestinian students under occupation and siege.

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CHAPTER 1 INTRODUCTION

1.1 Research area of interest

Growing empirical evidence supports the view that contemporary management accounting (MA) is not static in nature (Sulaiman and Mitchell, 2005) and management accounting change does exist. Moreover, it is essential to explicitly recognise that MA change is a heterogeneous phenomena to maintain the comparability, generalisability and assessment of results in MA change research (Sulaiman and Mitchell, 2005; Quattrone and Hopper, 2001). Sulaiman and Mitchell, (2005) suggested a typological structure for MA change recognises the heterogeneous nature of MA change. This typology consisted of five types of change: *addition* where new techniques are introduced as extensions of the management accounting system, *replacement* where new techniques are introduced as replacements for an existing part of the management accounting system, *output modification* which involves modification of the information output of the management accounting system, *operational modification* when the technical operation of the management accounting system is modified and *reduction* which is basically the removal of a management accounting technique with no replacement.

Researching change in MA by additions and replacements has its roots in the 'relevance lost' debate that was initiated around twenty years ago by Johnson and Kaplan's (1987) "Relevance Lost" book. There was a call for more research in order to discover, develop and diffuse management accounting innovations (MAIs) (Kaplan, 1993, 1998; Ax and Bjørnenak, 2005). Consequently a stream of new management accounting techniques that encompassing most MA sub-systems have now emerged (Ax and Bjørnenak, 2005). This emergence of new techniques was followed by a range of studies focusing on the different stages of the innovation and change processes including the adoption decision (e.g. Brown, et al., 2004; Malmi, 1999), the implementation process (e.g. Argyris and Kaplan, 1994; Krumwiede, 1998) and the success of the implementation (e.g. Briers and Chua, 2001; Shields, 1995).

Activity Based Costing (ABC) was the first technique introduced in order to regain the relevance of management accounting (Ax and Bjørnenak, 2007). Research on Activity Based Costing (ABC) could be considered as one of the most important in management accounting innovation research. That is, since the emergence of ABC in the late 1980s, it has attracted management accounting researchers and become the most written about MAI in both academic and professional journals (Bjørnenak and Mitchell 2002; Drury and Tayles 2005). Therefore, ABC related research exemplifies the different forms in which MAIs research occurred. MAI research started with case studies or field visits that aimed to discover, understand and describe the new practices (e.g. Kaplan, 1985; Cooper, Weiss, and Montgomery, 1985; Cooper and Kaplan, 1991, 1992). This was later followed by cross-sectional descriptive studies, reported adoption rates, characteristics, and the specific applications of MAIs (e.g. Innes and Mitchell, 1995). Then diffusion studies emerged citing the explanations of how and why MAIs spread (e.g. Bjørnenak, 1997; Gosselin, 1997; Malmi, 1999). Other studies, focusing on the assessment of the effects of MAIs on company performance emerged (e.g. Kennedy and Affleck-Graves, 2001; Davis and Albright, 2004). Finally, a growing field of studies focused on examining the determinants of the adoption, use and success of MAIs (e.g. Anderson, 1995; Anderson and Young, 1999; Booth and Giacobbe, 1998; Krumwiede, 1998; Brown, et al., 2004; Al-Omari and Drury, 2007; Askarany, et al., 2007).

There is a huge volume of ABC research, however, it has been criticised for being fragmented (Lukka and Granlund, 2002) and failing to develop the cumulative effects of several streams of research, a common criticism of management accounting research (Atkinson, et al., 1997). Moreover, ABC adoption research, which is identified in this study as the research field that examines and/or describes ABC adoption, was described as highly unstable, inconsistent and inconclusive (Brown, et al., 2004; Drury and Tayles, 2005). According to many management accounting scholars (Anderson, 1995; Brown, et al., 2004; Drury and Tayles, 2005; Ax and Bjørnenak, 2005; Zawawi and Hoque, 2008), there is an obvious need for more research in this interesting area, where management accounting change research overlaps with innovation research. These criticisms and the call for more systematic empirical research in this area have provided a major motivation for undertaking the current study.

1.2 ABC adoption research: overview and limitations

This field encompasses anecdotal evidence that was generated at and after the emergence of ABC based mainly on consultancy-oriented descriptive case studies (e.g. Cooper, 1989a, 1989b,1989c; Cooper and Kaplan, 1999); academic studies that aimed to provide a more reliable picture of ABC adoption, based on cross-sectional descriptive surveys, case studies and field interviews (e.g. Innes and Mitchell, 1990; Innes and Mitchell, 1995; Friedman and Lyne, 1999) and, finally, theory-based in-depth case studies and cross-sectional surveys that aimed to utilise certain theories in the explanation of how and why ABC is adopted or not adopted (e.g. Anderson, 1995; Burns and Scapens, 2000; Sion, et al., 2002; Brown, et al., 2004; Malmi, 1999).

The latest phase of ABC adoption research has used different theoretical approaches and frameworks. These include institutional theory (e.g. Burns and Scapens, 2000; Sion, et al., 2002, Adebayo, 2006), actor-network theory (e.g. Briers and Chua, 2001), diffusion of innovation theory (e.g. Malmi, 1999), contingency theory (e.g. Al-Omiri and Drury, 2007), organisational behaviour and psychology theories (e.g. Chenhall, 2004). A wide range of predictive variables have been studied including: organisational strategy and structure, various functional 'demand side' factors, 'supply side' or organisational environment factors and management 'fashion and fads'. The results of this research were described as highly unstable, inconsistent and inconclusive in terms of ABC adoption rates and identifying the determinants of this adoption (Brown, et al., 2004; Drury and Tayles, 2005). Adoption rates were not as high as expected. Gosselin (1997) termed this the "ABC Paradox", namely, "if ABC has demonstrated benefits, why are more firms not actually employing it?" (Gosselin, 1997, p.105). In addition, big variations in adoption rates were reported across studies conducted at similar points in time in different countries (for example, while studies in the U.K. in the early to mid-1990s reported adoption rates of around 10% (e.g. Innes and Mitchell, 1991, 1995; Nicholls, 1992; Drury, et al., 1993; Drury and Tayles, 1994), studies in the U.S. recorded much higher levels (e.g. Shim and Sudit, 1995 (27%); Green and Amenkhienan, 1992 (45%); Hrisak, 1996 (53%)). Additionally there were wide variances reported for individual countries (for example, adoption rates ranged in the UK from 6% to 35% during the nineties).

According to Brown, et al., (2004), the results of ABC adoption research were at best equivocal, and at worst contradictory in explaining this paradox by identifying the determinants of ABC adoption. That is, "no study has been able to establish a set of significant factors that influence the adoption of ABC" (Brown, et al., 2004, p.330). For example, some of the studies that explored the potential impact of product complexity and diversity on ABC adoption found a positive relationship (Bjørnenak, 1997; Krumwiede, 1998), while Clarke, et al., (1999) found a negative association and Van Nguyen and Brooks (1997) did not find any relationship. Booth and Giacobbe (1998) found a positive connection at the initiation of interest stage and no association at the evaluation and adoption stages. Therefore, instead of improving our understanding of ABC adoption drivers, the inconsistency of ABC adoption research's findings has increased the ambiguity of the ABC Paradox.

The sources of these disappointing results were attributed to theoretical and methodological limitations in ABC adoption research (Schoute, 2004). Brown, et al., (2004) suggests that "one possible reason for this is that the prior research has used both a disparate set of theoretical approaches and a wide variety of predictive variables" (Brown, et al., 2004, p.330). Methodological limitations include lack of explicit definition of ABC and an inconsistent definition of ABC adoption (Barid, et al., 2004; Brierley, 2008) and not accounting for the interaction between the proposed determinants (Brown, et al., 2004).

Very few recent studies have endeavoured to address these limitations. Inspired by Anderson (1995) and Krumweide's (1998) work, Brown, et al., (2004) adapted a framework from the IS innovation literature (Kwon and Zmud, 1987; Cooper and Zmud, 1990). This framework consists of two elements: modelling the implementation process as a number of sequential (at times overlapping) stages; and five major contextual factors, each encompassing minor factors that influence successful transition between stages of implementation. Utilising the multistage model Brown, et al.'s (2004) study clearly defined ABC adoption but did not use an explicit definition of ABC. In addition, it concentrated only on a very limited number of organisational and technological factors and limited their analysis to bivariate correlation tests to explore the association between these factors and ABC adoption without accounting for possible interaction between them. Other attempts include Baird, et al., (2004). This study is an extension to Gosselin's (1997) work that overcomes the limitation of not using an explicit definition of ABC. ABC was explained as the highest level of a multi-level innovation: Activity Management (AM) which encompasses Activity Analysis, Activity Cost Analysis and ABC. Like Gosselin (1997), Barid, et al., (2004) study is a factor or contingency study that focused on a limited number of factors. Finally, the most recent attempt is Schoute's (2004) study. The distinguishing feature of this study is the emphasis of the importance of rational-economic factors. This study did not provide a definition of ABC but did use a four stage model of implementation to identify ABC adopters and users. As can be seen, the recent attempts failed to address all the limitations already diagnosed by previous ABC adoption researchers. In addition, all these studies suffer from internal validity threats to the credibility of their findings because of their usage of under-specified models i.e. limiting their theoretical models to a very small number of factors and overlooking other important factors that could have an impact on the adoption of ABC (Askarany, 2003; Modell, 2005). This study is a step forward; it aims to attain more reliable findings to improve the current understanding of the ABC paradox and consequently enhance knowledge of MAI adoption in general. This is attained by addressing possible limitations; developing and utilising a robust theoretical framework and gathering extensive empirical evidence.

1.3 Research context, aim and objectives

To develop the current state of ABC adoption research, this study places ABC research in the context of innovation research. However, innovation research literature is also criticised as being inconclusive, inconsistent and characterised by low levels of explanation (Wolfe, 1994). "The most *consistent* theme found in the organisational innovation literature is that its research results have been *inconsistent*" (Wolfe, 1994, p.405). According to Wolfe (1994), the challenge of organisational innovation research rests in the complex, context-sensitive, nature of the innovation phenomenon itself. Wolfe (1994) has identified three related research streams within the innovation literature: "which have different foci as each addresses a different question, has different unit of analysis and a different dependent variable" (Wolfe, 1994, p.407) (See Table 1-1). These three streams are: diffusion of innovation (DI) research which addresses the diffusion of innovations over time and/or space, organisational innovativeness (OI) research addressing the determinants of the innovativeness of organisations, and process theory (PT) which addresses the process of innovation within organisations.

Table 1-1 Innovation research streams (adopted from Wolfe, 1994, p.407)

Research question	Research approach	Research focus
What is the pattern of diffusion of an innovation through a population of potential adopter organisations?	Diffusion of innovation (DI)	Address the diffusion of an innovation over time and/or space.
What determines organisational innovativeness?	Organisational innovativeness (OI)	Addresses the determinants of the innovativeness of organisations
What are the processes organisations go through in implementing innovations?	Process theory (PT)	Addresses the process of innovation within organisations

Given the complex and context-sensitive nature of innovation, Wolfe (1994) suggested that researchers should minimise ambiguity in the following aspects of innovation studies in order to develop innovation research innovation:

a) Connecting the research questions to the relevant stream
b) Clearly identifying the stage(s) of the innovation process upon which a study focuses
c) The types of organisations included in the study
d) Clearly stating how the study's outcome (e.g. adoption , use, implementation) is conceptualised, and
e) The attributes of innovation being investigated

Wolfe's (1994) suggestions are applied in the current study in the context of the UK manufacturing sector. The logic behind this choice is twofold. First, UK manufacturing organisations have been criticised for a relatively poor level of adoption of innovations and they, on average, lag behind competitors such as Germany, Australia, Japan and Switzerland with regards to the adoption of modern practices (e.g. Birdi, et al., 2003; Porter and Ketels, 2003; Clegg, et al., 2002). Second, although the ABC paradox is so evident in the UK (See Table 1-2) the majority of the research on ABC adoption consisted of either descriptive surveys or in-depth case studies that were informative but not conclusive in terms of generalisable findings.

Table 1-2 Activity Based Costing adoption rates in the UK

Study	Sample	ABC adoption%
Cobb, Innes and Mitchell (1992)	Manufacturing industry; non-manufacturing	6
Drury and Tayles (1994)	Manufacturing industry	4
Innes and Mitchell (1995)	The largest 1000 companies	20
Innes, Mitchell and Sinclair (2000)	The largest 1000 companies	18
Kennedy and Affleck-Graves (2001)	The largest 1000 companies	19.5
Drury and Tayles (2005)	Manufacturing industry; non-manufacturing	12
Al-sayed (2005)	Manufacturing industry; non-manufacturing	10
Al-Omiri and Drury (2007)	Manufacturing industry; non-manufacturing	15

In addition, studies that approached the issue quantitatively have concentrated on very limited contingency factors and suffer from methodological problems that hinder any reliable generalisation when it comes to ABC adoption (e.g. Al-Omiri and Drury, 2007). This study is mainly an extension of organisational innovativeness (OI) research in management accounting as the overall purpose of this study is to explore management accounting change via innovation adoption. It aims to explore the innovativeness of the UK manufacturing sector in terms of "using" new management accounting techniques in general and "adopting" Activity Based Techniques in particular by answering the following research questions:

Q1 To what extent are Management Accounting Innovations in use in the UK manufacturing sector?

Q2 What are the stages through which organisations go in implementing management accounting techniques in general and what are they in relation to ABT?

Q3 To what extent are Activity Based Techniques adopted and used in the UK manufacturing sector?

Q4 What are the main predictors of the adoption of ABT in the UK manufacturing sector?

The second research question belongs to the process theory stream, as it addresses the *process of innovation* within organisations. This is an essential step in order to have a clear identification of the outcome variable of this study "ABT adoption".

Answering these research questions involved the following objectives:

1. Finding the extent to which MA change is occurring via innovation adoption in the UK manufacturing sector. This involved identifying a list of management accounting innovations which are considered to be new in the contemporary management accounting literature.

2. Developing a generic and robust theoretical model for studying MAI adoption. This involved enhancing a multistage model of ABT adoption and implementation from prior research and developing a heterogeneous theoretical model for MAI adoption representing different theoretical perspectives from the innovation literature and considering the current generic models available in the literature.

3. Empirically testing the model in the context of ABT adoption. This objective involved the following sub-objectives:

    1- Identifying and addressing earlier ABC adoption research limitations by consulting organisational innovation theory and literature.

    2- Developing and adopting an explicit and comprehensive definition of ABT.

    3- Developing a research strategy to examine the ABC paradox.

    4- Improving the measurement and testing procedures used in prior research.

1.4 Research significance and contribution

This study is considered to be a significant attempt to bridge a gap in the literature, in terms of providing reliable and conclusive findings that improve understanding of innovation phenomena in management accounting in general and of the ABC paradox in particular. The study provides both practical and academic contributions. It has contemporary relevance and practical value because it provides insight into why ABC is adopted and why, despite its apparent benefits, it can fail. A better understanding of these issues is important in developing the science of management accounting and in providing support to practitioners. Academically, this study contributes to management accounting research and teaching. First, it provides a generic and heterogeneous model that can be used to study management accounting innovations and establish the determinants of their adoption and use. Second, it provides a comprehensive review of alternative theoretical perspectives especially institutional theory, innovation theory, contingency theory and change management leading to the identification of 40 potential variables that might influence management accounting innovation. Third, this study highlights the importance of understanding the nature of the innovation under investigation and develops such an understanding in relation to ABT. This involved an investigation of the evolution of ABT and in-depth review of the relevant literature in order to provide a comprehensive picture of activity based techniques concepts, components and attributes. The illustrative figures that were developed for the above purpose could be used in teaching and future research. Fourth, this study makes a contribution at the methodological level: the research design was effective in achieving a reasonable response rate despite a relatively long questionnaire; follow-up procedures facilitated gathering more details about the innovation and new measures were developed and tested that could be used in future research. Finally, in the particular case of ABT, it was discovered that, institutional theory together with change management provide the key to understanding ABT adoption. Contingency theory was found to be relatively unimportant. This suggests that research based solely on contingency theory may be under-specified with possible implications not only for ABT research but also for management accounting innovation research in general.

1.5 Structure of the thesis

In addition to this first chapter, the thesis comprises of eight further chapters. Chapter 2 provides an overview of innovation diffusion theory and the innovation research literature. Chapter 3 defines MAIs and discusses their characteristics. In addition, it provides an overview of management accounting innovation research and explores ABC-related research. Chapter 4 reintroduces ABC as a management accounting innovation and provides a comprehensive definition of ABT to be used in the current study. Chapter 5 presents the theoretical model and hypotheses. This chapter starts with an overview of three theoretical perspectives to study innovation process. Then three main theoretical models used/suggested by researchers in studying management accounting innovations were related to the selected theoretical perspectives and synthesised to produce this study's framework. The final model is then customised to study ABT adoption and the research hypotheses formulated. Chapter 6 describes the research methodology and the data collection method employed to achieve the research objectives. The reliability, validity and comparability of the results of this study, the operationaliation of the research constructs and their validity and reliability assessments are provided in chapter 7. Chapter 8 presents the results and findings of this research and provides the most parsimonious model to predict ABT adoption based on the comprehensive heterogeneous theoretical model developed in chapter 5. Finally, Chapter 9 provides a summary and discussion of the major findings of the study, its limitations and directions for future research.

CHAPTER 2 INNOVATION IN ORGANISATIONS

In this chapter, an overview of innovation research is provided. This overview aims at presenting the evolution of innovation research, highlighting its limitations and identifying the requirements for innovation research that builds cumulatively on a firm foundation and facilitates comparison of studies in the field. As an introduction, this chapter starts with defining innovation and explores its main types and attributes.

2.1 What is Innovation?

According to Wolfe (1989), the term innovation could refer in organisational innovation literature to two different and broad concepts. Some researchers used the term innovation to refer to the process of bringing a new object into use; (e.g. Van de Van, et al., 1989, Wolfe, 1989) while others have used it to refer to the object of the innovation process itself (e.g. Down and Mohr, 1976; Rogers, 1983, 2003). Moreover, the concept of newness has also been identified in two different ways, in relation to the degree to which an innovation is considered an organisation specific phenomenon (Wolfe, 1989). Some researchers adopted the objective newness of innovation i.e. the innovation should be an objectively new object in terms of its age (e.g. Daft, 1978; Kimberly and Evanisko, 1981), while other researchers accepted the relative newness of innovation i.e. they considered innovation to be organisation specific regardless of its age (e.g. Down and Mohr, 1976; Rogers, 1983, 2003). This element of perceived newness is the distinguishing feature between an innovation and change. That is, as Zaltman, et al., (1973, p.158) argue, all innovations imply change, but not all change involves innovation because not everything that an organisation adopts is perceived as new. Everett Rogers' widely cited book [1] "Diffusion of Innovation" provided the most adopted innovation definition in current social sciences research. It states that innovation is "an idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behaviour is concerned, whether or not an idea is "objectively" new as measured by the lapse of time since its first discovery." (Rogers, 1983, p.11; 2003, p.12). This definition, which is adopted in the current study, represents the view that focuses on the object of the innovation process and considers it as an organisation specific phenomenon.

Innovation scholars stress the importance of understanding innovation characteristics/attributes for innovation research (Downs and Mohr 1976; Tornatzky and Fleischer, 1990; Wolfe, 1994). Tornatzky and Fleischer, (1990) argue that understanding any innovation starts with understanding its attributes. Innovation scholars have provided a wide range of different classification schemes of innovations according to their types and attributes. Notably, there are two attributes that innovation scholars agree upon as representing the nature of innovation phenomenon, complexity and context-sensitivity (Downs and Mohr 1976; Tornatzky and Fleischer, 1990; Wolfe, 1994). However, a broadly accepted typology does not exist (Wolfe, 1994). Wolfe (1994) has provided a table that defines and groups innovation attributes based on the available classification schemes in the literature to be used as a guide for innovation classification efforts (See Table 2-1). Wolfe (1989,

[1] In 1990, the Institute for Scientific Information designated this book as a "Citation Classic" on the basis of the large number of citations (approximately 7000) that it received in articles published in social science journals.

1994) has selected six attributes from Table 2-1 that were found to influence innovation in previous research to be used in classifying innovations: Organisational focus, Radicalness, Centrality, Adaptability, Uncertainty, and Pervasiveness.

Table 2-1 Innovation attributes definitions (adopted from Wolfe, 1994, p.419)

Attribute	Definition
Adaptability (Flexible vs. Inflexible)	The ability to refine, elaborate, and modify an innovation according to the needs and objectives of the implementer.
Architectural Impact (Architectural vs. Modular)	The extent to which an innovation impacts the usefulness of existing architectural vs. component knowledge of the firm.
Centrality (Central vs. Peripheral)	The degree to which the innovation concerns the major day to day work of the organisation and involves activities critical to organisational performance.
Compatibility	The degree to which an innovation is consistent with the existing values, past experiences, and needs of a potential adopter.
Complexity (Low to High)	The extent to which an innovation is perceived as relatively difficult to understand and use.
Cost	The extent of initial financial investment and ongoing expenses.
Divisibility	The degree to which the innovation is a 'tight' package of interlinked parts as opposed to being a 'loose' composite of independent parts that could be adopted separately.
Duration	The period of time to which the change is applicable and is intended to persist.
Disruptiveness	The degree of displacement of existing organisational states that the innovation implies. Organisational states that may be affected by an innovation include structural arrangements, personal and financial resources.
Demonstrability (Low to High)	The extent to which the results of an innovation are visible to others.
Organisational focus (Technical vs. Administrative)	The aspect of the organisation to which the innovation is most relevant.
Pervasiveness, scope (Low to High)	The proportion of total behaviours occurring within an organisation that is expected to be affected by the innovation; pervasiveness is a function of how many organisational members are expected to change their behaviours due to the innovation and how much of the time they will be behaving in new ways.
Physical properties (Hard vs. Soft)	Classification on this dimension differentiates material or physical object innovations from social, programmatic, or process innovations.
Radicalness (Low to High)	The extent to which an innovation represents technological changes and thus implies new behaviours for organisational subsystems and/or members.
Relative advantage	The extent to which an innovation is perceived as being better than the idea it supersedes.
Risk	The level of risk of liability to which an adopting organisation is exposed.
Status (Low to High)	The extent to which an innovation is adopted in the quest for prestige rather than organisational profit or effectiveness.
Uncertainty (Low to High)	Knowledge concerning the link between the innovation's inputs, processes, and outcomes.

It is important to highlight that, as Moore and Benbasat (1991) emphasise, innovation research is related to the *perceived* attributes of *using* an innovation rather than the perceptions of the innovation itself. They argue that different adopters might perceive innovation attributes in different ways and consequently their behaviours might differ (Moore and Benbasat, 1991). An example they provide is the attribute "cost" and its influence on buying behaviour. Adopters' perception of the cost of an innovation is relative to their income, "and thus, what might appear "costly" to one potential adopter, could be "inexpensive" to another, depending on their relative levels of income." (Moore and Benbasat, 1991, pp.194-195). Therefore it is argued that it is relative attributes which have the greatest effect on adopters' behaviour (Rogers, 2003). Another point Moore and Benbasat, (1991) stress is that "it is not the potential adopters' perceptions of the innovation itself, but rather their perceptions of using the innovation that are key to whether the innovation diffuses" (Moore and Benbasat, 1991, p.196).

2.2 Organisational innovation research: an overview

The literature of innovation research is enormous (Wolfe, 1994) and has a long history as a multi-disciplinary field (Rogers, 2003), with contributions from sociologists, communication researchers, economists, organisational researchers, IT researchers, and many others (Fichman, 2000). Utilizing five major critical reviews of the organisational innovation literature, this section provides a brief presentation of the development of innovation research in the organisational context. Each of the reviews aimed at minimizing the inconsistency and improving generalizability of innovation research using different perspectives. Damanpour's (1991) meta-analysis identified the relationship between organisational innovation and a number of its potential determinants, Downs and Mohr (1976) explored the different factors that they believed to be responsible for instability in organisational innovation research findings, Rogers (2003) provided a synthesis of over 3000 previous studies of adoption and diffusion in different disciplines with a large number of generalizations about innovation diffusion, Tornatzky and Klein (1982) were concerned in their review and meta-analysis with innovation characteristics and their relationship to innovation adoption and implementation and finally Wolfe (1994) provided a conceptual review of innovation literature which summarized and organized prior research and presented strategies for conducting more generalizable innovation research. This overview of organisational innovation research is mainly based on Wolfe's (1994) review and his classification of innovation literature as it is the most comprehensive and covers other reviews' perspectives. According to Wolfe (1994, p.407) prior organisational innovation research could be summarized "into three related research streams which have different foci; as each addresses a different question, has different unit of analysis and a different dependent variable" (See Table 2-2). These three streams are: Diffusion of Innovation (DI) research which addresses the diffusion of innovations over time and/or space, Organisational Innovativeness (OI) addresses the determinants of the innovativeness of organisations, and Process Theory (PT) addresses the process of innovation within organisations. The following paragraphs briefly describe these streams and Table 2-2 summarises their main features.

Table 2-2 Innovation research streams (adopted from Wolfe, 1994, p.413)

Research stream	Question	Innovation stage focus	Unit of analysis	Independent variables	Dependent variables
Diffusion	What is the pattern of diffusion of a population of potential adopters?	Adoption	An innovation (extra-organisational focus)	Organisational characteristics, Innovation characteristics, Promoter characteristics	Diffusion pattern, extent, rate
Innovativeness	What determines organisational innovativeness?	Adoption or implementation	Organisational	Organisational characteristics, Innovation characteristics, Managerial characteristics, Environmental characteristics	Innovativeness: number/speed of adoptions
Process (A) Stage Model	What are the stages organisations go through in implementing innovation?	Adoption through implementation	Innovation process (Intra-organisational focus)	Innovation characteristics	Stage: existence and/or sequence
(B) Process	What factors explain the chain of events which result in innovation implementation?	Adoption through implementation	Innovation process (Intra-organisational focus)	Precursor: Organisational context, Organisational politics	Outcome: The innovation process

2.2.1 Diffusion of Innovation (DI)

"Diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system." (Rogers, 2003, p.5). Thus DI research is concerned with the spread of an innovation through a population of potential adopters (Wolfe, 1994). In general the DI research stream has the following elements (Wolfe, 1994):

- The unit of analysis is the innovation.
- The objective of the research is to explain or predict rates and patterns of innovation adoption over time and /or space.
- The focus of the analysis is on the fit of hypothesized innovation diffusion models to actual diffusion histories.
- The main data collection methods used in DI research are, survey questionnaires, expert judgment and archival data collection.

The classical DI research was developed in the context of *individuals* making *voluntary* decisions to *accept or reject* an innovation based on the benefits they expect to accrue from their own *independent use* of the innovation (Fichman, 1992, Rogers, 2003). Everett Rogers' widely cited book "Diffusion of Innovation" provided a synthesis of over 3000 previous studies of adoption and diffusion. The results of this synthesis include numerous generalizations about innovation diffusion, i.e., the process by which innovations spread through populations of potential adopters. Among the more well-established generalizations are (Rogers, 2003):

1) Innovations possess certain characteristics which, as perceived by adopters, determine the ultimate rate and pattern of adoption;
2) Some potential adopters are more innovative than others, and can be identified as such by their personal characteristics;
3) The adoption decision unfolds as a series of stages (flowing from knowledge of the innovation through persuasion, decision, implementation and confirmation) and adopters are predisposed towards different kinds of influence (e.g., mass market communication versus word-of-mouth) at different stages;

4) The actions of certain kinds of individuals (opinion leaders and change agents) can accelerate adoption, especially when potential adopters view such individuals as being similar to themselves; and

5) The diffusion process usually starts out slowly among pioneering adopters, reaches "take-off" as a growing community of adopters is established and the effects of peer influence kick-in, and levels-off as the population of potential adopters becomes exhausted, thus leading to an "S-shaped" cumulative adoption curve.

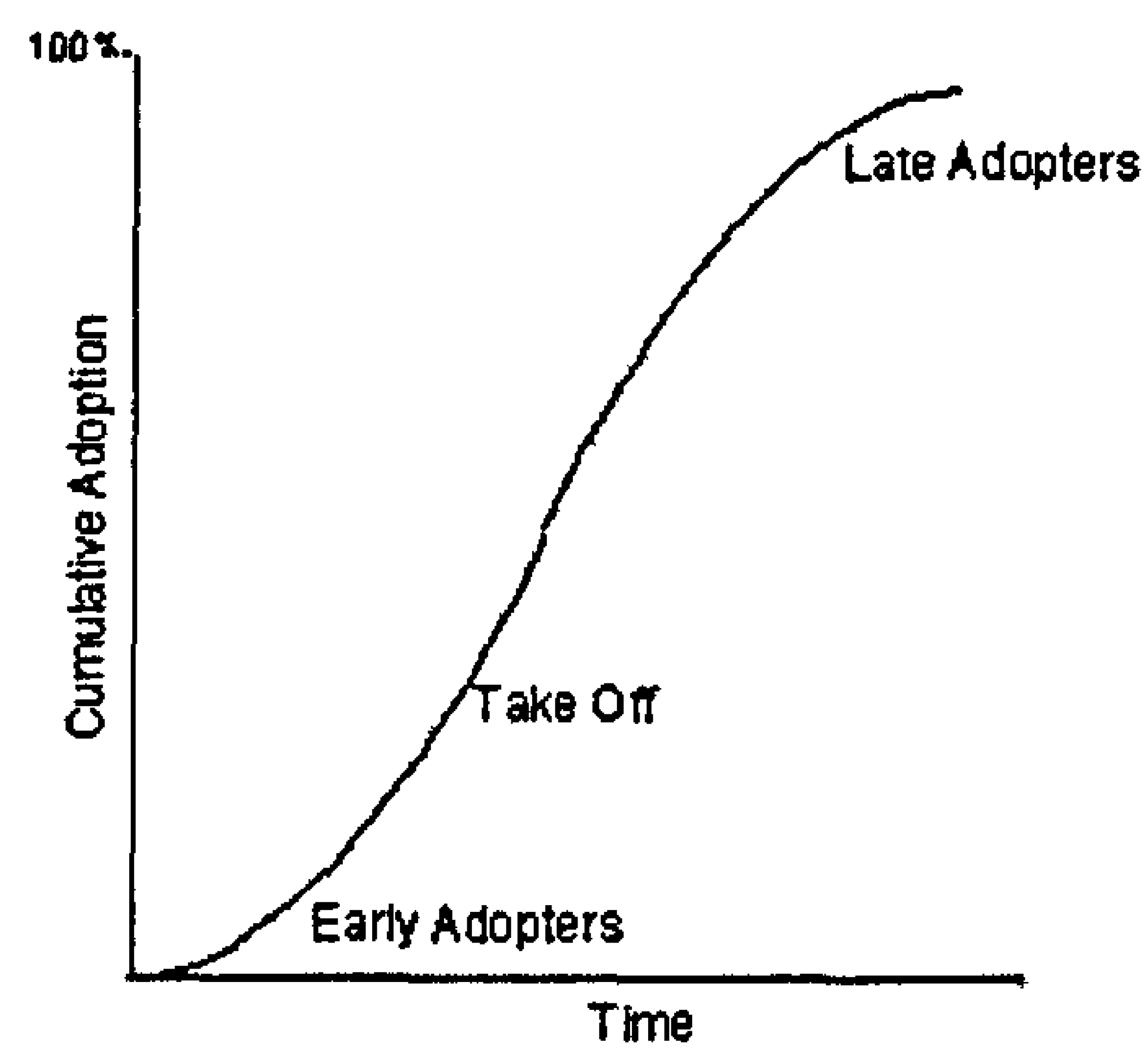

Figure 2-1 The innovation adoption curve (adapted from Rogers, 1995)

More specifically, factors that have been found influential in classical DI research include: (1) The personal characteristics of adopters (cosmopolitanism, level of education, etc.). (2) The social network to which that adopters belong. (3) Innovation attributes (i.e., relative advantage, compatibility, complexity, trialability and observability). (4) Environmental characteristics. (5) The process by which an innovation is communicated and (6) The characteristics of those who are promoting the innovation (Rogers, 2003).

Although DI research and the diffusion model became a conceptual paradigm with relevance for many disciplines (Rogers, 2003); it has been criticised for a number of its assumptions and approaches; and for its applicability in context different from the original context for which it has been used and developed.

Rogers (2003) identified four major limitations of classical DI research including[2]:

- The pro-innovation bias which implies that an innovation should be diffused rapidly and adopted by all members of the social system i.e. neither re-invention nor rejecting cases are considered,
- The individual blame bias, which refers to the tendency in classical DI research to err on the side of the innovation rather than the individuals who are the potential adopters of the innovation i.e. if the innovation did not fit an individual, the blame lies with the individual, himself or herself rather than social system that produced the innovation,
- The recall problem, that is most DI researchers asked respondents to remember the time at which they adopted the innovation which led the system open to inaccuracies,
- The issue of equality, which refers to the tendency in DI research to undermine the fact that the socioeconomic gaps among the members of a social system are often widened as a result of the spread of innovations.

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[2] These problems are specific to DI research that looked at the adoption of innovations by individuals. The reasons behind each of them and different remedy strategies were presented and discussed by Rogers (2003).

In addition to these limitations, which are specific to DI research between individuals, other limitations arise when the classical DI framework is used in different contexts. The generalizations of classical diffusion were developed mainly by looking at the adoption of innovations by individuals making autonomous choices about whether to adopt personal-use innovations that do not require extensive specialized knowledge prior to adoption. DI theory was not developed for more complicated adoption scenarios (Fichman, 1992). These scenarios include (Fichman, 1992):

- Adoption of innovations by individuals subject to strong managerial influences.
- Adoption of innovations by organisations as a whole.
- Adoption of special classes of technologies, i.e., those that involve marked adopter interdependencies or that impose an exceptional knowledge burden on would-be adopters.

Such scenarios influenced the attempts to look past the classical DI theory (Fichman, 1992, Wolfe, 1994, Rogers, 2003). As this study is concerned with innovation in organisations, the following paragraphs review the main developments of DI theory that were developed to make DI generalizations more applicable for innovation adoption in organisations. The Organisational Innovativeness (OI) and Process Theory (PT) research streams represent these developments in DI research.

2.2.2 Organisational Innovativeness (OI)

> "Realization of the limits of DI research models in incorporating issues unique to organisations contributed to growth of the organisational innovativeness stream of research" (Wolfe, 1994, p.408)

In order to use the original diffusion research model, which dealt with the adoption behaviour of individuals, early organisational diffusion studies reduced each studied organisation to the equivalent of an individual (Wolfe, 1994, Rogers, 2003). The variable of interest, the characteristics of individuals (the adopters), were simply replaced with the characteristics of the organisations' leaders and organisations' structure (Wolfe, 1994). Early organisational diffusion studies failed to recognize that the assumptions of classical DI research could not always be applied successfully (Tornatzky and Fleischer, 1990; Fichman, 1992; Wolfe, 1994; Rogers, 2003) and different modifications and extensions are therefore necessary to the classical diffusion theory in order to make it applicable for organisations, because: "(a) some classical variables do not map clearly the organisational level of analysis (e.g., adopter characteristics), (b) the organisational adoption of an innovation is not typically a binary event, but rather, one stage in a process that unfolds over time, and (c) the organisational decision process, particularly in the absence of a dominant individual decision maker, frequently involves complex interactions between vested stakeholders." (Fichman, 1992, p.4) Therefore, unsurprisingly, the results of such research were disappointing (Wolfe, 1994, p.408) and a new research stream was developed that was concerned with the level of the innovativeness of organisations.

The objective of Organisational Innovativeness research (OI) is to identify the factors that determine an organisation's propensity to innovate 'innovativeness'

(Wolfe, 1994, Fichman, 2004). In general the OI research stream has the following elements (Wolfe, 1994):

- The unit of analysis is the organisation.
- Adopting a variance research model.
- The main data collection method used is cross-sectional surveys.

While the dependent variable of DI research was innovation related i.e. diffusion pattern, extent or rate, the dependent variable of OI research is the innovativeness of organisations measured by number, speed of adoptions; the extent of innovation use or assimilation (Wolfe, 1994; Fichman, 2000). The influence of a wide variety of factors has been investigated including individual, organisational and environmental variables (Wolfe, 1994; Fichman, 1992). Nevertheless, this research stream failed to provide a conclusive set of factors that explains the differences in the innovativeness of organisations (Rogers, 1978, cited in Wolfe, 1994). Different criticisms and suggestions were provided in order to overcome this shortcoming. OI was criticised for its invariant perspective of innovations (i.e. ignoring the possible changes in an innovation during the innovation process) and its concentration on adoption decision (as dependent variable) rather than implementation (Wolfe, 1994). In addition, the OI research treatment of specific organisation innovation attributes as generic attributes was considered to be a critical factor that confounds and dilutes research outcomes (Downs and Mohr, 1976). Moreover, it was suggested that the OI stream, in order to improve its results, needs to give more attention to the interaction between organisation innovativeness determinants. Interaction between independent variables has not been investigated and therefore little is known about it (Meyer and

Goes, 1988, cited in Wolfe, 1994). To deal with these criticisms and suggestions the following recommendations were prescribed (Wolfe, 1994):

1. Considering classifying innovations' attributes to the specific attributes of organisations and the objective innovation inherited attributes (Downs and Mohr, 1976).

2. Conceptualizing the dependent variable as extent of innovation implementation instead of adoption decision (Downs and Mohr, 1976; Tornatzky and Klein, 1982, cited in Wolfe, 1994).

3. Investigating the nature of the innovation process and the factors which influence this process (Van de Van, et al., 1989, cited in Wolfe, 1994).

These recommendations have led to interest in process research.

2.2.3 Process Models

Process theory research addresses the process of innovation in organisations. It investigates the nature of innovation processes and examines the sequence of activities in the development and implementation of innovations (Wolfe, 1994; Rogers, 2003). It is concerned with the research question "What are the processes organisations go through in implementing innovations to determine organisational innovativeness?" The focus is on how and why innovations emerge, develop, grow and possibly terminate (Wolfe, 1994). Wolfe (1994) identified two generations of PT research: stage model and process research. Stage model research conceptualises innovation as a series of stages that unfold over time and tries to determine whether the innovation process involves identifiable stages and, if so, what are they and what is their order. Process research aims to describe fully the sequences of, and the conditions by which innovation processes are determined by in-depth, longitudinal case studies, which often involve theory building and qualitative data collection.

Stage model research produced various stage models of the organisational innovation process (e.g. Ettlie, 1980; Kwon and Zmud, 1987; Cooper and Zmud, 1990; Rogers, 2003; Leseure, et al., 2004)[3]. Although these models vary in terminology and their individual start and end points, there is a significant overlap among them (Wolfe, 1994). In general a unitary sequence adoption process has two main phases that consist of different sub-stages: pre-adoption and post-adoption where the adoption decision represents the watershed between the phases (Rogers, 2003). For example, Rogers' (2003) stage model divides the innovation process in organisations into two main parts - initiation and implementation. The split between the two parts is the point at which the organisation decides whether or not to adopt. These two main elements are sub-divided into five further stages, See Figure 2-2.

[3] Two patterns of innovation adoption process have been used in previous innovation research: unitary sequence and multiple sequence pattern (Damanpour and Schneider, 2006). The unitary sequence pattern accepts the assumption that the adoption process is systematic and occurs in a linear sequence, on the other hand the multiple sequence pattern assumes that the process is more random and has unpredictable phases and sequence. Both have been found useful in describing innovation generation and adoption process (Gopalakrishnan and Damanpour, 1994). This study adopts a unitary pattern because previous management and management accounting innovation adoption research (including ABC research) gave some evidence that the unitary pattern adequately describes adoption process (e.g. Ahire and Ravichandran, 2001; Bessant et al., 2003; Ravichandran, 2000; Szulanski, 1996; Anderson,1995; Krumwiede, 1998; Brown et al., 2004). In addition, it is more appropriate for a large sample study (Damanpour and Schneider, 2006).

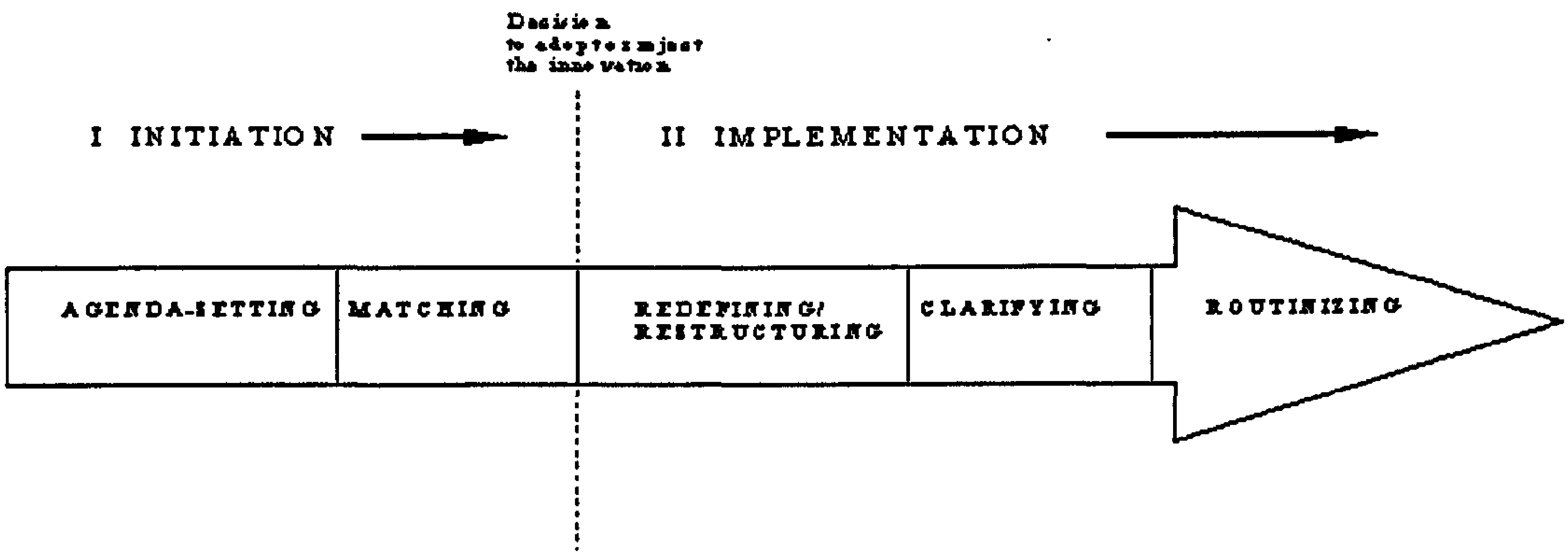

Figure 2-2 The innovation process in an organisation (Source: Rogers, 2003, p.421)

In the *Initiation* phase, problems and opportunities come to the attention of management (agenda setting), against which potential innovations are matched. This phase includes information gathering and planning, resulting in a decision whether or not to adopt the innovation. If the innovation is adopted then a second *Implementation* phase will follow. During redefining/restructuring there is a small window of opportunity when the innovation may be re-invented to achieve a closer fit with the needs and expectations of the organisation. After this period the innovation rapidly becomes part of the routine of the organisation, eventually losing its novelty and innovative character. Wolfe (1994) provided a composite of these proposed models by proposing a general pattern as follows : “A decision making unit becomes aware of an innovation’s existence, a problem or opportunity is matched to the innovation, the innovation’s cost and benefits are appraised, sources of support and/or opposition attempt to influence the process, a decision is made to adopt/(reject) the innovation, the innovation is implemented, the innovation decision is reviewed and confirmed/(reversed), the innovation becomes accepted as routine, and the innovation is infused, i.e. is applied to its fullest potential." (Wolfe, 1994, p.411).

The stage model research stream provided evidence that identifiable innovation stages do occur, but the extent to which they occur in a predictable order is dependent on different features of the innovation (Ettlie, 1980; Wolfe, 1994). According to Gopalakrishnan and Damanpour (1994) the nature of the innovation (simple vs. complex, technological vs. administrative) and the source of it (internal vs. external) affects the process of innovation. For example, it is more likely that unitary stage models adequately describe (a) the *adoption* of both *simple* and *administrative* innovations, and (b) the *generation* of *complex* and *technical* ones (Gopalakrishnan and Damanpour, 1994). While multiple sequence pattern models describe more accurately: (a) the *adoption* of both *complex* and *technical* innovations, and (b) the *generation* of *complex* and *administrative* ones.

To improve stage model research, process research has emerged. Process research aims to examine how innovation processes occur, how innovations develop over time, and what factors explain such processes (Wolfe, 1994; Rogers, 2003). In order to obtain such insight, process research uses inductive, in-depth, longitudinal research (Wolfe, 1994).

2.3 Barriers to knowledge cumulation in innovation research

Innovation research has been criticized for being underdeveloped, unstable and failing to develop the cumulative effects of pursuing streams of research (Wolfe, 1994; Tornatzky and Klein, 1982; Downs and Mohr, 1976). Innovation scholars attributed this instability and undeveloped state of innovation research to certain methodological and theoretical limitations. Wolfe (1994) has summarised these as follows:

1. The tendency of researchers to ask and, at times, confound different research questions because of failing to distinguish between the three research streams and their characteristics.

2. Lack of specificity concerning the innovation stage upon which investigations focus. Traditionally OI innovation studies focused on adoption as the central event but researchers did not provide an explicit definition of this stage/decision in their research. This has resulted in using different dependent variables but under one title, adoption.

3. Minimal consideration given to innovation types and characteristics which has hindered comparisons of empirical findings as well as theoretical development. This is because without knowing an innovation's attributes, systematic and meaningful comparison is impossible. This is applicable for both empirical studies that study one innovation and a group of innovations.

4. Tendency to limit the research to single-organisational-type (e.g. hospitals, local governments, cities etc.). This has led to doubts in generalisations beyond these organisational types.

5. Researchers limiting their scope of inquiry by working within single theoretical perspectives. This has resulted in equivocal interpretations of research results despite using the same explanatory variables.

2.4 Research strategies to mitigate innovation research limitations

Wolfe (1994) suggested research approaches to counter each of these barriers, and thus, to contribute towards having more generalizable and knowledge cumulation innovation research. These approaches are summarized in the following points:

1. The innovation research stream most relevant to a research question needs to be determined in order to ascertain the relevance of previous literature;
2. The innovation stage of interest and dependent variable operationalization requires to be clearly articulated;
3. The type and attributes of the focal innovation needs to be well specified;
4. Increased emphasis requires to be placed on the potential influence of organisational type on innovation;
5. Heterogeneous research perspectives should be considered.

In the following chapter, Chapter 3, the author of the current study is presenting and arguing that management accounting innovation research in general and ABC innovation research in particular has generally failed to avoid the above limitations. In this study, all of Wolfe's (1994) remedies were implemented to establish and contribute to better MA innovation research. Furthermore, the research questions of this study are related to the three innovation research streams as follows:

- Research question 1 and 2, *"To what extent are Management Accounting Innovations in use in the UK manufacturing sector?"; "To what extent are Activity Based Techniques adopted and used in the UK manufacturing sector?"*, are related to DI research as they are concerned with identifying the adoption rates of MAIs in general and ABT in particular. The UK manufacturing sector is a diverse sector which would increase the credibility and the generalisability of the results of this study as suggested by Wolfe (1994).

- Research question 3, *"What are the stages organisations go through in implementing ABT?"* is a stage model related question where the possible routes and stages of ABT adoption are explored via interviews and a comprehensive literature review. This is considered necessary to establish the definition of "adoption" used in this study and to operationalise the dependent variable.

- Research question 4 belongs to OI research, *"What are the main drivers underlying the adoption of ABT in the UK manufacturing sector?"*. To answer this research question, Chapter 4 identifies ABT attributes and innovation type clearly based on a thorough investigation of ABC evolution history. Moreover, Chapter 5 provides an overview of the main theoretical perspectives and models utilised in innovation research and synthesises a theoretical framework that is believed to be a generic model that could be used in MA innovation research. This final model reflects heterogeneous research perspectives and could provide better explanation of the complex innovation phenomena.

CHAPTER 3 MANAGEMENT ACCOUNTING INNOVATION RESEARCH

During the nineteen eighties, Robert Kaplan and Thomas Johnson initiated the 'Relevance Lost' debate in their well known book "Relevance Lost: The Rise And Fall of Management Accounting". The core of this debate was the criticism of the management accounting academics' and professionals' inability to innovate and keep up with the changes in the business environment. They argued that a lack of innovation has resulted in management accounting losing its relevance for planning, decision making and control in an environment of global competition (Johnson and Kaplan, 1987). This debate was soon followed by the introduction of a large number of 'new' management accounting 'concepts', 'techniques', 'models' and 'systems' which were labelled as management accounting innovations (MAIs) (Bjørnenak and Olson, 1999, Ax and Bjørnenak, 2005; Ax and Bjørnenak, 2008). These innovations were given acronyms like ABC and EVA™ or attractive names, such as the balanced scorecard and intellectual capital. In this chapter MAIs are defined and their characteristics are discussed. In addition, an overview of management accounting innovation research is presented and ABC related research is explored.

3.1 Management accounting innovations, definition and characteristics

Definitions of management accounting are plentiful. In this study CIMA's official terminology definition is adopted. CIMA's official terminology defines management accounting as (2005, p.18): "The application of the principles of accounting and financial management to create, protect, preserve and increase value for the stakeholders of for-profit and not-for-profit enterprises in the public and private sectors. Management accounting is an integral part of management. It requires the identification, generation, presentation, interpretation and use of relevant information to:

- Inform strategic decisions and formulate business strategy
- Plan long, medium and short-run operations
- Determine capital structure and fund that structure
- Design reward strategies for executives and shareholders
- Inform operational decisions
- Control operations and ensure the efficient use of resources
- Measure and report financial and non-financial performance to management and other stakeholders
- Safeguard tangible and intangible assets
- Implement corporate governance procedures, risk management and internal controls"

Rogers' (1983, p.11; 2003, p.12) defined innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behaviour is concerned, whether or not an idea is "objectively" new as measured by the lapse of time since its first discovery". This definition has been adopted in this study. Combined with the above definition of management accounting the following definition of management accounting innovation emerges:

Management accounting innovation is: an idea or practice that is perceived as new by an adopting organisation. This idea/practice is an integral part of management that, by the application of the principles of accounting and financial management, creates, protects preserves and increases value for the stakeholders of for-profit and not-for-profit enterprises in the public and private sectors.

Management accounting innovations are mostly assumed to be radical, administrative innovations (e.g. Bjørnenak and Olson, 1999; Schoute and Wiersma, 2001). Ax and Bjørnenak (2008) argue that MAIs, as administrative innovations, are characterised by a certain degree of conceptual ambiguity which contributes to their interpretative viability. This interpretative viability facilitates a wide variety of interpretations and uses of MAIs (Ax and Bjørnenak, 2008). Therefore, MAIs can be seen as models that consist of different elements which can be packed or bundled in different ways (Ax and Bjørnenak, 2008; Bjørnenak and Olson, 1999). These elements fall into two types *design characteristics* and *rhetorical elements* (Ax and Bjørnenak, 2008; Bjørnenak and Olson, 1999). Design characteristics are the technical specifications that define a MAI (Bjørnenak and Olson, 1999). Examples include type of cost objects (customer, product, process etc.) and type of data (financial or non-financial). Rhetorical elements represent the assumed benefits of a MAI that are normally used to market an innovation by emphasising its benefits, areas of use, problems it can solve and stories about its successful use (Ax and Bjørnenak, 2008). According to Rüling (2005, p.179 cited in Ax and Bjørnenak, 2008), rhetoric typically consists of "an ensemble of assumptions and claims about the functioning of organisations, the economy and society that are related to a set of more or less precise suggestions and rules about how to manage organisations". Beyond the assumption that MAIs are mainly administrative, Schoute and Wiersma, (2001) remarked that MAIs could involve new technical as well as administrative elements and their adoption could lead to the adoption of other technical or administrative innovations. For example, the implementation of a MAI might lead to the purchase of new software (technical), the creation of new tasks and/or functions (administrative), etc. (Schoute and Wiersma, 2001). Because of this ambiguity, high interpretative viability and composite nature of MAIs, MAIs can be interpreted and used in ways that differ from what was initially intended (Ax and Bjørnenak, 2008). Users and suppliers "can eclectically select those elements that appeal to them, or that they interpret as the fashion's core idea, or that they opportunistically select as suitable for their purposes" (Benders and van Veen, 2001, pp.37-38 cited in Ax and Bjørnenak, 2008). Therefore, Bjørnenak and Olson, (1999) and Ax and Bjørnenak, (2008) stress that in order to facilitate MAIs understanding and studying it is important to unbundle MAIs to their basic elements and acknowledge the dynamic nature of innovation phenomena.

3.2 MA innovation research: an overview

The introduction of management accounting innovations has influenced and is influencing management accounting research, practice and teaching (Ax and Bjørnenak, 2007). The impact of MAIs on teaching is evident. In order to illustrate this impact, Ax and Bjørnenak (2007) compared the set of concepts listed in the glossaries of the 1982 and 2005 editions of the bestselling textbook "Cost Accounting: A Managerial Emphasis" by Horngren (1982) and Horngren, et al., (2005). The comparison showed that almost 60% of the concepts listed in the 2005 edition are new, compared to the 1982 edition and they were mainly new management accounting models. The impact on research and practice can be traced to the 'relevance lost' debate which has comprised a call for more research on management accounting practice. According to Kaplan (1983), management accounting academic researchers need to leave their offices and go out into the field and leave behind their traditional experimental and analytical methods. Kaplan's (1983) view stressed the importance of working alongside "real life" managers and within companies in order to grasp the details of the challenge faced by companies at that time. Furthermore, he called for collaborative research with researchers from other disciplines, (e.g. operations management and industrial engineering) arguing that such collaboration would give management accountants a new perspective (Kaplan, 1983). Also, he called for academia and researchers to act as communication channels for the diffusion of management accounting innovations (Kaplan, 1983). Consequently, MAI research started with case studies or field visits that aimed to discover, understand and describe new practices (e.g. Kaplan, (1985); Cooper, Weiss, and Montgomery, 1985; Cooper and Kaplan, 1991, 1992). This was later followed by cross-sectional descriptive studies that reported adoption rates, characteristics and the specific applications of certain MAIs (e.g. Innes and Mitchell, 1995). Then diffusion studies emerged with the aim of explaining how and why MAIs spread (e.g. Bjørnenak, 1997; Gosselin, 1997; Malmi, 1999). Other studies focusing on the assessment of the effects from MAIs on company performance emerged (e.g. Kennedy and Affleck-Graves, 2001; Davis and Albright, 2004). And finally, a growing field of studies focused on examining the determinants of the adoption, use and success of MAIs (e.g. Anderson, 1995; Anderson and Young, 1999; Booth and Giacobbe (1998); Krumwiede (1998); Brown, et al., 2004; Al-sayed, 2005; Al-Omari and Drury, 2007; Askarany et al., 2007).

Management accounting innovation research was conducted at different levels (Zawawi and Hoque, 2008): national levels (e.g. Alcouffe, et al., 2008; Firth, 1996), industry levels (e.g. Ittner and Larcker, 1998; Lapsley and Wright, 2004), organisational levels (e.g. Hussain and Hoque, 2002), innovation levels (e.g. Ax and Bjornenak, 2005; Bjørnenak and Olson, 1999), individual levels (e.g. Emsley, 2005). The focus of these studies was on management accounting innovations in general (e.g. Abernethy and Bouwens, 1995; Lapsley and Wright, 2004; Libby and Waterhouse, 1996) or on specific management accounting innovation including, for example, the balanced scorecard (e.g. Kaplan and Norton, 2001; Johanson, et al., 2006), total quality management (e.g. Dunk, 2002; Emsley, 2008) and activity-based costing (e.g. Anderson, 1995; Baird, et al., 2004). The following section is devoted to exploring and evaluating the innovation literature of the central innovation in this study, ABC.

3.3 ABC innovation research

ABC literature is vast. Gosselin (2007), using Proquest ABI/Inform Global database, found 1,477 ABC related papers that were published between 1988 and 2004. This literature was examined by Bjørnenak and Mitchell (2002), Lukka and Granlund (2002) and Gosselin (2007). Empirical research constitutes a large portion of this literature (Bjørnenak and Mitchell, 2002; Gosselin, 2007). Empirical research on ABC covered a variety of topics including: ABC adoption rates, characteristics and applications, factors influencing the success, failure, adoption and implementation of ABC systems; and the association between ABC and improvement in financial performance. Scrutinizing this voluminous literature is far beyond the aim of this section, a task that was comprehensively tackled in the above mentioned reviews. This section aims to highlight what is known as the "ABC paradox" in the literature and its possible causes suggested by MA scholars. It focuses on examining empirical research that studied the ABC Paradox especially these studies that regarded ABC as an innovation and applied an innovation research perspective. Finally, these studies will be evaluated in order to reveal their limitations based on Wolfe's (1994) criticism of innovation research which were presented in the previous chapter.

3.3.1 ABC Paradox

A large number of survey based research studies have been conducted since the early 1990s to report the rate of adoption of ABC in different countries. These surveys were descriptive from early to mid-nineties but became more exploratory and explanatory with a descriptive element later (Gosselin, 2007). Table 3-1 presents a sample of these studies conducted in Europe, North America and Australia. The results of these studies showed that, despite the great deal of interest in ABC that academics and practitioners have shown, the adoption rates reported were not as intense as it was expected (Gosselin, 2007). Moreover, Gosselin (2007, p.650) warned that "it is possible that most ABC surveys overestimate the ABC implementation rates" due to possible confusion among the survey respondents about what exactly is ABC. In addition there may be bias because those who are working in organisations that have not implemented ABC, may not be inclined to respond to ABC surveys. Moreover, an evidence was provided by Horngren (1990) and Nanni, et al., (1992) showed that some firms have stopped the implementation process. Gosselin (1997) terms this as the "ABC Paradox", namely, "if ABC has demonstrated benefits, why are more firms not actually employing it?" (Gosselin, 1997, p.105). According to Scapens (1994) accounting lag (i.e., the time lapse between development of theory and application in practice) offers an explanation for these low adoption rates in studies in the early to mid-1990s (Baird, et al., 2004). This explanation is supported by the results of empirical studies. For example, the adoption rate found for U.K. organisations by Innes and Mitchell (1995) of 20% was three times more than the rate they reported earlier in their 1991 study of (6%). But as the recorded rates of adoption remain lower than might be expected and the significant variation in the rates recorded across studies conducted at similar points in time continues to be found, there must be other explanations besides "accounting lag" (Baird, et al., 2004).

Several recent studies emerged with the aim of addressing this paradox by considering factors that influence the adoption of ABC (e.g. Clarke, et al., 1997; Van Nguyen and Brooks, 1997; Bjørnenak, 1997; Booth and Giacobbe, 1998; Krumwiede, 1998; Malmi, 1999). Factors studied include functional 'demand side' factors, supply side or organisational environment factors and organisational strategy and structure. The following paragraphs are a brief presentation of these empirical studies and their results. These studies are classified according to Wolfe's (1994) classification of innovation research to DI, OI, and PT streams. Finally this brief presentation is followed by a critical evaluation from an innovation research perspective.

Table 3-1 Previous ABC surveys

Study	Sample	ABC adoption
Innes and Mitchell (1991)	Manufacturing and Non-manufacturing industries – UK	6%
Cobb, Innes and Mitchell (1992)	Manufacturing and Non-manufacturing industries- UK	6%
Bright, et al., (1992)	Manufacturing industry – UK	32%
Nicholls (1992)	179 companies that attended ABC seminar in May 1990 – UK	10%
Drury and Tayles (1994)	Manufacturing Industry – UK	4%
Innes and Mitchell (1995)	1000 Largest firms in the UK	21%
Innes, et al., (2000)	1000 Largest firms in the UK	17.5%
Kennedy and Affleck-Graves (2001)	1000 Largest firms in the UK	20.1%
Drury and Tayles (2005)	Manufacturing and Non-manufacturing industries – UK	12%
Al-Sayed (2005)	Manufacturing and Non-manufacturing industries – UK	10%
Al-Omiri and Drury (2007)	Manufacturing and Non-manufacturing industries – UK	15%
Brierley (2008)	Manufacturing industry – UK	49%
NAA (1991)	CMAs of 2500 firms - USA	11%
IMA (1993)	CMAs of 1500 firms - USA	36%
Kiani and Sangeladji (2003)	500 Fortune largest industrial corporations – USA	28%
Gosselin (1997)	Manufacturing strategic business units – Canada	30%
Chenhall and Langfield-Smith (1998)	Manufacturing Industry – Australia	56%
Ask and Ax (1992)	Engineering industry – Sweden	2%
Sorensen and israelsen (1996)	Manufacturing industry – Denmark	3%
Malmi (1996)	Engineering industry – Finland	14%
Virtanen, et al., (1996)	Manufacturing industry – Finland	24%
Bjørnenak (1997)	Manufacturing industry – Norway	40%
Clarke, et al., (1999)	Manufacturing industry – Ireland	32%
Groot (1999)	Food industry – Holland	12%
Dahlgren, et al., (2001)	Manufacturing industry – Sweden	16%

3.4 Diffusion of Innovation studies

DI research is concerned about the spread of an innovation throughout a population of potential adopters (Wolfe, 1994). The main objective is to explain or predict rates and patterns of innovation adoption over time and /or space. Malmi's (1999) study, to the knowledge of the author, is the only study that represents this stream in ABC innovation research.

3.4.1 Malmi (1999)

This study is an explorative study and builds on theoretical perspectives outlined by Abrahamson (1991) with the aim of explaining what drives innovation diffusion in management accounting during its various phases. Malmi (1999) identified four perspectives with potential to explain the diffusion of ABC: the efficient-choice, forced selection, fad and fashion perspectives. The diffusion of ABC in Finland provided the empirical context of this study. Three data collection methods were used. Four postal surveys were conducted to gather data from the demand side establishing motives for adoption as well as background data. Interviews were conducted to gauge motives, perceptions and involvement in ABC diffusion by the supply side (consultants, academics and the software vendors). Finally the frequency of published material (articles and books) on ABC in Finland over a period of time was tracked to provide secondary evidence of supply-side effects. This study showed that the early diffusion of ABC in Finland has followed a temporal trajectory fairly similar to most other innovations. Second, it showed that the dominant economic rationales - and also those based on power and politics - are insufficient alone to explain innovation diffusion among organisations (Malmi, 1999). In fact, the results showed that management fashions and fads had played an important role in certain phases of the ABC diffusions proposed. It was concluded that the "driving forces behind innovation diffusion in management accounting change over the course of diffusion. Efficient choice may explain the earliest adoptions, whereas fashion-setting organisations exert considerable influence in the take-off stage. At a later stage, the influence of fashion setting organisations diminishes. Further diffusion is explained both by mimetic behaviour and efficient-choice." (Malmi, 1999, p.649).[4]

3.5 Process Theory studies

The focus of this stream is on how and why innovations emerge, develop, grow and possibly terminate (Wolfe, 1994). Process research aims to describe fully the sequences of, and the conditions which determine, innovation processes via in depth, longitudinal case studies which often involve theory building and qualitative data collection. Anderson (1995) represents this type of research in ABC innovation literature.

3.5.1 Anderson (1995)

The purpose of this study was "to develop a framework for assessing ABC implementation and hypotheses about factors that influence implementation success" at corporate level (Anderson, 1995, p.2). It investigated the correspondence of an innovation implementation model with one company's eight year experience of moving from problem awareness, to the experimentation and evaluation of alternative cost systems, and finally, to the adoption of ABC. A single case study of ABC implementation at General Motors Corporation was conducted over a span of eight years (1986-1993) and included multiple perspectives. Data were collected via interviews, archival records and direct observation. Anderson (1995) adopted Kwon and Zmud's (1987) factor-stage model of IT implementation. This model consists of two elements: a stage model that contains six sequential (at times overlapping) stages

[4] Abrahamson (1991) typology is examined in chapter five.

(initiation, adoption, adaptation, acceptance, routinization and infusion) and five groups of contextual variables that influence successful transition between the suggested stages. These groups are: characteristics of individuals associated with implementation, organisational factors, technological factors, the task to which the technology is applied, and environmental factors[5]. Table 3-2 presents a list of factors that Anderson (1995) compiled from anecdotal evidence in prior ABC literature, information technology and organisational change literatures as factors that influence ABC implementation success.

Table 3-2 Anderson's (1995, p.10) factor model.

Contextual Factor	IT Implementation Literature (Kwon & Zmud 1987)	Cost System Change Literature	Anecdotal Evidence from ABC Implementations
Individual Characteristics			
Disposition toward change/ Intrinsic reward in change	X	X	
Education	X		
Job Tenure	X		
Role Involvement	X	X	X
Informal support (e.g., sponsors, champions)			X
Organizational Factors			
Centralization	X		
Functional specialization versus Multi-disciplinary approaches	X		X
Internal communications	X	X	X
Extrinsic reward systems		X	X
Training investments	X	X	X
Technological Factors			
Complexity for users	X		X
Compatibility with existing systems	X	X	X
Relative improvement over existing system (accuracy and timeliness)	X	X	X
Relevance to managers' decisions			X
Task Characteristics			
Uncertainty/lack of goal clarity	X	X	X
Variety			
Worker autonomy	X		
Worker responsibility	X	X	
External Environment			
Heterogeneity of demands	X		
Competition	X		
Environmental uncertainty	X		
External Communications	X		

[5] This model is described in details in chapter 5.

Data analysis showed that individual characteristics are critical at the early stages of the implementation process (initiation, adoption and adaptation). It showed the importance of not only having individuals who champion the cause of ABC but the importance of them being patient and willing to persuade others of the merit of the change. Furthermore, it was found that individuals with significant process knowledge (engineers or first-line supervisors) were most likely to be the most enthusiastic ABC implementation team members. The impact of the corporation structure on the ABC implementation process was evident at the different stages of implementation. Centralisation had both positive and negative effects on ABC implementation stages. While functional specialisation had mixed influence at the initiation stage, negative at adaptation stage and positive at the acceptance stage. Internal communications played a role, both positive and negative, at all the studied stages. For example, vertical communications have positively influenced the adaptation stage as it aimed at supporting local implementation teams rather directing them. Training investments were essential in all the stages and facilitated the shift to ABM from ABC at the adaptation stage. Different technological factors influenced the different implementation stages: complexity for users and relative improvement were found to positively influence initiation and adaptation.

Compatibility of the model with existing systems has positively affected initiation and adaptation. Representational accuracy of the model positively affected adoption and adaptation. Finally, relevance of the model to managers' decisions positively influenced the adoption and acceptance stages. All the external environment's factors, heterogeneity of demands, competition, environmental uncertainty and external communication; pushed towards the initiation of ABC implementation.

This study provided the first clinical account of ABC implementation over nine years and included the perspectives of managers from many functional areas and hierarchical levels in GM Corportation. In addition, it has provided a unifying framework for the anecdotal evidence and descriptive case studies prevalent in ABC literature. "Finally, as part of theory development, the paper identifies behavioural and contextual factors that influence ABC implementation success. These factors provide a basis for hypothesis testing and suggest measurement strategies for empiricists who wish to establish the relative importance of different factors for implementation success" (Anderson, 1995).

3.6 Organisational Innovativeness studies

The objective of Organisational Innovativeness research (OI) is to identify the factors that determine an organisation's propensity to innovate (Wolfe, 1994; Fichman, 2004). Most of the ABC innovation studies belong to this research stream and key studies that influenced the current research are reviewed in this section.

3.6.1 Bjørnenak (1997)

Bjørnenak (1997) studied ABC adoption in the Norwegian largest manufacturing companies from two perspectives, demand side and supply side (market and infrastructure) perspectives. This highlights that the diffusion of innovations could be an active and purposeful process via propagation (Bjørnenak, 1997). This study examined the demand side of diffusion that is traditionally argued to be behind ABC adoption. The demand side perspective "focuses on the link between ABC properties and characteristics of the potential adopters" (Bjørnenak, 1997, pp.8-9). This study tested whether cost structure, characteristics of the existing cost system, product diversity and competition led to ABC adoption, as argued in ABC literature. The only factor that was found to be associated with the adoption of ABC was cost structure. From a market and infrastructure perspective, the supply side perspective, Bjørnenak (1997) explored two factors, namely company size and information sources. Company size (number of employees) was therefore used as a representation of the information field (infrastructure of contacts and communication channels) of potential adopters. This factor was found to significantly discriminate between adopters and non adopters concerning the knowledge of ABC. Bjørnenak's (1997) interpretation of this finding was that "larger companies have a larger network of communication channels and the necessary infrastructure for adopting ABC" (Bjørnenak, 1997, p.14). Moreover, Bjørnenak (1997) found that size does not differentiate between adopters and non-adopters with knowledge of ABC. The second factor, information sources, which includes magazines, courses, and internal information, was found to discriminate between adopters and non-adopters. That is, adopters were found to have more information sources than non-adopters. This was not surprising as adopters normally seek more information about ABC. But this author argues that the more interesting finding can be said to be that the type of the information source has more impact on ABC adoption. ABC adopters were found to be more dependant on courses and personal and internal information sources as information sources about ABC. In contrast, non-adopters were found to obtain their information from non-personal source of information, mainly magazines.

3.6.2 Gosselin (1997)

In this study the effect of strategy and organisational structure on adoption and implementation of activity management (AM) approaches was examined. Gosselin (1997) identified three levels of activity management (AM): AA, ACA and ABC. AA "consists of identifying the activities and procedures carried out to convert material, labor and other resources into outputs"; ACA progresses AA "to identify the costs of each activity and the factors that cause them to vary"; while ABC progresses a further stage to trace costs to products and services through identifying overhead costs with homogeneous activity-cost pools and applying pooled costs to products and services based on measures of the activities consumed by those products and services (Gosselin, 1997, p.106–107). Furthermore, Gosselin (1997) suggested AA and ACA are technical innovations as they have an impact on how products are manufactured. ABC was therefore classified as an administrative innovation. That is ABC, according to Gosselin (1997), leads to new administrative procedures, policies and organisational structures. Based on Miles and Snow's (1978) typology of businesses by strategy, Gosselin proposed that a prospector strategy is positively associated with the adoption of an AM level. That is because Prospectors exhibit the fastest rate of change in products and markets in response to changes in competition level. Defenders "compete aggressively on price, quality, and customer service" (p.108) i.e. the exact opposite of prospectors; and analyzers fall somewhere between prospectors and defenders. Reactors do not have a defined strategy. Gosselin (1997) examined the effect of organisational structure on AM adoption by testing two theories: dual-core model and ambidextrous model. The dual-core model distinguishes two types of organisations, organic and mechanistic. In this model "mechanistic characteristics facilitate the adoption and the implementation of administrative innovations. Technical innovations are easier to adopt and implement in organic organisations." (Gosselin, 1997, p.109). Therefore, Gosselin (1997, p.109) proposed that "Among organisations that adopt an AM approach, a mechanistic structure is positively associated with organisations that adopt ABC." The ambidextrous model distinguishes between the initiation and implementation stages of innovation process. In this model, it is said that "the initiation of innovations is easier in organic organisations while implementation is facilitated in mechanistic organisations" (Gosselin, 1997, p.109). Assuming that AA and ACA are the initiation stages of ABC, Gosselin (1997) suggested that mechanistic organisations that decide to adopt ABC are more likely to complete their process of ABC, while organic organisations would be more tempted to limit the innovation process to the AA or ACA level. Therefore, the following hypothesis was tested "Among organisations that adopt ABC, a mechanistic structure is positively associated with organisations that implement ABC." (Gosselin, 1997, p.109). Three Organisational determinants were selected to operationalize organic and mechanistic structures: centralization, vertical differentiation and formalization. That is a mechanistic organisation is characterized by higher levels of centralization, vertical differentiation and formalization in comparison to an organic organisation. To test these hypotheses, Gosselin (1997) employed a mail survey to collect the required data in the Canadian manufacturing sector. A significant association between strategy and the adoption of MA approaches was found (Gosselin, 1997). As proposed, it was found that prospectors are more likely to adopt AM approaches, followed by analysers and defenders. In terms of organisational structure, a partial support to the second hypothesis was found. Among the three organisational dimensions, vertical differentiation was significantly associated with ABC adoption i.e. companies with higher levels of vertical differentiation (mechanistic) were found to be more likely to adopt ABC. Finally, the third hypothesis was supported for centralization and formalization, but not for vertical differentiation. Gosselin, (1997) concluded that organisations that ultimately implement ABC tend to be bureaucracies.

3.6.3 Booth and Giacobbe (1998)

Building on the work of Bjørnenak (1997), Booth and Giacobbe,(1998) investigated both demand and supply factors as potential sources of influence on ABC adoption. Unlike the Bjørnenak (1997) study, which identified adoption of ABC as actual or planned implementation of ABC, Booth and Giacobbe (1998) employed a three stage model of the ABC adoption process and investigated whether differences in companies' decisions at each stage are influenced by demand and supply factors. The model stages were: initiation of interest, adoption of ABC as an idea which involves a decision to reject it or to further evaluate its introduction and, finally, its adoption or rejection as a practice. The demand factors examined were the importance of overheads, product line complexity and the ability to influence market prices of products. Their finding indicated that companies interested in ABC adoption tend to have a larger overhead percentage compared with those that never considered the adoption of ABC. Furthermore, companies adopting ABC as an idea showed a larger overhead cost percentage compared with those rejecting it as an idea. Product line complexity in terms of the number of product lines was found to be significantly higher for firms adopting ABC as an idea. Finally, more price takers than price makers were found amongst adopters of ABC as an idea and adopters of

ABC as a practice. Booth and Giacobbe (1998) examined three supply side factors: the role of consultants, the impact of company size and source of ideas. They found consultants' role to be a significant factor for adopters of ABC both as an idea and as a practice. With regards to size, they found that company size affects only the initiation of interest in ABC as interested companies were found to be larger than those that were not interested and this finding was not repeated for ABC adoption both as an idea and as a practice. Finally, the role of parent companies was the only significant information source in initiating interest in ABC.

3.6.4 Krumwiede (1998)

This study builds on the findings of Anderson (1995) that critical success factors change at different stages of implementation of ABC system. The multistage model that was adopted by Anderson (1995) from the published IS literature (Kwon and Zmud, 1987; Cooper and Zmud, 1990) was adapted and expanded by Krumwiede, to 10 stages, with the first four stages designated as adoption stages (Not considered, Considering, Considered then rejected, Approved for implementation) and the rest as implementation stages (analysis, getting acceptance, implemented then abandoned, acceptance, routine system, used extensively). This study tested how five contextual factors (degree of potential for cost distortions, degree of total quality management implementation, degree of lean production system implementation, information technology quality, manufacturing process type) and four organisational factors (level of top management support, level of non-accounting ownership, level of ABC training provided, number of purposes identified for ABC) affect the ten stages of the ABC suggested implementation process. Krumwiede (1998) had two hypotheses to test: reaching progressively higher levels of ABC implementation is associated with factors that differ among the various stages; and the degree of importance for each factor varies by ABC implementation stage. These two hypotheses were tested using data collected through a survey of U.S. manufacturing business units. The findings confirmed the hypotheses of the study. That is, different factors become important as higher stages of ABC implementation are reached. For example, it was found that the adoption decision is positively associated with the degree of potential for cost distortions, size and the type of manufacturing process while reaching the last stage of the process, integrated system, is positively associated with the quality of IT system, level of non-accounting ownership and level of ABC training provided. Also this study provided evidence to support the second hypothesis. It found that the direction and level of importance for many factors varies by stage. For example, it was found that "a high quality information system may lead to rejecting ABC before adoption or abandoning it after implementation has started, but it also appears to enable reaching the highest implementation stage." (Krumwiede, 1998, p.239). The interpretation that Krumwiede (1998) suggested was that a strong existing IT system might be perceived to provide most of the information needed for decision making that ABC is proposed to provide, thus, the cost of adopting and implementing ABC cannot be justified. At the same time, a strong existing IT system can facilitate the final stages of ABC implementation (integration) as it could provide the needed operational data for this task. Moreover, this study showed that low top management support, low usefulness of cost information and high quality information systems are resulting in companies abandoning ABC.

3.6.5 Clarke, et al., (1999)

Clarke, et al., (1999) examined the adoption of ABC in Irish manufacturing companies. Their survey showed that almost 11% of the surveyed companies were implementing ABC, 21% assessing ABC, and the rest had either rejected or not considered ABC. The impact of five attributes of the responding companies were explored with regard to ABC adoption: subsidiary of multinational companies, size (annual sales), manufacturing activity, number of product lines and manufacturing overheads as a percentage of total costs. The main findings of this research were that being a subsidiary of a MNC, the size of the company and its manufacturing activity are significantly associated with ABC usage. They found that ABC is in use in a greater proportion of companies from the drug, pharmaceutical and healthcare industry. However, the authors highlighted the fact that most of the companies surveyed in these industries were multinational subsidiaries. No significant association was found in respect of number of product lines or percentage of overhead costs. The final conclusion of the authors suggested that the above results show that adoption of ABC in Ireland is trailing behind other Anglo-American countries due to both supply and demand barriers. They emphasised that lack of compulsory continuing professional education, practitioner journals devoted specifically to management accounting, and executive MBA programmes are the cause of Ireland lacking a supply of innovative managerial accountants. In addition, academia and the Irish business community have not actively demanded changes in the accounting curricula.

3.6.6 Brown, et al., (2004)

This is an Australian study. Brown, et al., (2004) used a cross-sectional survey of Australian companies to examine the influence of seven technological and organisational factors on companies' initial interest in ABC and their decision to adopt ABC or not. The organisational factors were top management support, internal champion support, organisational size and use of consultants. Technological factors included: level of overhead, product complexity and diversity, and relative advantage. In order to identify the dependent variables, Brown, et al., (2004) adapted Krumwiede's (1998) multistage model with some changes, see Table 3-3.

Table 3-3 Brown's et al., (2004) and Krumwiede's (1998) multistage models

Krumwiede (1998)	*Brown et al. (2004)*
A. Not considered: ABC has not been seriously considered. We use either single or departmental/multiple plant-wide allocation methods only.	A. Not considered: ABC has not been seriously considered. We use either single or departmental/multiple plant-wide allocation methods only.
B. Considering: ABC is being considered and implementation is possible, but implementation has not yet been approved.	B. Initiation/evaluating: ABC is being evaluated and implementation is possible, but implementation has not yet been approved.
C. Considered then rejected: ABC has been considered (not implemented) and was later rejected as a cost assignment method.	C. Evaluated then rejected: ABC has been evaluated (but not implemented) and was later rejected as a cost assignment/ management method.
D. Approved for implementation: approval has been granted to implement ABC and devote/spend the necessary resources, but analysis has not yet begun.	D. Evaluated and approved for implementation: approval has been granted to implement ABC and devote/spend the necessary resources, but analysis (see next stage) has not yet begun.
E. Analysis: ABC implementation team is in the process of determining project scope and objectives, collecting data and/or analysing activities and cost drivers.	E. Analysis: ABC implementation team is in the process of determining project scope and objectives, collecting data and/or analysing activities and cost drivers.
F. 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.	F. Gaining acceptance: analysis is complete and ABC model has project/implementation team support, but ABC information is not yet used outside of the project/implementation team for decision-making.
G. Implemented then abandoned: ABC was implemented and analysis performed but it is not being pursued at this time.	G. Implemented then abandoned: ABC was implemented and analysis performed but it is not being pursued at this time.
H. Acceptance: occasionally used by non-accounting upper management or departments for decision-making. General consensus among non-accounting departments is that the model provides more realistic costs. However, it is still considered a project model only, with infrequent updates.	H. Restricted Use: used by accountants for internal accounting purposes, but has not been accepted by non-accounting upper management or departments for decision-making. It is still considered a project model only with infrequent updates.
I. Routine system: commonly used by non-accounting upper management or departments for decision making and considered normal part of information system.	I. Used somewhat: Occasionally used by non-accounting upper management or departments for decision-making. General consensus among non-accounting departments is that the model provides more realistic costs. However, it is still considered a project model only, with infrequent updates.
J. Used extensively: commonly used by non-accounting upper management or departments for decision making and considered a normal part of the information system. Clear benefits can be identified, such as: non-value adding activities identified, process performance improved, products priced better and strategic/ operating decisions improved.	J. Used extensively: commonly used by non-accounting upper management or departments for decision making and considered a normal part of the information system. Clear benefits can be identified, such as: non-value adding activities identified, process performance improved, products priced better and strategic/operating decisions improved.

Two hypotheses were tested. Firstly, that the organisational factors and the technological factors are positively associated with interest in ABC initiatives. Secondly, that the organisational factors and the technological factors are positively associated with the decision to adopt ABC.

Two sets of analyses were undertaken to test the two hypotheses. First, the association of each of the organisational and technological factors with the movement from not having considered ABC (stage A) to interest in ABC initiatives (stages B,C,D) were tested via univariate binary logistic regression analyses. Significant factors identified in the first step were entered in a logistic regression multivariate analysis to examine how the factors worked together and which factors showed an association after adjusting for other factors. These two steps were then repeated for firms that have adopted the innovation (stage D) with those that have rejected the innovation (stage C). Findings of the first step showed that all four organisational factors (top management support, internal champion support, size and use of consultants) and two technological factors (product complexity and diversity, and relative advantage) were positively associated ($p < 0.05$ level) with interest in ABC initiatives. Only one factor was not significant: the level of overhead. For ABC adoption, two organisational factors of top management support and internal champion support and the technological factor of relevant advantage were positively associated ($p < 0.05$ level) with ABC adoption. Multivariate analysis showed that three organisational factors (top management support, champion and size) were significantly positively associated with interest in ABC initiatives ($p < 0.05$ level). Use of consultants, product complexity and diversity, and relative advantage were not significantly associated with interest in ABC when controlling for the other factors. Only internal champion support, an organisational factor, was significantly positively associated with the adoption of ABC after controlling for the other factors. These results highlight the importance of the ownership of the innovation. Stronger internal support from an ABC champion influencing both interest in ABC and its adoption reflects that "an environment where there is strong internal support in the firm for first considering and then deciding to adopt an innovation, may be a key element in driving movement through ABC adoption decision stages" (Brown, et al., 2004, p.353). Moreover, this study provided evidence that organisational factors are the main drivers of progression through the ABC adoption decision stages, rather than the technological factors traditionally advocated by many proponents of ABC. "Organisational factors, such as the support of an internal ABC champion and top management support, as well as the greater discretionary staff and computing resources (as found in larger organisations), may be necessary for the firm to effectively act on the motivations for change and to facilitate a sustained and successful evaluation process and adoption decision." (Brown, et al., 2004, p.353).

3.6.7 Baird, et al., (2004)

Baird, et al., (2004) conducted an exploratory survey study in Australia. The aim of this study was to empirically test the utility of Gosselin's (1997) three levels of activity management (Activity Analysis, Activity Cost Analysis and Activity-based Costing) for research into adoption of activity management practices. Three objectives were identified. Firstly, to examine the extent of adoption of activity management at each of Gosselin's (1997) three levels (AA, ACA, ABC). Secondly, to examine organisational factors previously found to be associated with adoption of activity management generally (specifically, business unit size and decision usefulness of cost information) for their association with the extent of adoption of activity management at each of Gosselin's three levels. Thirdly, to examine the business unit's cultural dimensions, (specifically, innovation, outcome orientation, and tight versus loose control) for their association with the extent of adoption of activity management at each of Gosselin's three levels. The findings showed that the extent of adoption of activity management at each of Gosselin's three levels is considerably higher than previous studies conducted in Australia. They found that AA and ACA, the simpler forms of AM, have attracted greater proportionate adoption rates (86 and 82%, respectively) than the more complex ABC (78%). Organisational factors (specifically business unit size and decision usefulness of cost information) were found to be associated with activity management generally. More specifically, their results showed that size was associated with both AA and ACA levels of activity management, but not the ABC level, where it was replaced by the decision usefulness of cost information. The results of the examination of the three dimensions of business unit culture (innovation, outcome orientation, and tight versus loose control) for their association with the adoption of each AM level were strong and promising with respect to the importance of culture in explaining extent of adoption of activity management practices. Their results suggest that business units with a culture of outcome orientation are likely to be attracted towards, and to adopt, all levels of AM. Similarly, business units with a culture of tight (versus loose) control were also found to be more likely to be attracted towards the three levels of activity management. Finally, an innovative culture was found to be associated with the first two levels of AA and ACA. They argued that these two levels can be considered as innovations while ABC, which represents a later and more advanced stage in activity management, "does not represent an innovation, but rather an evolutionary development from an earlier stage" (Baird, et al., 2004, p.395).

3.6.8 Schoute (2004)

This study is a cross-sectional survey-study among medium-sized, Dutch manufacturing firms. It examined environmental, organisational and technological determinants of the adoption and use of ABC. ABC adopters were defined as companies that currently are either using or implementing ABC, whereas companies that are currently using ABC are considered ABC users. The ABC non-adopters/users comparison group consists of companies that are currently considering adoption of ABC, have not yet considered adoption of ABC, or have rejected ABC after assessment. Ten hypotheses were proposed related to the different factors studied. It was hypothesized that the higher the level of intensity of market competition, perceived environmental uncertainty, product/market innovation, vertical differentiation, formalization, centralization and product diversity is found, the more likely it is that companies will adopt and use ABC. In addition, the larger the organisational size and the number of production lines, the more likely it is that firms will adopt and use ABC. Also this study proposed that the influence of product diversity on a companies' likelihood of adopting and using ABC is negatively moderated by the extent to which these companies use advanced manufacturing technologies. And finally, companies with a production process classified as either heterogeneous mass production or serial unit production are more likely to adopt and use ABC than companies with a production process classified as either homogeneous mass production or unit production. The overall ABC adoption and use rates were 17.8% and 11.6% respectively. The results suggested that companies with a higher level of product/market innovation, vertical differentiation and product diversity are more likely to adopt ABC, whereas companies with a serial unit production process are, opposite of expected, less likely to adopt ABC than firms with a homogeneous mass production process. Moreover, companies with a higher level of vertical differentiation and product diversity, and, opposite of expected, a lower level of centralization are more likely to use ABC. Also, as expected, some evidence is found that the influence of product diversity on a company's likelihood of adopting and using ABC is negatively moderated by the extent to which the firm uses advanced manufacturing technologies.

3.6.9 Askarany, et al., (2007)

This study examines the level of association between the perceived attributes of Activity Based Management (ABM) and its diffusion in Australian organisations. Fourteen innovation attributes belonging to five main categories (relative advantage, compatibility, complexity, trialability and observability) were addressed in this study including: 'can get the job done quicker' (the level of importance of time saving from innovation); 'can do the job easier' (the level of importance from easiness of innovation); 'can improve the quality of service' (the level of importance from the quality of innovation); 'can do the job more effectively' (the level of importance of effectiveness from innovation); 'can achieve greater control over work processes' (the level of importance of control from innovation); 'can be learned quickly and easily' (the level of importance of learning aspect from innovation); 'is easy to implement' (the level of importance of easiness of implementing the innovation); 'is compatible with existing processes' (the level of importance of compatibility of innovation with existing process); 'has minor implications for other processes' (the level of importance of the minor implication of innovation for other processes); 'is compatible with corporate culture' (the level of importance of the compatibility of innovation with corporate culture); 'advantages/benefits are clear and demonstrable' (the level of importance of the observability of benefits of innovation); 'outcomes are easily reported/communicated' (the level of importance of easiness in reporting of the outcomes of innovation); 'able to trial the technique to ensure it does what it says' (the level of importance of trialability of innovation) and finally; 'it enhances the profile and reputation of the company' (the level of importance of the reputation of company by implementing the innovation). The dependent variable, the level of the diffusion of ABM, was measured as follows: discussions have not taken place regarding the introduction of this practice; a decision has been taken not to introduce this practice; some consideration is being given to the introduction of this practice; this practice has been introduced on a trial basis; this practice has been implemented and accepted. It is important to note that the authors did not either assess a model fit or explore interdependence of attributes. The findings suggest that among these fourteen attributes of innovations, only four attributes significantly contribute to the diffusion of ABM in practice. It was found that ABM diffusion is positively associated with 'compatibility of the technique with existing processes', 'the quality of the technique in doing the job', 'the effectiveness of the technique' and negatively associated with the 'level of implication of the technique for other processes' (the lower interference with other processes, the better chance of implementation).

3.6.10 Brierley (2008)

The objective of this paper is to use ordinal regression analysis to develop and test a model of the influences of the level of competition, product customization, manufacturing overhead costs and operating unit size on the level of consideration that operating units give to ABC, including those that have considered and rejected ABC. It hypothesised that the level of competition, product customization, percentage of manufacturing overhead costs to total manufacturing costs, and operating unit size are all related positively to the extent to which operating units have considered ABC. The dependant variable, the level of consideration for ABC, was measured on a three-point ordinal scale ranging from not considered, considering and considered ABC. The first group, not considered, represented respondents who have never considered ABC. Respondents who were currently investigating or intending to investigate using ABC were regarded as considering ABC. All other respondents were regarded as having considered ABC (currently using ABC; intending to use ABC; rejected ABC, but established a system of activity analysis or cost driver analysis; implemented ABC and subsequently abandoned it; investigated using ABC and rejected it; rejected ABC, but never investigated its possible use). In order to examine these hypotheses a survey questionnaire was employed in manufacturing companies in the UK. The results of the ordinal logistic regression revealed that operating unit size, regardless of whether it was measured by annual sales revenue or number of employees, was the only factor to significantly influence the level of consideration for ABC. Competition, product customization and manufacturing overhead percentage hypothesised associations were rejected. It was concluded that "operating units appear to consider

ABC based on their size. They consider ABC when they believe that they are sufficiently large, in terms of, for example, financial, labour, computing and time resources, to consider it. Until this point is reached they do not consider it." (Brierley, 2008, p.64)

3.7 Limitations of previous work

The results of ABC innovation research were at best equivocal and at worst contradictory (Brown, et al., 2004). "No study has been able to establish a set of significant factors that influence the adoption of ABC" (Brown, et al., 2004, p.330). In other words there was a lack of consistent findings from the empirical surveys of ABC adoption research (Drury and Tyles, 2005). For example, studies that explored potential impact of product complexity and diversity on ABC adoption have produced inconsistent findings. Bjørnenak (1997), Krumwiede (1998) and Schoute (2004) all found a positive relationship between the level of product complexity and diversity and the adoption of ABC, Clarke, et al., (1997) found a negative association and Van Nguyen and Brooks (1997) did not find any relationship, and Booth and Giacobbe (1998) found a positive connection at the initiation of interest stage and no association at the evaluation and adoption stages. In order to analyse the causes of such results, this study utilises Wolfe's (1994) review and critiques of innovation research. As presented in the previous chapter, Wolfe (1994) has identified four main barriers that contribute to the relatively undeveloped state of innovation research. These are: lack of specificity concerning the innovation stage upon which investigations focus, minimal consideration given to innovation types and characteristics, tendency to limit the research to single-organisational-type, and finally, researchers that were limiting their scope of inquiry by working within single theoretical perspectives. Table 3-4 summarises the main elements of previous ABC innovation research. As can be seen from the table 3-4, Malmi's (1999) study is classified as a Diffusion of Innovation study, Anderson's (1995) is considered as belonging to the process theory research and the rest of the studies are classified as organisational innovativeness research.

Table 3-4 A summary of the prior ABC adoption research

Study	Context	Dependent variables	Independent variables	Definition of ABC	Innovation attributes specification	Method	Innovation research stream
Anderson (1995)	General Motors Corporation	N/A	N/A	No definition was provided	N/A	Case Study	PT
Malmi (1999)	Finland	N/A	N/A	No definition was provided	Not specified or tested	Survey questionnaire, interviews, and archival sources.	DI
Bjørnenak(1997)	Largest manufacturing companies in Norway	ABC (planed or actual adoption) If a respondent had implemented ABC, was currently implementing it or said that they wanted to do so, then he was classified as an adopter.	Cost structure Competition Existing costing system Product diversity	No definition was provided	Not specified or tested	Survey questionnaire	OI
Gosselin (1997)	Canadian manufacturing sector	Three dependent variables: AM adoption. decision to pursue any level of activity management ABC adopters vs. AA and ACA adopters ABC implementers vs. AA and ACA implementers	strategy and organisational structure	ABC is the higher level of activity management where trace costs to products and services through identifying overhead costs with homogeneous activity-cost pools and applying pooled costs to products and services based on measures of the activities consumed by those products and services	AA and ACA are technical innovations ABC administrative innovation	Survey questionnaire	OI
Booth and Giacobbe (1998)	Australian manufacturing firms	Three-stage model initiation of interest, adoption of ABC as an idea which involve a decision to reject it or to further evaluate its introduction and, finally, its adoption or rejection as practice.	The importance of overheads, product line complexity and the ability to influence market prices of products The role of consultants, size sources of ideas	No definition was provided.	Not specified or tested	Survey questionnaire	OI

Table 3-4 (continued)

Study	Context	Dependent variables	Independent variables	Definition of ABC	Innovation attributes specification	Method	Innovation research stream
Krumwiede (1998)	U.S. manufacturing business units	Ten-stage model, with the first four stages designated as adoption stages (Not considered, Considering, Considered then rejected, Approved for implementation) and the rest as implementation stages (Analysis, Getting acceptance, Implemented then abandoned, Acceptance, Routine system, Used extensively).	Degree of potential for cost distortions, Degree of total quality management implementation, degree of lean production system implementation, information technology quality, manufacturing process type, level of top management support, level of non-accounting ownership, level of ABC training provided, number of purposes identified for ABC	No definition was provided.	Not specified or tested	Survey questionn aire	OI
Clarke, et al , (1999)	Irish manufacturing companies.	Companies were classified in four groups: implementing, ,assessing, rejected or not considered ABC	Companies characteristics: subsidiary of multinational companies, size (annual sales), and manufacturing activity, number of product lines and manufacturing overheads as a percentage of total costs.	No definition was provided.	Not specified or tested	Survey questionn aire	OI
Brown et.al (2004)	Australian companies (manufacturing and non-manufacturing)	Ten-stage model: Not considered, Initiation/evaluating, Evaluated then rejected, Evaluated and approved for implementation, Analysis, Gaining acceptance, Restricted Use, Used somewhat, Used extensively.	Top management support, internal champion support, organisational size, use of consultants, level of overhead, product complexity and diversity, and relative advantage	No definition was provided.	Relative advantage	Survey questionn aire	OI
Schoute (2004)	Dutch manufacturing firms	ABC adoption: currently either using or implementing ABC ABC use	Competition, PEU, Strategy, Structure, Size, Product diversity, Advanced manufacturing technology, Production process	No definition was provided.	Not specified or tested	Survey questionn aire	OI
Baird, et al., (2004)	Australian manufacturing sector	level of activity management (AA,ACA,ABC)	Business unit size, decision usefulness of cost information, and organisational culture dimensions	As Gosselin (1997)	Not specified or tested	Survey questionn aire	OI

Table 3-4 (continued)

Study	Context	Dependent variables	Independent variables	Definition of ABC	Innovation attributes specification	Method	Innovation research stream
Askarany, et al., (2007)	Australian companies (manufacturing and non-manufacturing)	As Booth and Giacobbe (1998)	The importance of fourteen innovations attributes.	No definition was provided.	Fourteen items belong to relative advantage, compatibility, complexity, trialability and observability	Survey questionnaire	OI
Brierley (2008)	British manufacturing industry	Level of consideration for ABC: Three points ordinal variable The dependant variable, the level of consideration for ABC, was measured on a three-point ordinal scale ranging from not considered, considering and considered ABC. The first group, not considered, represented respondents who have never considered ABC, respondents who were currently investigating or intending to investigate using ABC were regarded as considering ABC, and all other respondents were regarded as having considered ABC (currently using ABC, intending to use ABC; rejected ABC, but established a system of activity analysis or cost driver analysis, implemented ABC and subsequently abandoned it; investigated using ABC and rejected it; rejected ABC, but never investigated its possible use).	competition, product customization, manufacturing overhead costs and operating unit size	No definition was provided.	Not specified or tested	Survey questionnaire	OI

3.7.1 Specificity of the investigated stage

Malmi's (1999) study, as a DI study, focuses on the adoption stage. Similarly, Anderson's (1995), as a PT research, addresses different innovation stages. The limitation of lack of specificity of the investigated stage is of most direct relevance to OI research. The main focus of OI studies was the adoption of ABC. In addition to this stage, Krumwiede (1998) has investigated more stages beyond the adoption stage. Likewise, Schoute (2004) studies ABC use in addition to ABC adoption. Exceptionally, Brierley (2008) has focused on the consideration of ABC rather than adoption. Studies that followed Anderson's (1995) suggestion to use a stage model to identify the stage in focus were successful in clearly specifying the stage(s) that they were investigating (Booth and Giacobbe, 1998; Krumwiede, 1998; Brown, et.al 2004; Schoute, 2004; Askarany, et al., 2007; Brierley, 2008). However, and regardless of whether stage models were used, the definition of the studied stages might differ due to using different stage models. The rest of the studies that did not use a stage model have used only a simple dichotomous model of adopt or not-adopt (implemented or not-implemented) in their studies and left the interpretation of this stage to their respondents (e.g. Bjørnenak, 1997 and Clarke, et al., 1999). While some studies (e.g. Gosselin, 1997 and Baird, et al., 2004) provided clear statements that define what adoption and implementation means to the researcher, it can be seen that ABC innovation research, despite the use of stage models, is still immature in terms of having an agreement on the definition of the studied stages. Consequently, comparing the results of these studies is difficult as they can be studying different stages but using only one title: adoption. This inconsistency and ambiguity concerning the innovation stage contributed to the inconsistency and, at times, contradictory research results.

3.7.2 Innovation attributes

According to Wolfe (1994), the threat to the development of innovation research that results from giving minimal consideration to innovation attributes is twofold. Firstly, it makes a systematic and meaningful comparison to other innovations impossible without the knowledge of an innovation's attributes. Secondly, cumulative knowledge building is limited when innovation attributes are not specified. In all of the ABC innovation research presented in this chapter, ABC attributes as an innovation were not discussed or presented explicitly. It was regarded, as most of MAIs, as an administrative innovation. The only exception to this simple treatment is Gosselin's (1997) study. Gosselin (1997) has explicitly discussed the attributes of the activity management approaches he identified. He argued that AM has characteristics of both technical and administrative innovations. He classified AA and ACA as technical innovations because their focus is mainly on processes and activities and they have an impact on how products are manufactured and services are rendered. "If organisations decide to go beyond the AA and ACA levels and install ABC, then the innovation becomes more administrative than technical" (Gosselin,1997, p.109). He classified ABC as an administrative innovation because its implementation may lead to new administrative procedures, policies and organisational structures. Gosselin's (1997) treatment of ABC attributes can be considered as a step towards clearly presenting ABC attributes, however, it is still limited when one considers the definition and nature of ABC. That is, by using an activity management hierarchical model, Gosselin (1997) has ignored the very complex and dynamic nature of innovations. As discussed in the early sections of this chapter, management accounting innovations are ambiguous, have high interpretative viability and composite nature. Overlooking ABC attributes is a direct result of the unclear nature of ABC in the management accounting literature. Prior studies have used a multiplicity of terms to refer to activity based techniques such as: ABC itself, Activity-based Management (ABM) (Reeve, 1996), Activity-based Cost Management (ABCM) (Foster and Swenson, 1997), Activity Accounting (AA) (Brimson, 1991), Activity Management (AM), Activity Analysis (AA) and Activity Cost Analysis (ACA) (Gosselin, 1997). These labels or acronyms could therefore refer to the same thing or to something totally different. ABC and ABM could refer to different mixtures of techniques to different researchers. This fact has been highlighted by Jones and Dugdale, (2002): "The term ABC now covers a melange of competing, and often contradictory, ideas and practices that may appear to be without authors, or authors so multiple that no clear guiding intelligence can be identified. Despite or perhaps because of this fact, ABC became aggrandized into a 'management philosophy,' under the acronyms ABCM and ABM" (159-160). Previous ABC adoption studies failed to recognize this nature of ABC and ABM. Most of these studies have ignored this nature and did not provide explicit definitions of the terms they have used (Baird, et al., 2004). This has resulted in making results across studies and across time incomparable and gave the chance to participants to place their own understandings on the term which could differ from those of the researcher and from other participants in the study (Baird, et al., 2004).

The consideration of ABC attributes is an issue that should be considered as, first, comparing ABC innovation research results with other MAIs research results (e.g. BSC) is almost impossible without a clear identification of these innovations attributes. Second, and most importantly, the simple treatment of ABC attributes overlooks the ambiguity, high interpretative viability and composite nature of MAIs.

3.7.3 Organisational context

Wolfe's (1994) concern about the tendency in innovation research to limit investigations to single-organisational-type studies is not applicable in the case of ABC innovation research. That is, all the above studies surveyed highly diversified sectors of organisations (manufacturing sector mainly) and did not limit their efforts to one single industry.

3.7.4 Theoretical perspective

According to Wolfe (1994), the theoretical research perspective of innovation studies has an impact on their results and contribution to the literature. That is the interpretation of study results differs according to the theoretical perspective of the research even when this interpretation is related to the same explanatory variables. Further, adopting different theoretical perspectives leads a one-sided focus on the issues and the use different logics and vocabularies.

Innovation research tended to be heavily rationalistic as researchers adopted deterministic and objective perspectives but recently more voluntaristic, subjective and political orientations have been adopted (Wolfe, 1994). Wolfe (1994) suggested that heterogeneous research perspectives should be considered in innovation research. He observed three potential approaches in this direction. Firstly, in-depth inductive innovation studies could provide a safeguard against adopting premature innovation frameworks and limited scope of inquiry. Secondly, multi-disciplinary innovation research, where pooling different specialties and collecting data from different research methodologies by triangulation can add insight and depth well beyond any one perspective. Thirdly, using multiple theoretical perspectives in innovation research could combine different perspectives together to understand innovation processes (like efficient choice with fad and fashion as suggested by Abrahamson (1991)).

Examining ABC innovation research shows that only the two studies that represent DI and PT streams have followed Wolfe's (1994) suggestion of utilising a heterogeneous perspectives or grounded theory perspective. Anderson (1995) has used the in-depth explorative case study to develop a framework of cost management system change as exemplified by ABC adoption. However, her research was guided by information technology and organisational change literature besides ABC prior literature. Thus, to a certain extent, Anderson's (1995) study represents the grounded theory suggestion provided by Wolfe (1994). Malmi's (1999) study represents a unique example of using heterogeneous theoretical and methodological perspectives in studying ABC diffusion in Finland. That is, he based his study on Abrahamson's (1991) typology that includes fad, fashion and forced selection perspectives as well as the efficient choice perspective in studying innovation diffusion. Further, different research methods were used to collect data from different participants including interviews with consultants, academics and software vendors; questionnaires to gather data from the demand side to collect data about the motives of adoption as well as the background data; and finally the frequency of published material (articles and books) on ABC in Finland over time was tracked to provide secondary evidence of supply-side effects. The rest of ABC innovation studies can be classified as factor-based (contingency) studies as they mainly focus on establishing the relationship between different factors and ABC adoption or other related dependent variables. These factors are mainly selected in the light of the anecdotal evidence provided in ABC prior literature or based on IS innovation literature that was first adopted by Anderson (1995). In all these studies, the rational perspective is the dominant theoretical base. Therefore, OI research of ABC has failed to overcome the limitations of single theoretical perspectives.

In summary, ABC innovation research has, to a greater extent, the main limitations and barriers that hinder producing cumulative, generalizable knowledge in innovation research. In order to overcome these barriers, this study has followed the following steps:

1- Exploring ABC history and evolution in order to identify it as an innovation and specify its attributes (Chapter 4).

2- Developing a generic, heterogeneous, robust theoretical model for MAI adoption based on innovation literature, models developed in management accounting change literature and ABC literature (Chapter 5).

3- Developing a research strategy to examine the ABC paradox. This strategy contains different methods of data collection for different purposes (Chapter 6).

CHAPTER 4 ACTIVITY BASED COSTING AS AN ORGANISATIONL INNOVATION

According to Bjørnenak and Olson (1999) and Ax and Bjørnenak (2008), studying management accounting innovations requires dismantling them to study their basic elements and acknowledging the dynamic nature of the innovation phenomena. This chapter is devoted to studying ABC as a management accounting innovation. It aims to synthesise all definitions and views of ABC provided in the literature. In this chapter ABC's ambiguity is highlighted and its components, as a management accounting innovation, are identified by exploring the history and evolution of ABC. This serves the purpose of, first, developing and adopting a comprehensive definition of Activity Based Techniques (ABT) and, second, clarifying its attributes. This is considered, as described in previous chapters, an important step to overcoming previous ABC innovation research limitations. A comprehensive definition of ABT facilitates the differentiation between ABT adopters and non-adopters and helps in differentiating between different levels and types of any claim of ABT adoption. Clarifying the attributes and components of ABT facilitates comparison of the results of this study with other studies that adopt a similar understanding of ABC, and studies of other innovations that are similar to ABC in their attributes.

4.1 Understanding ABC

Studying and analyzing the previous literature of ABC could lead to a confusion and misconception regarding the exact nature of the ABC acronym[6]. Surveying previous literature revealed that a multiplicity of terms[7] have been used to label one apparent management accounting innovation[8] (Baird, et al., 2004). It is justifiable to ask: are all these acronyms referring to one thing, or are they different? Understanding the nature of ABC could help in answering this question. The following paragraphs illustrate this nature by utilizing the historical studies of Jones and Dugdale (2002), Troxel and Milan (1990), Bjørnenak and Mitchell (2002) that followed ABC's emergence and evolution, in addition to Kaplan and Cooper's different ABC publications. In the following paragraphs the history and evolution of ABC is illustrated briefly. Four main phases of ABC evolution and development were identified: serendipitous implementation, the emergence of ABC (first and second waves), expansion and exploitation, and finally a simplification phase.

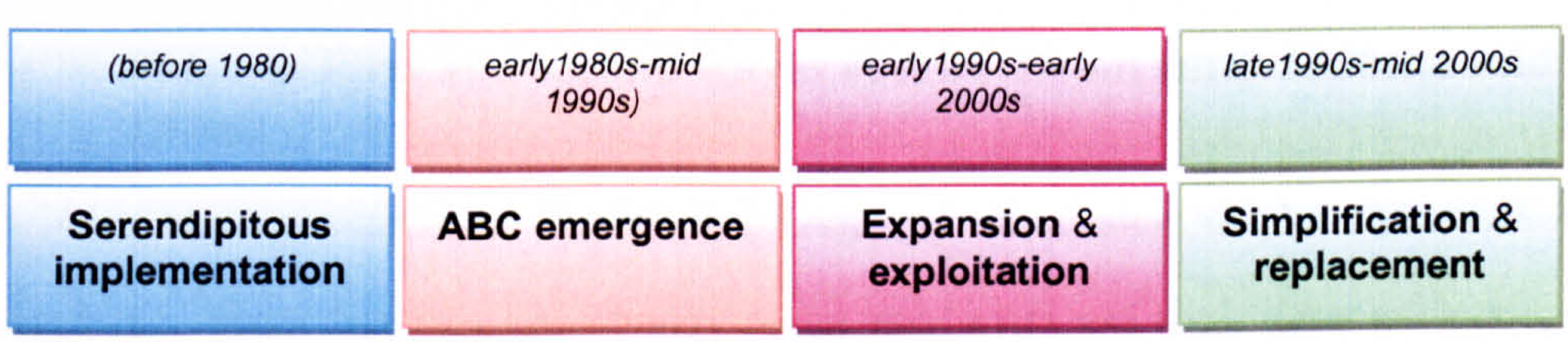

Figure 4-1 ABC evolution and development phases

[6] And its synonyms: ABCM, ABC/M, and ABM

[7] Such as ABC itself, Activity-based Management (ABM) (Reeve, 1996), Activity-based Cost Management (ABCM) (Foster and Swenson, 1997), Activity Accounting (AA) (Brimson, 1991), Activity Management (AM), Activity Analysis (AA) and Activity Cost Analysis (ACA) (Gosselin, 1997)

[8] The present paper considers ABC as an accounting innovation. This point is discussed in the following sections.

4.1.1 Phase 1- Serendipitous implementation (before 1980): "Necessity is the Mother of Invention"

An agreement about the nameless existence of the basic principles of Activity Based Costing, several decades before its emergence in the literature in the nineteen-eighties, can be noticed in the ABC literature. There were some cases where ABC principles have been adopted since the 1930s. These were a result of the necessity to have more sophisticated costing systems, although the reasons differed from case to case. These systems with ABC characteristics were just considered to be sophisticated traditional systems; and were used for normal financial purposes (Troxel, et al., 1990). Early implementation of the principles of ABC was serendipitous (Troxel, et al., 1990). That is they resulted from unique circumstances in each case. These needs were identified later in the nineteen-eighties as particular internal factors, such as performing a complex array of activities, having numerous products or services, and facing a variety of strategic pricing decisions that are highly dependent on costs (Troxel, et al., 1990).

4.1.2 Phase 2- First and second waves of ABC (from early 1980s to mid 1990s)

Drawing on actor-network theory and Giddens' discussion of the dynamics of modernity, Jones and Dugdale (2002) found that ABC has been built by different actors from different networks[9]. Each of those actors and networks left an impact on what we know today as ABC. According to Jones and Dugdale (2002), today's ABC can be considered as a mixture of elements of two waves of ABC. First-wave ABC represents the usage of activity based information for different purposes which differ

[9] The networks that have been studied by Jones and Dugdale, (2002) are Harvard network (Cooper, Kaplan and Johnson are the main actors) and CAM-I network.

according to network interests. Second wave ABC could be considered a totally different approach with new concepts that rejects first wave ABC principles.

4.1.2.1 First-wave ABC: "Superior costing system" (1984-1989)

ABC is *"an approach to the costing and monitoring of activities which involves tracing resources consumption and costing final output. Resources are assigned to activities and activities to cost objects based on consumption estimates. The latter utilize cost drivers to attach activity cost to output."* (C.I.M.A, 2000, p.21). This definition reflects first-wave ABC. It is the ABC that most articles and textbooks present and explain when they introduce the concept of ABC. This introduction usually contains a presentation of traditional costing systems and ABC's essentials with a comparison that shows the superiority of the new costing technique. Traditional cost accounting systems are typically based on the assumption that products cause the costs (See Figure 4-2). This assumption leads to tracing overhead costs to the product by using a few allocation bases like direct labour hours (Cooper, 1988). The amount of overhead allocated to a batch of products increases linearly with the volume produced. So it is assumed that as volume of output increases, overhead increases in a linear fashion (Turney, 1992).

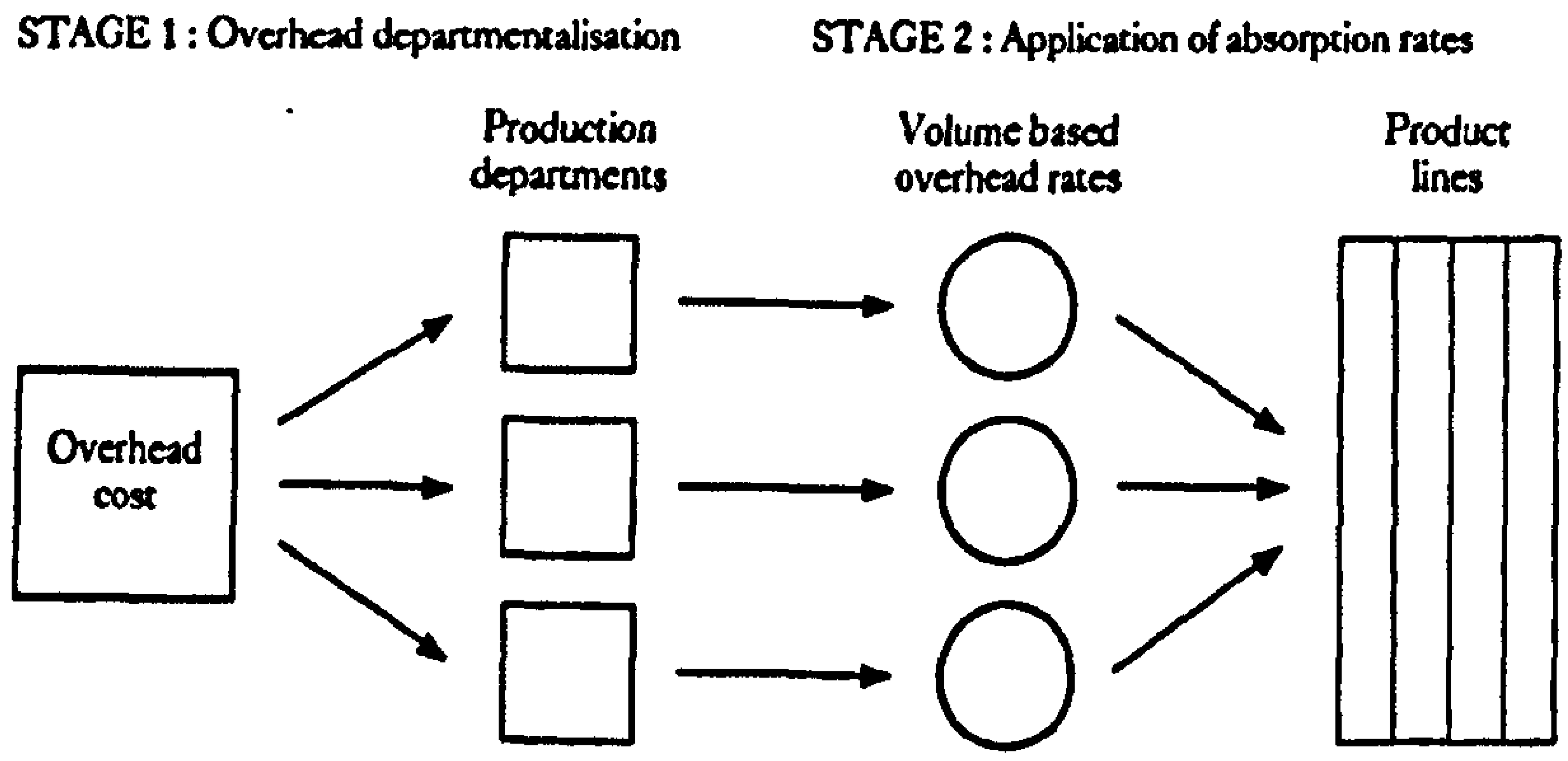

Figure 4-2 Overhead costs in Traditional Costing Systems (Innes and Mitchell, 1990, p.6)

An activity-based costing system, on the other hand, focuses on activities performed in manufacturing the product. ABC rejects the assumption that products consume resources and drive costs. It recognizes that activities link products and costs. Products consume activities and activities consume resources, which consequently drive costs up (Innes and Mitchell, 1990). ABC is a two-stage approach (See Figure 4-3). In the first stage it assigns *all* costs of resources to the activities in activity centres based on the resource drivers (Kaplan and Cooper, 1998). The amount paid for a resource and assigned to an activity is called a cost element (Cooper and Kaplan, 1988). A *cost pool* has been defined as "The point of focus for the costs relating to a particular activity in an activity-based costing system" (C.I.M.A, 2000, p.27).

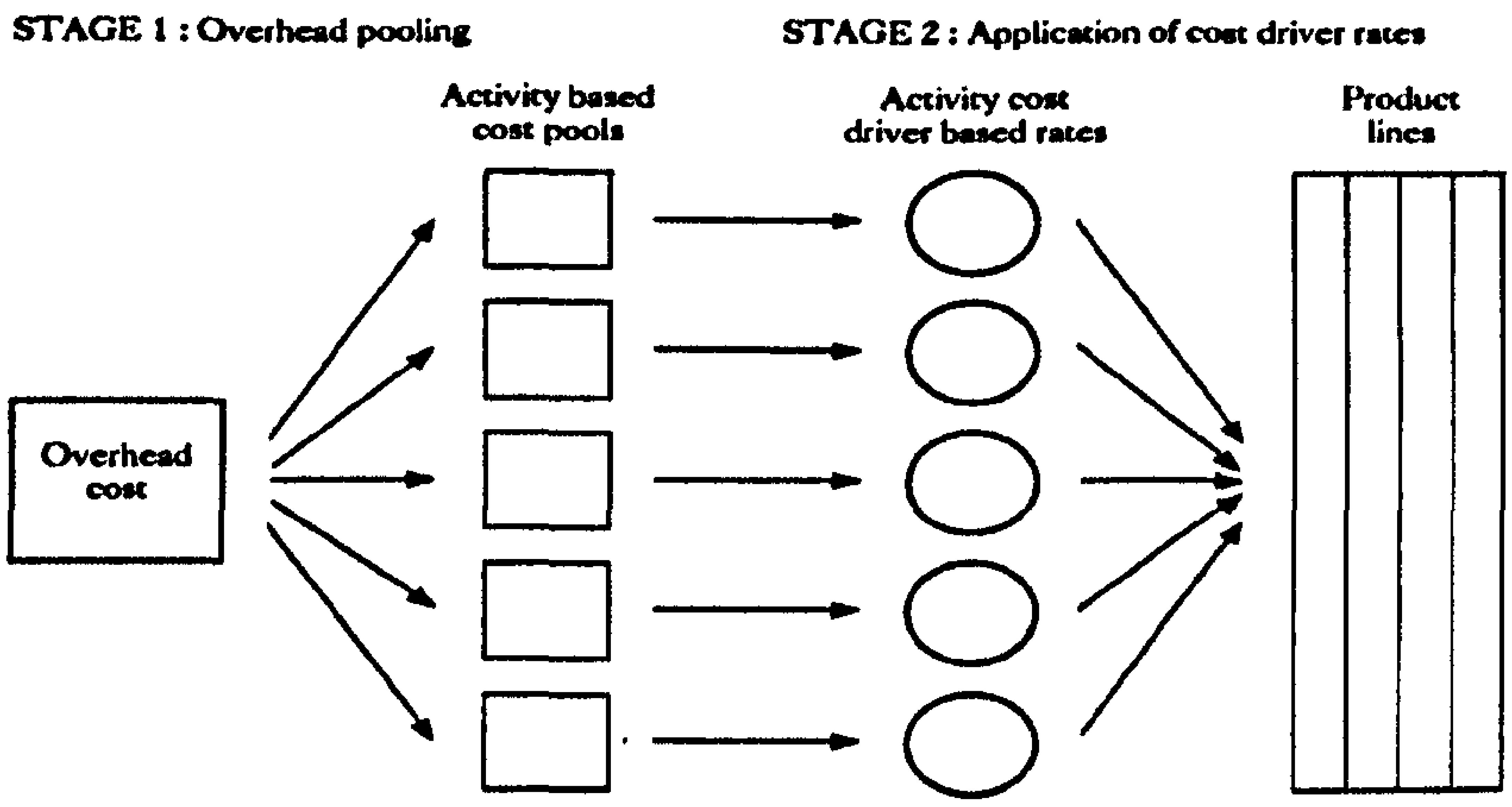

Figure 4-3 Overhead costs in Activity Based Costing Systems. (Innes and Mitchell, 1990, p.7)

A basic assumption of ABC is that cost pools are homogenous, i.e. the costs of activities in each cost pool should have the same cause-and-effect relationship with the chosen cost driver (Novin, 1992). In the second stage, costs assigned to the cost pools are then assigned to products based on each product's consumption of each activity. The final cost is assigned to the product, which is called a *cost object.* Cost drivers are used to assign the costs of activities to products. A *cost driver* is any factor that causes costs to be incurred, such as number of machine set-ups, number of engineering change notices, and number of purchase orders.

First-wave ABC information could be used for different purposes reflecting the interests and different emphases of ABC's authors: providing more accurate fully absorbed costs (Cooper and Kaplan style), reducing costs by eliminating waste/ non-value added activities and attacking overheads (Johnson style) and improving operations management through better performance measures (CAM-I style) (Jones and Dugdale, 2002). However, as a result of the lack of a particular structure and solid conceptual framework, ABC systems of this phase used to be developed on an ad hoc basis without particular structure (Troxel, et al., 1990).

4.1.2.2 Second-wave ABC: "Marginal contribution analysis" (1989-1992)

Second-wave ABC emerged by 1992 as a result of adopting new theoretical concepts and jettisoning a number of first-wave ABCs principles (Jones and Dugdale, 2002). The Harvard network, represented by Cooper and Kaplan (1991, 1992) stressed and gave more weight to the distinction between resources used and resources supplied; and introduced the concept of the cost hierarchy. In addition, a number of key concepts of first-wave ABC were discarded. Namely, the concept of allocation was abandoned and low importance was given to the unit level cost. Moreover, the claim of first-wave ABC that practically all costs are variable was questioned and abandoned and the list of overhead categories that should not be allocated to the unit cost became longer. These changes resulted in a new ABC which is very different from its predecessor (Jones and Dugdale, 2002). "Gone is the fully allocated costing system with allocations that are more accurate in determining unit costs; in its place is a marginal contribution analysis with two categories of resources (supplied and used) and an hierarchical cost structure—a model in which interest in unit product cost is marginalized." (Jones and Dugdale, 2002, p.144). At this stage, ABC was viewed as a separate system with the potential to have a more uniform and structured implementation approach (Troxel, et al., 1990). ABC's potential as a decision making tool providing strategic insights was recognized (Troxel, et al., 1990).

ABC today could be considered as a result of the circulation of two different ABCs; and this compromised its simplicity and made its ambiguity more problematic (Jones and Dugdale, 2002). "On the one hand, ABC may appear to be becoming a fixed certainty, something in particular, a black box, something that is pinned-down in social practices, as it is codified and inserted into computer software. On the other hand, it can appear to remain open, to offer a toolbag of disparate elements into which anyone can dip and extract what they want." (P.159)

4.1.3 Phase 3- ABC Expansion and exploitation (early 1990s-early 2000s)

During this phase of ABC evolution, ABC use expanded in depth and breadth. The depth of ABC use expanded as ABC mutated from a costing system to a 'management philosophy' that linked with other new and high-profile techniques (theory of constraints, TOC, BPR, EVA, benchmarking...) (Bjørnenak and Mitchell, 2002; Jones and Dugdale, 2002). At the same time, the breadth of ABC use expanded to cover non-production functions within companies (e.g. marketing, R&D, procurement, etc.) and economic sectors other than the private manufacturing sector, eventually including both private and public sector services. (Bjørnenak and Mitchell, 2002). The cornerstone of this expansion was the codification and insertion of ABC into computer software in the late 1980s/early1990s (Jones and Dugdale, 2002; Troxel, et al., 1990). ABC software has therefore reduced the implementation costs and enhanced activity based analysis process (Troxel, et al., 1990). This led to ABC being viewed as a separate system with a uniform and structured implementation approach (Troxel, et al., 1990, Cooper, 1989, 1990; Reeve 1990; Kaplan, 1990; MacArthur, 1992; Turney 1992; Howard, 1995).

4.1.3.1 Expanding in depth

This phase of ABC evolution witnessed the emergence of new terminologies reflecting ABC's importance as a technique for strategic cost management and budgeting. Jones and Dugdale (2002) linked this emergence to the simplicity and ambiguity of ABC which has facilitated its mutation from a costing system to a 'management philosophy' by the early 1990s. This management philosophy, ABM, quickly became like a broad umbrella term that included many concepts associated with many different techniques and theories including activity based techniques (Martin, 2006) (See Figure 4-4).

Figure 4-4 ABM model's components. (Martin, 2006)

4.1.3.1.1 Activity-Based Management (ABM)

ABC was quickly recruited to feed the strong appetite for new forms of managing by management consultants (Jones and Dugdale, 2002). Again this managerial philosophy has been presented under different labels including ABM, ABCM or AM. Although all these labels refer to the adaptation of the idea of managing organisations through their activities (the common denominator of these different labels), there are different views regarding the components of this managerial approach and its relation to its "origin", ABC. Martin (2006) identified different models of ABM in the literature. These include the CAM-I conceptual design, Johnson's (1989, 1992), Brimson's, (1996), Turney's, (1992) and Campi's, (1992) models. Each of these models represents an attempt to integrate all of the new accounting and management concepts into one effective system (Martin 2006)[10]. These models could be classified into two groups according to their relation to ABC: cost related ABM and cost free ABM. Johnson's model represents the latter category while the remaining models belong to the first one.

4.1.3.1.1.1 Cost free ABM

Johnson's ABM represents this category. Johnson (who helped in the development of early ABC) asserted that ABM should focus on managing activities, not costs (Johnson, 1992). He argues that ABC information "improves cost-focus management practices of the past, but it is not a tool for managing competitive operations in the global economy" (Johnson, 1992, p.32). The new global economy is a customer-

[10] Most of the ideas or concepts that these authors discuss can be found in CAM-I conceptual design, although each author uses somewhat different terminology (Martin, 2006).

driven economy where customers, empowered by information technology tools, are in charge. In such an environment, Johnson argues, management practices 'must' support a bottom-top management style. Unfortunately, activity-based management that adopts ABC information usually reflects and reinforces a top-down authority management style which, consequently, leads to decisions that impair competitiveness in the long term (Johnson, 1992). Johnson's ABM, by managing activities, places the emphasis on mapping and improving customer-focused processes of organisation. Improving these processes, through eliminating delay, excess, and variation; leads to reducing waste and improving customer value and satisfaction (Johnson, 1992). Thus, the key idea in Johnson's framework, which separates it from traditional accounting control systems, is that the process side of the ABM model, at the bottom in Figure 4-5, is not connected to the cost side (activity costing). The performance measurements (Element 5) that are used to manage processes (Element 6) are not financial or cost-based measurements. (Martin, 2006).

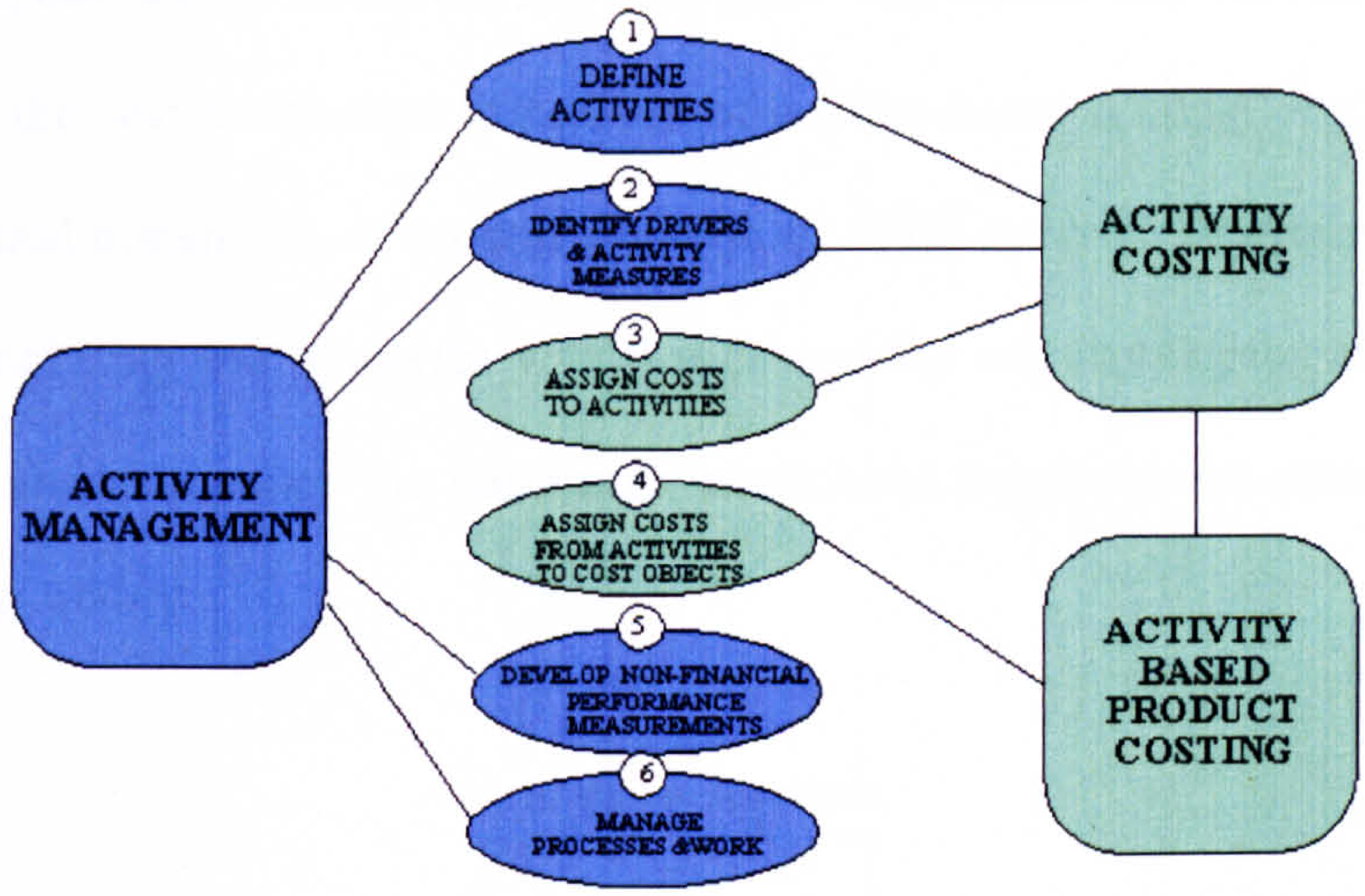

Figure 4-5 ABM model based on Johnson's framework (adopted from Martin, (2006))

4.1.3.1.1.2 Cost related ABM

"Activity Based Management, or ABM, refers to the entire set of actions that can be taken, on a better informed basis, with activity based ***cost*** information." (Cooper and Kaplan, 1998, p.137, emphasis added). This statement reflects the second understanding of ABM. It provides a wide definition of ABM, which shows ABM as a natural consequence of exploiting ABC information for decision-making[11].

This ABM model is conceptually different from Johnson's ABM model concerning this point (Martin, 2006). The CAM-I glossary of activity based management

[11] Cooper and Kaplan (1998) identified four different stages of cost system development as follows: Stage1- broken systems; Stage2- systems driven by financial reporting requirements; Stage3-customized, stand-alone systems including the introduction of PC-based ABC systems; Stage4-integrated systems including strategic ABM implementations. Development beyond Stage 4 requires the introduction of an integrated system which enables the ABC data to be kept up to date in line with improvements in organisational activities and processes including those of a strategic nature.

presented this model of ABM (See Figure 4-6). This model is two dimensional and mainly emphasizes the difference between ABC and ABM. The vertical dimension represents the cost assignment dimension of activity-based costing. And by adding the horizontal dimension, or process dimension, ABM evolved. Managing activities requires analyzing the processes within each activity and developing performance measurements to monitor the company's continuous improvement efforts (Cooper and Kaplan, 1998).

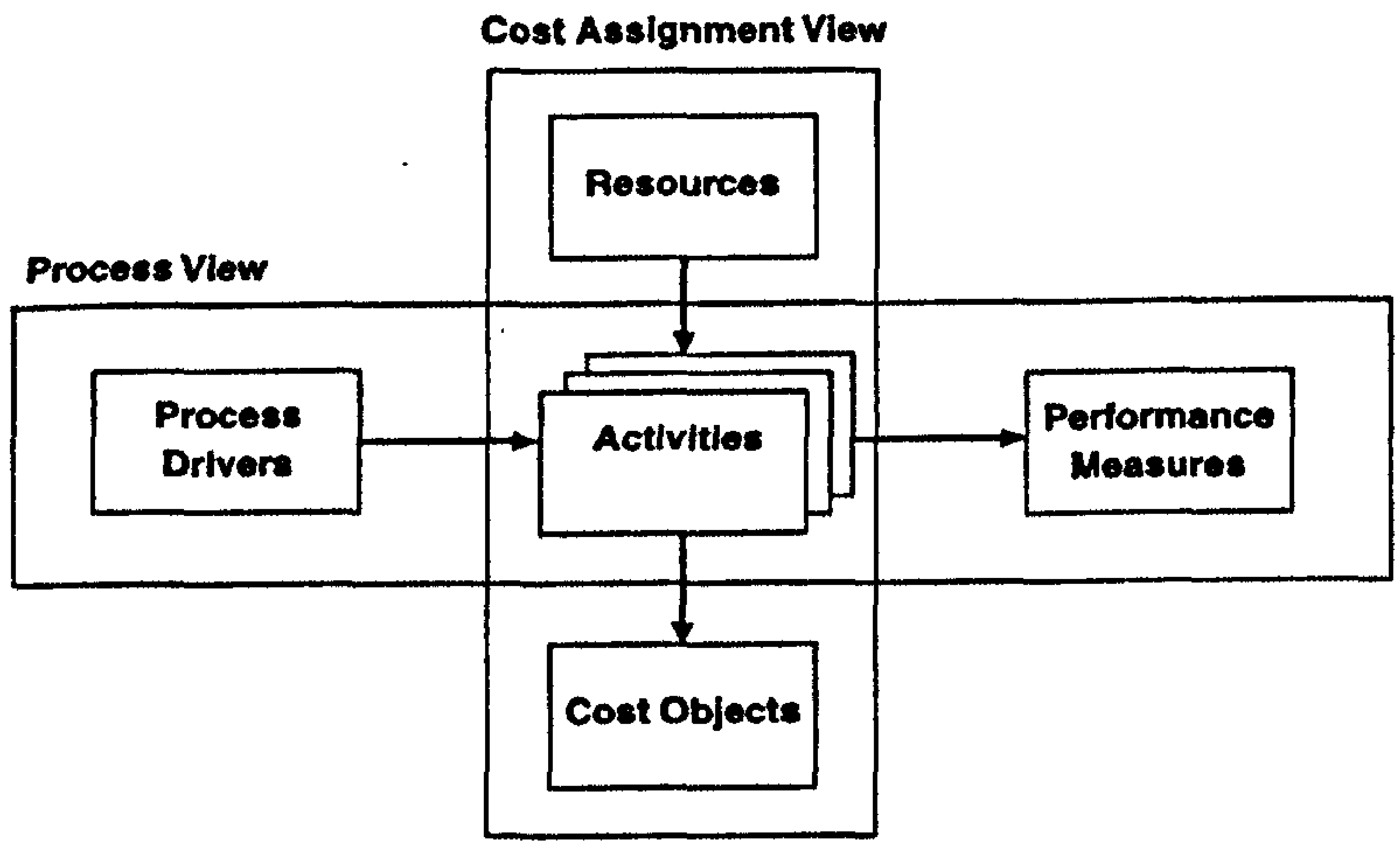

Figure 4-6 CAM-I two dimensional ABM model. (Cited in Cooper and Kaplan (1998, p.153)

Unlike Johnson's framework, the process side of the ABM model, at the bottom in Figure 4-7, should be connected to the cost side (activity costing); that is, in the CAM-I model, both non-financial information and cost information are used to manage activities.

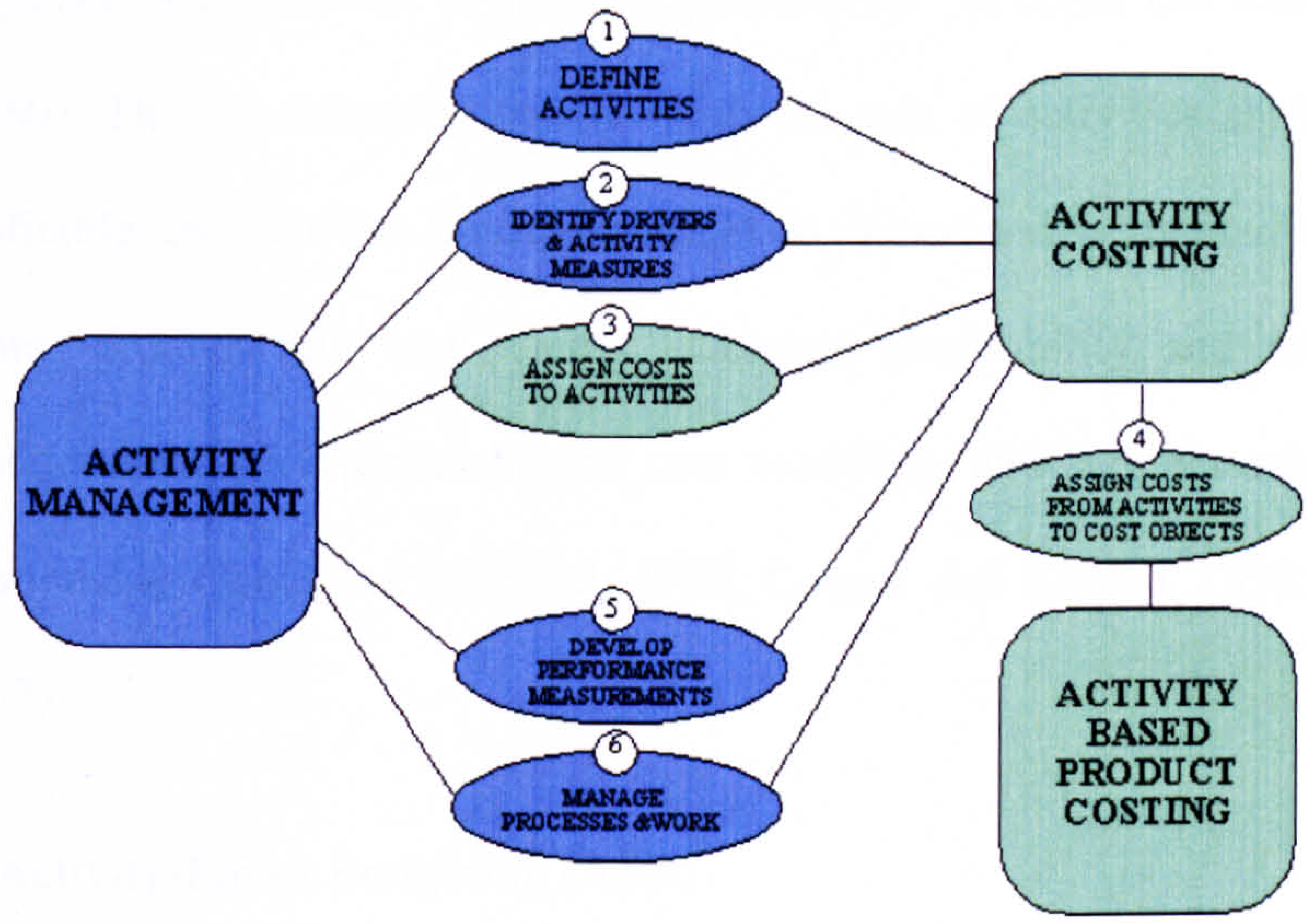

Figure 4-7 ABM model based on the CAM-I framework (adopted from Martin (2006))

Cooper and Kaplan (1998), in their book "Cost and Effect", have differentiated between two types of ABM: *operational* and *strategic.*

- Operational ABM: aims at increasing efficiency, reducing costs, and enhancing asset utilization. Operational ABM is used to enhance performance improvement (continuous and discontinuous) programs in organisations like Total Quality Management (TQM) and Business Process Reengineering (BPR) (Cooper and Kaplan, 1998). Adopting ABC for purposes like cost reductions and performance measurement could be classified as operational ABM (Innes and Mitchell, 1995; Dugdale, 2007).

- On the other hand, strategic ABM aims at "modifying the demand for organisational activities to enhance profitability." (Cooper and Kaplan, 1998, p.160). This modification occurs when the mix of activities shifts to more profitable applications. Strategic ABM is concerned with decisions made about: product mix and pricing, customer profitability and relationship, product design and development; cost modeling, and supplier selection and relationship (Innes and Mitchell, 1995; Cooper and Kaplan, 1998; Dugdale, 2007).

4.1.3.1.2 Activity-Based Budgeting (ABB)

Activity-Based Budgeting was identified as a useful application of ABC in the field of management control (Mitchell, 1994). ABB can be considered as a component of ABM in some ABM models (for instance, Brimson, 1996 and Turney, 1992). The concept of ABB can be seen as a reverse process of ABC (Cooper and Kaplan, 1998) (See Figure 4-8). ABB was identified in the CAM-I glossary of ABM as: "an approach to budgeting in which a company uses an understanding of its activities and driver relationships to quantitatively estimate work load and resource requirements as part of an ongoing business plan. Budgets show the types, number of, and cost of resources that activities are expected to consume based on forecasted workloads. The budget is part of an organisation's activity-based planning process and can be used in evaluating its success in setting and pursuing strategic goals." (Cited in Dierks and Cokins, 2001, p.35).

According to Innes and Mitchell (1995), ABB can support the operation of practical responsibility accounting by matching activity budgets to relevant individuals, and the availability of cost driver statistics at the stage of setting budgets can assist in assessing future resourcing needs by giving an indication of existing and planned work throughput. The ABB system can provide a highly detailed and reliable variance analysis and provide information on capacity utilization (Kaplan, 1994).

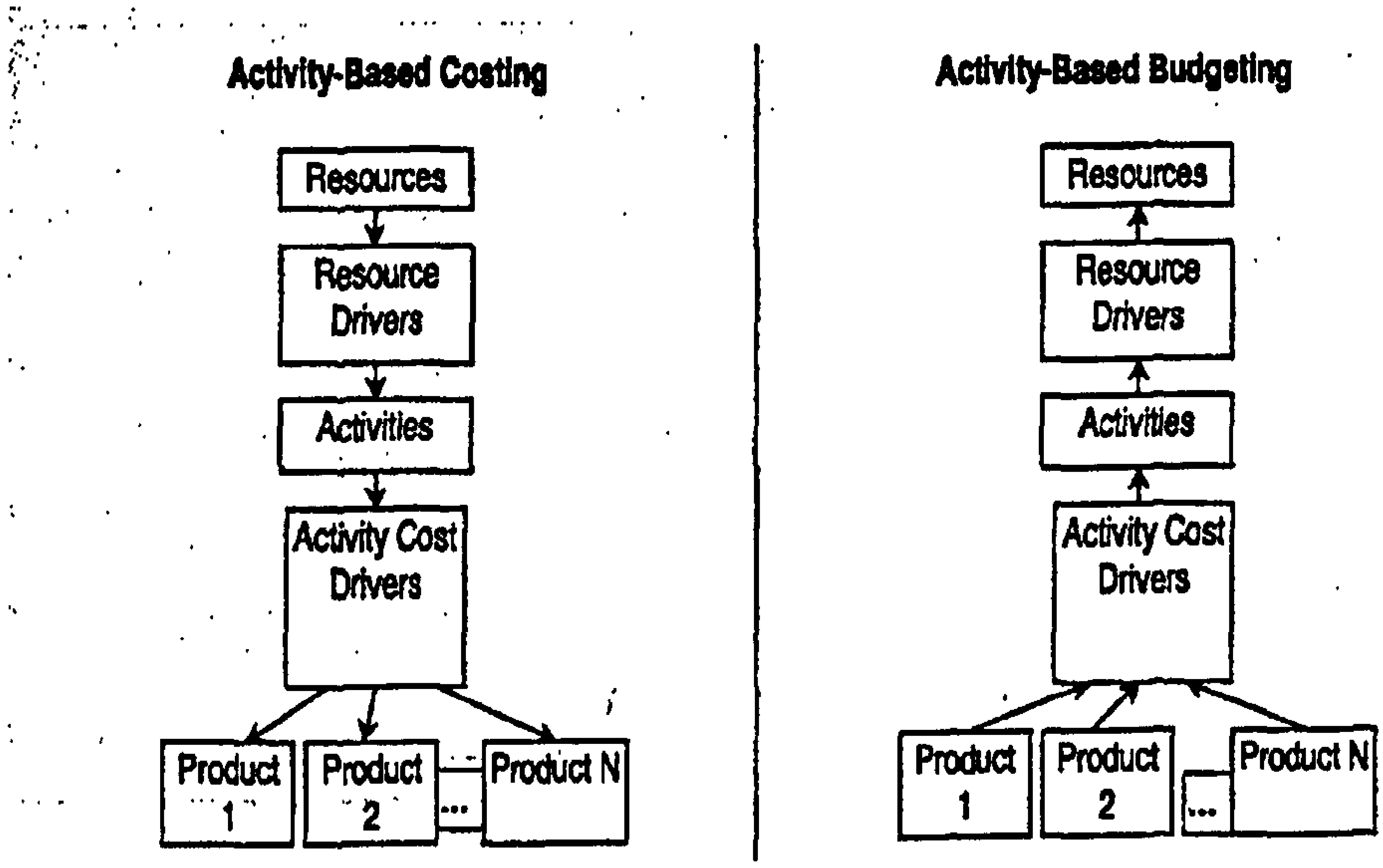

Figure 4-8 Activity Based Budgeting Systems as a reverse process of ABC (Kaplan and Cooper, 1998, p.303)

4.1.3.1.3 ABC and other improvements initiatives

Activity-based techniques were seen as a complement to other organisational improvement initiatives such as: Business Process Reengineering (BPR) (Sharman, 1992; Briody, 1994; Cokins, 1994; Moravec and Michael, 1992; Porter and Kehoe, 1994), the Theory of Constraints (TOC) (Kee, 1995; Campbell, et al., 1997; Gupta, et al., 1997; Demmy and Talbott, 1998), Target Costing (Koons, 1994; Booth, 1995; Baker, 1995), Economic Value Added (EVA™) (Hubbell, 1996a,b), product life cycle costing (Lobo, 1998), strategic costing (Yang and Wu, 1993), supply chain management (SCM) (Andel, 1996; Houlihan, 1985) and Total Quality Management (TQM) (Steimer, 1990; Cooper and Kaplan, 1998). Different links have been made between ABC and the above suggested techniques. This trend to link ABC with other concepts reflects the level of the interest in ABC during this phase of ABC evolution and, probably, the need to explore ABC to get the most from it in practice.

4.1.3.2 Expanding in breadth

The use of ABC has expanded in breadth by diffusing to new environments beyond commercial manufacturing businesses. Examples include: banking, environment, education, food, government, healthcare, technology and utilities (e.g. Johnson, 1998; Brewer, 1998; West and West, 1997; Carter, Sedaghat, and Williams, 1998; Evans, 1996; Cobb, Helliar and Innes, 1995). Moreover, ABC information was seen to have a potential application in different organisational functional areas beyond manufacturing such as logistics, purchasing, marketing, research and development (e.g. Drucker, 1995; Manning, 1995; Partridge and Perren, 1994; Roth, and Sims, 1991; Ortman and Buehlmann, 1998; Chalos, 1995; Ellram, 1995; Anderson and Sedatole, 1998)

4.1.3.3 Different Approaches to ABC Software

At this stage of ABC evolution, different types of information systems technology have been used as ABC software. According to the results of Innes and Mitchell's (1995) survey, three main types of information systems have been used to support activity-based software: general software applications, in-house developed software, and specialized stand alone ABC packages. A new type of ABC software has appeared with the emergence of Enterprise Resource Planning (ERP) systems in the late 1990s. This new type is a result of integrating analytic ABC applications with ERP systems, thus providing an enterprise-wide ABC environment (Shaw, 1998).

4.1.4 Phase 4- ABC simplifying and replacement attempts (late 1990s-early 2000s)

At this stage of ABC evolution, practical implementation problems were acknowledged and new variants of ABC - Feature costing (Brimson, 1998) and Time-Driven ABC (Kaplan and Anderson 2004) emerged. Although the basic model of ABC seems easy and straightforward, several problems arise when companies endeavour to increase its ABC model's size and complexity. (Brimson, 1998; Kaplan and Anderson, 2004). The main source of these problems is what could be labelled as the "ABC complexity paradox".

The promise of ABC systems was to provide more accurate cost information which was considered as a priority in a business environment where overhead costs are increasing, and competition is more vigorous and more global, which consequently made the cost of poor decisions much higher (Kaplan and Cooper, 1998). In order to increase accuracy, by reducing specification and aggregation errors[12], more activities with clear cause-effect cost drivers were the key (See Figure 4-9) (Kaplan and Cooper, 1998).

[12]Datar and Gupta (1994) classify possible errors of costing systems into: "Specification errors" arising from using the wrong cost driver. "Aggregation errors" resulting from adding together heterogeneous resources into cost pools, and "Measurement error" resulting from either practical difficulty in identifying costs with a particular cost pool, or in measuring the specific units of resource consumed by individual products.

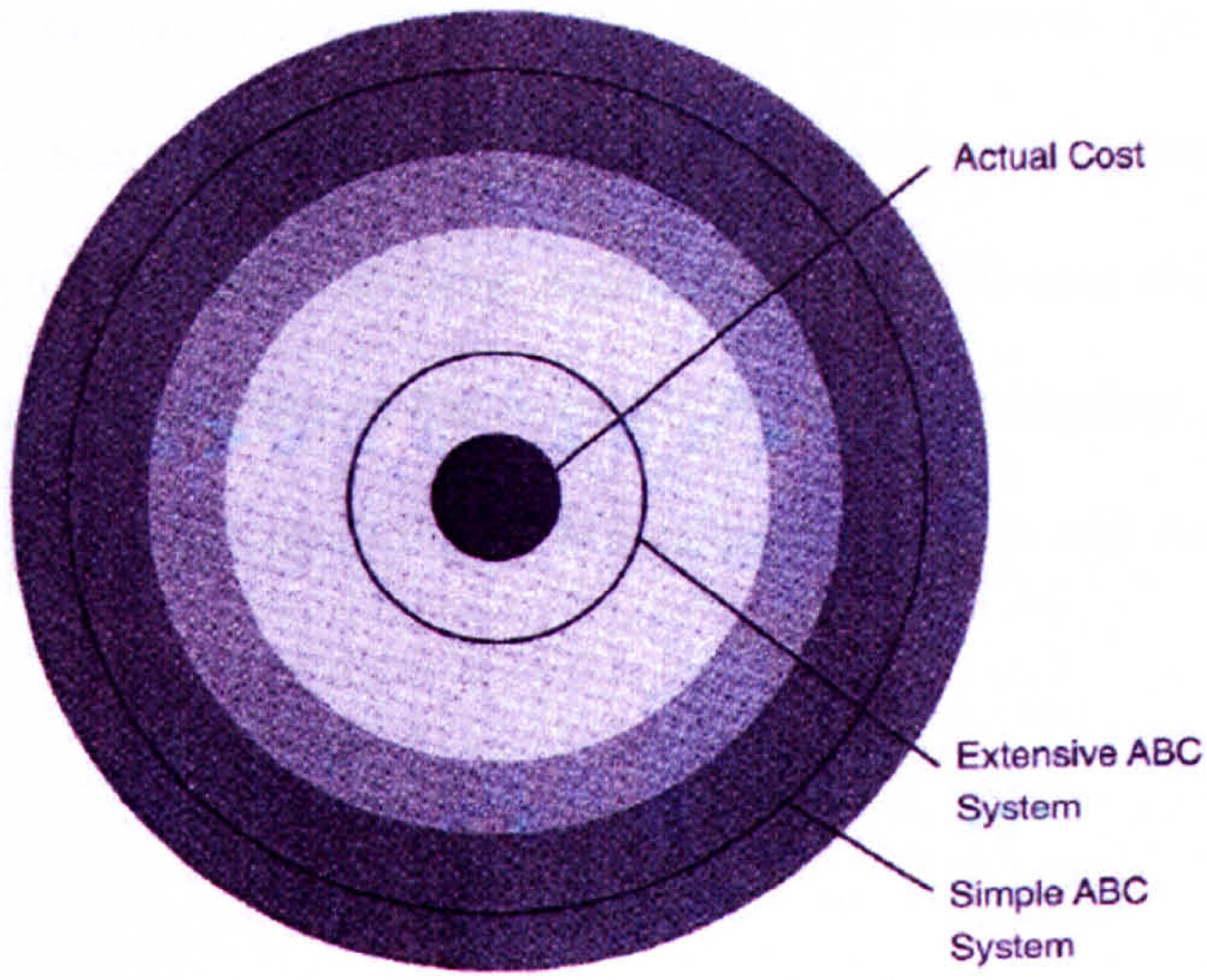

Figure 4-9 Cost Accuracy Target (Kaplan and Cooper, 1998, p.103)

But more accurate and detailed ABC models proved to be a high cost, time consuming and laborious project [13] (Cooper, 1990; Anderson, et al., 2002). A complex ABC model with a high level of disaggregated activity pools means high costs of developing the initial model, using subjective and costly-to-validate time allocations [14], and an expensive and difficult to maintain and to update system (Armstrong, 2002; Kaplan and Anderson, 2004)[15]. In other words the more detailed an ABC system becomes the more useful, but at the same time the system becomes harder to build and maintain (Brimson, 1998) (See Figure 4-10). It was believed that the advent of information technology innovations would reduce the cost of collecting, processing and reporting information (Kaplan and Cooper, 1998). But according to Kaplan and Anderson (2004), as the activity dictionary expands, the

[13] The analysis of activities involves many interviews, typically requiring about three people working full-time for between four and six months (Cooper, 1990).
[14] As this mainly involves interviewing and surveying people at the different levels of the organisational structure and depending on their estimations of the time that they spent on different activities.
[15] As (i) processes and resource spending change, (ii) the number of activities is changing, and (iii) increases occur in the diversity and complexity of individual orders, channels and customers. (Kaplan and Anderson, 2004).

demands on the computer model used to store and process the data escalate dramatically. For example, a company has 150 activities in its enterprise ABC model, and applying the costs in these activities to 600,000 cost objects (products and customers) and running the model monthly for two years requires data estimates, calculations and storage for more than 2 billion items (Kaplan and Anderson, 2004, p.132).

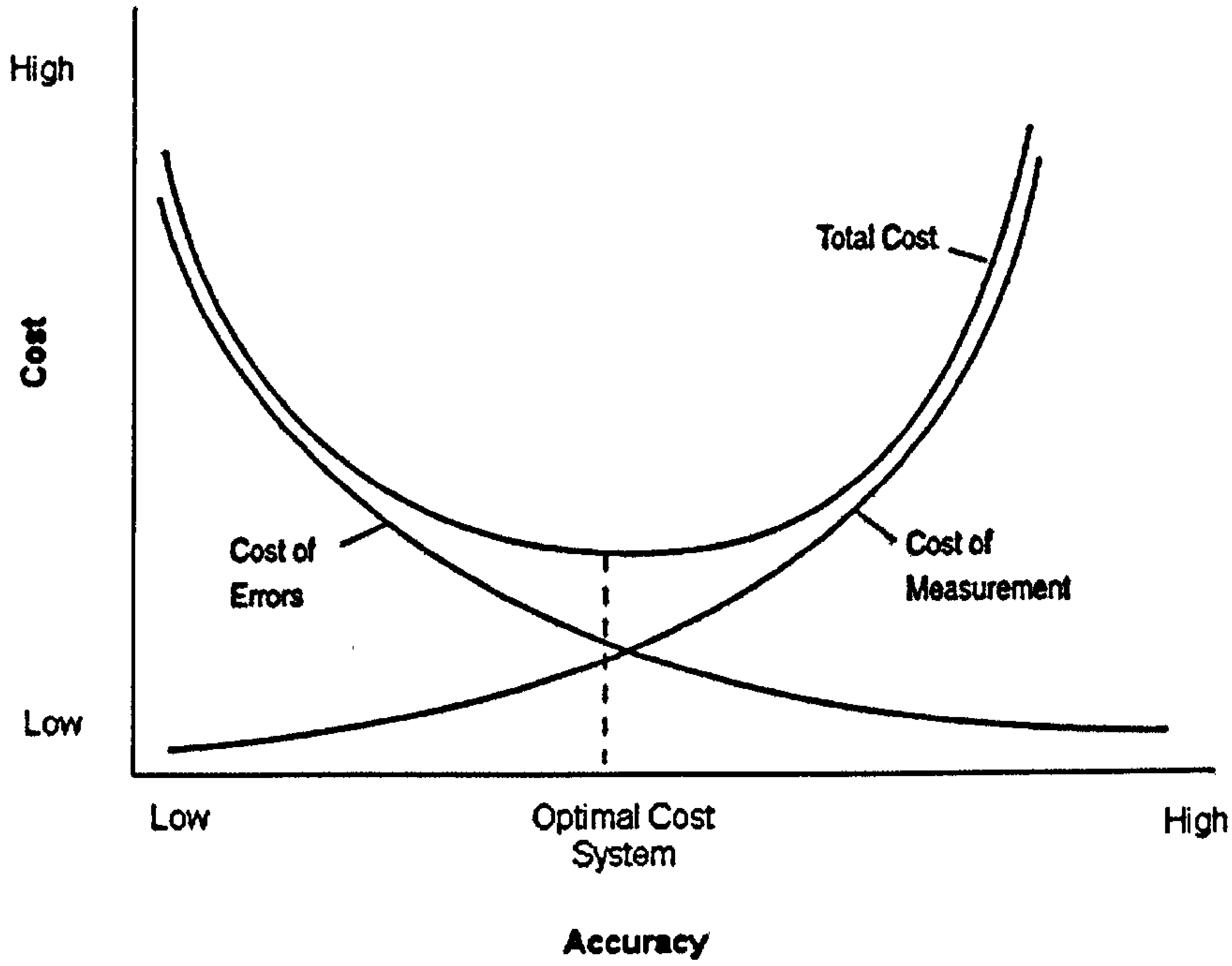

Figure 4-10 Optimal ABC system (Kaplan and Cooper, 1998, p.104)

In order to deal with this paradox, two recent attempts to simplify the process of ABC implementation and maintenance have emerged: Feature costing and Time-driven ABC. The main difference between the two approaches is that the feature costing approach tries to achieve simplicity by shifting the focus of the costing system from activities to the cost object itself (i.e. its features). On the other hand, Time-driven ABC tries to simplify the traditional ABC approach by changing the way ABC data is to be collected and the nature of the cost drivers. The following paragraphs give a brief description of the main characteristics of these new approaches.

4.1.4.1 Feature Costing (Brimson, 1998)

Feature costing was considered by its founder as "a logical next step in the evolution of management accounting" (Brimson, 1998, p.6). "Feature costing uses product characteristics to assign cost to activities and processes, to differentiate cost by product" (Brimson, 1998, p.9). A product feature cost computation goes through the following steps and procedures (See Figure 4-11):

1. Determine the product features and sub-features
2. Determine the activity routing associated with each product feature
3. Determine the cost of each activity
4. Determine product characteristics that will cause the process to vary
5. Determine how much the product characteristics cause the process to vary
6. Associate features and characteristics to products
7. Adjust the activity cost based on the product's features and characteristics

According to Brimson, feature costing is a superior alternative to ABC in terms delivering the same benefits of ABC, but with greater ease of use. This superiority is a result of:

1. Building feature costing on a process management model. The approach develops an understanding of the process and the factors that cause the process to vary. Process variation caused by product characteristic is separated from the variation caused by poor process execution and used to adjust the average activity rates that will be used to calculate the product cost.

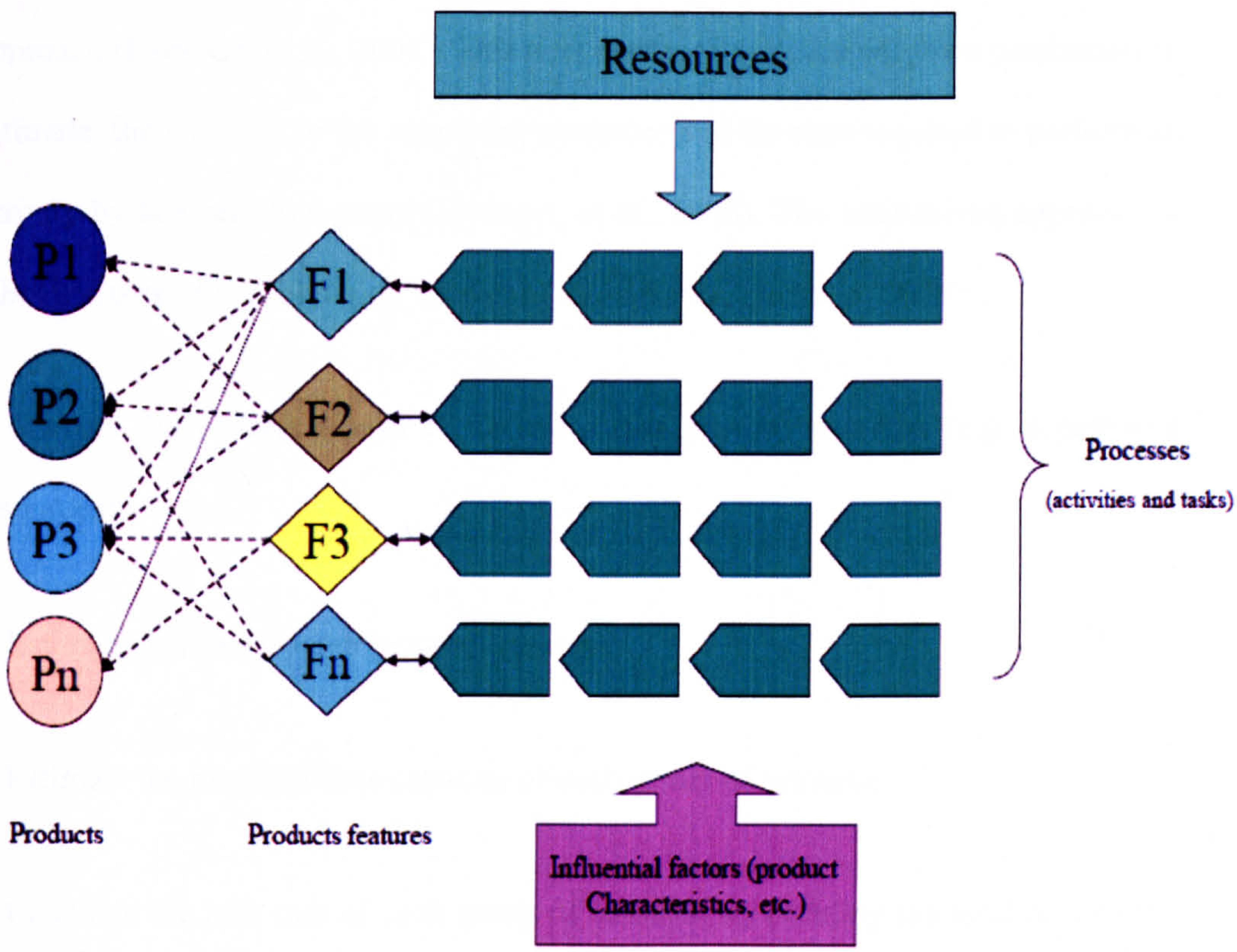

Figure 4-11 Overhead costs in Feature Costing Systems

2. Using many fewer activities as it associates activity routings to products' features and characteristics which are limited in number and remain stable over time.

3. Relating product to the factors that cause process cost variation which facilitate process improvement and cost reduction.

4.1.4.2 Time Driven ABC (Kaplan and Anderson, 2004)

The concept of time-driven ABC was originally developed in 1997 by Steven Anderson and practiced through his company Acorn Systems, Inc. In 2001, Anderson teamed up with Robert Kaplan of Harvard Business School to perfect the approach (Everaert, et al., 2008). This new approach requires only two parameters to estimate: the *unit cost* of the supplying resources and the *time* required to perform an activity by this resource group (Everaert, et al., 2008). The time-driven approach to ABC consists of the following six steps (Kaplan and Anderson, 2004):

1. Identify the various groups of resources that perform activities (e.g. department resources)

2. Estimate the cost of each group of resource.

3. Estimate the practical time capacity of each group of resource

4. Calculate the unit cost of each group of resource by dividing the total cost of the resource group by the practical capacity.

5. Determine the required time for each activity of a process based on different time drivers.

6. Multiply the unit cost by the time required to trace costs to cost objects.

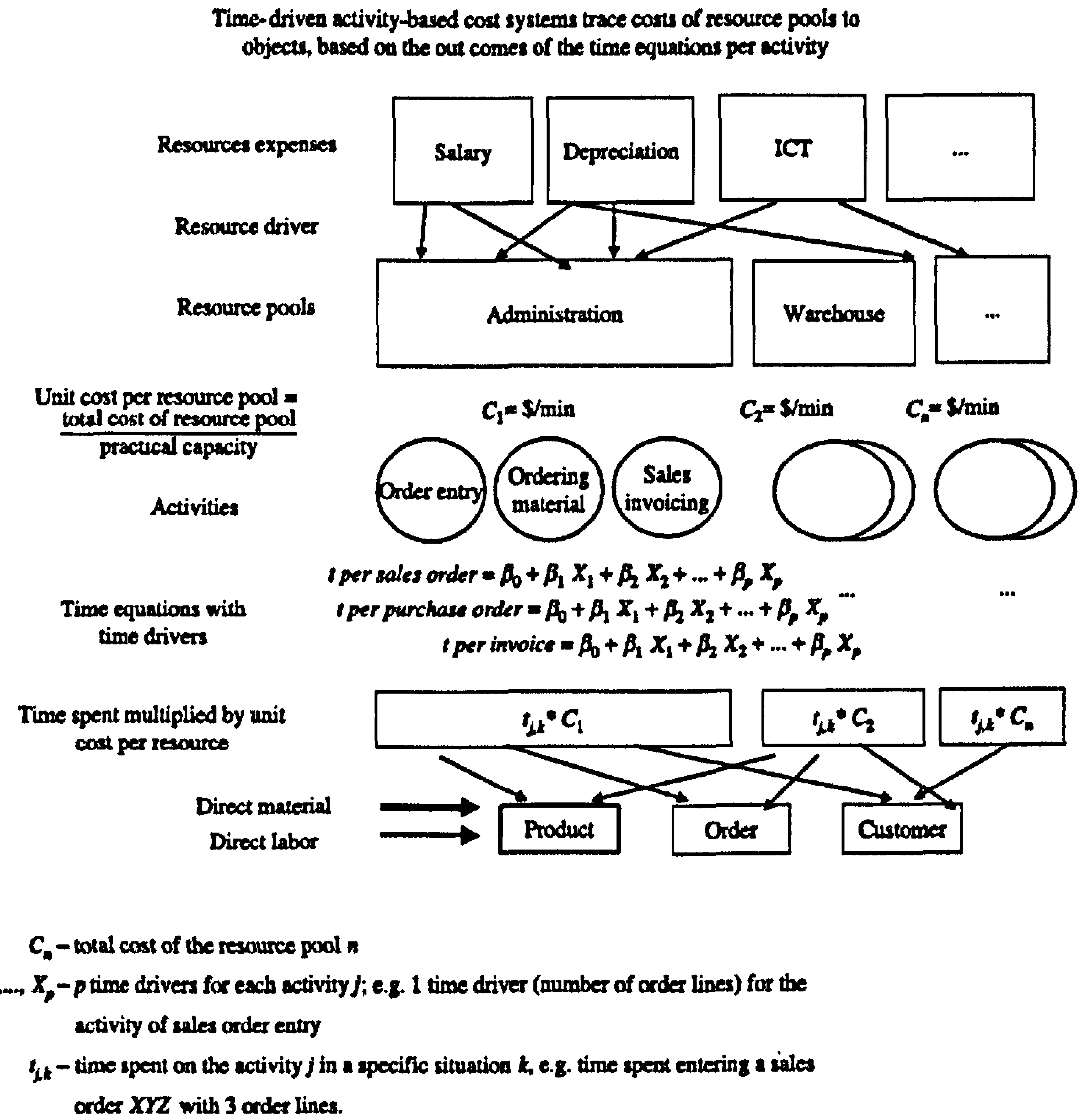

Figure 4-12 Time-Driven Activity Based Costing (Everaert, et al., 2008, p.177)

TDABC is an event based updated system[16]. That is, resource per time unit should be updated when there is a significant shift in the cost or practical capacity of the resources supplied, or when there is a change in the resources required to perform the activity. Similarly the unit time estimate should be updated when there is a significant shift in the efficiency with which an activity is performed (Kaplan and Anderson, 2004). Furthermore, using duration (time) drivers, the use and

[16] Unlike traditional ABC which is a calendar based updated systems (once a quarter or annually) (Kaplan and Anderson, 2004)

exploitation of time equations is facilitated, that incorporates variation in orders and customer behaviour without expanding model complexity (Kaplan and Anderson, 2004). "For example, consider an activity to package a chemical for shipment. If the item is already a standard one in a compliant package, the operation may take only 0.5 minutes to get it ready for shipment. If the item requires a special package, then an additional 6.5 minutes is required. And if the item is to be shipped by air, an additional 0.2 minutes is required to place it in a plastic bag. Rather than define a separate activity for every possible combination of shipping characteristics, or use a duration driver for every possible shipping combination, the time-driven approach estimates the resource demand by a simple equation (Kaplan and Anderson, 2004, p.136):

Packaging Time = 0.5 + 6.5 (if special handling required) + 0.2 (if shipping by air)"

4.1.5 ABT systems components, attributes and definition

Utilising the above presentation of ABC evolution, components, attributes and definition of ABT were determined. ABT system components can be classified in three dimensions: the current use of ABT information, ABT model's sophistication, and the type of ABT software (See Figure 4.13). This multi-dimensional definition is expected, in a survey type study, to handle the classification difficulty which is a main limitation of previous ABC adoption research.

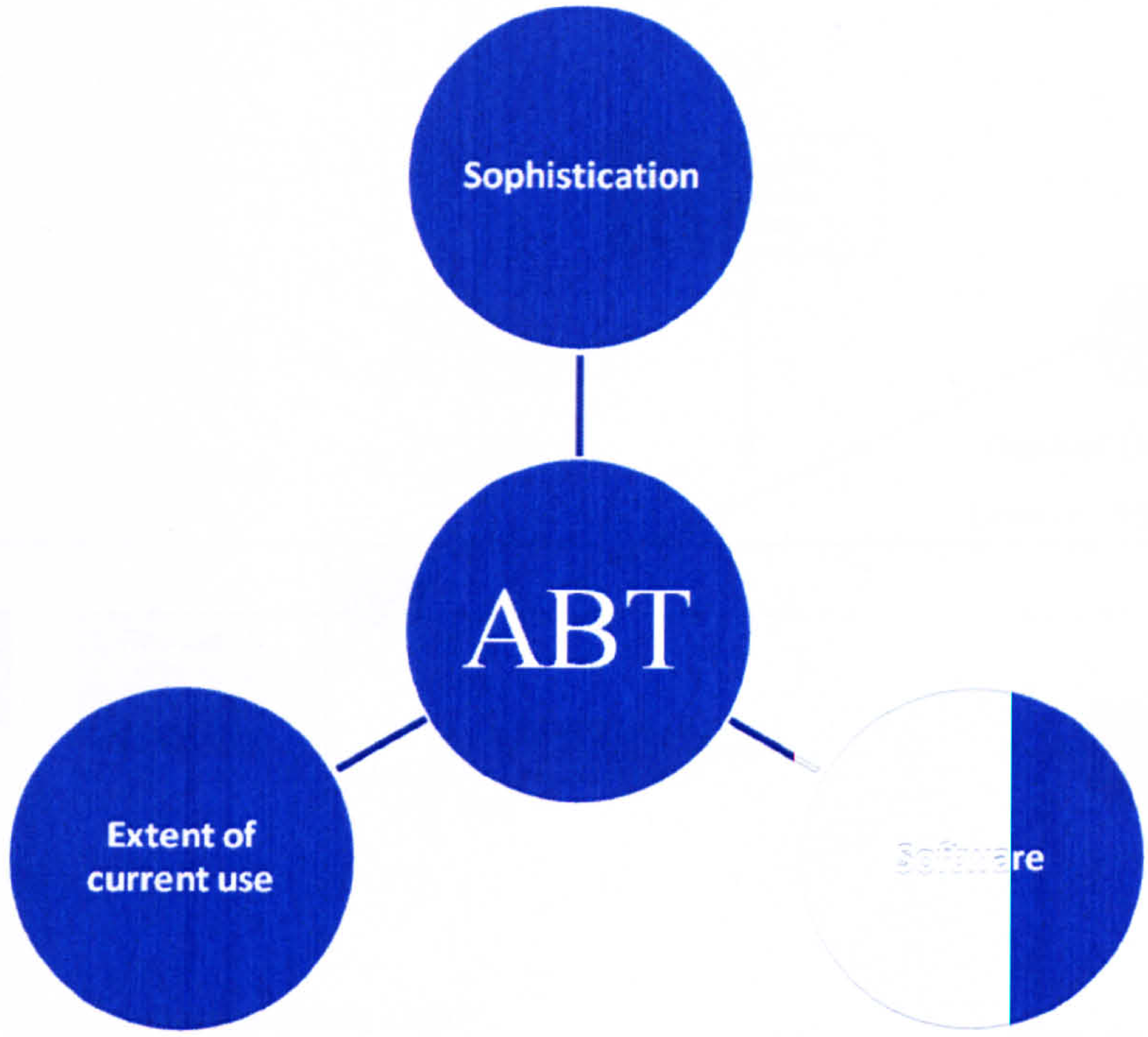

Figure 4-13 ABT three-dimensional definition

4.1.5.1 The extent of current use of ABT information

The use of the information produced by the ABT system is a very important indicator of the nature of the system. The use of ABT could vary from simple use activity information to identify the non-value added activities and thus eliminate them to a wide-ranging integrated enterprise wide managerial system. By integrating and enhancing previous studies' models which show the ABT depth of usage and level of integration, a hierarchical model that can reflect the available theoretical understandings of ABC and ABM is developed. This model integrates Gosselin (1997), Cooper and Kaplan (1998) and the main two understanding of ABM (CAM-I model and Johnson's model) (See Fig.1.14).

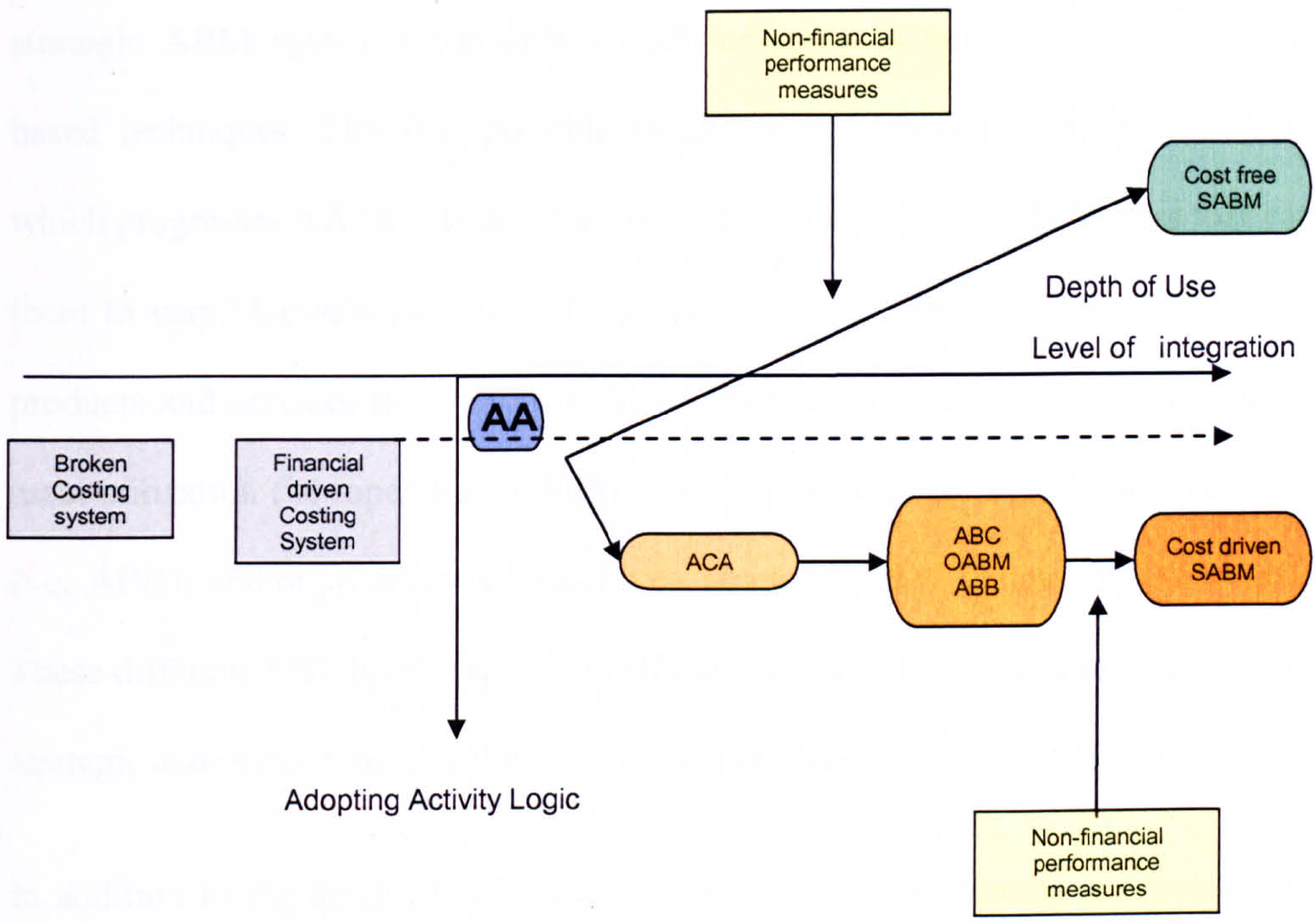

Figure 4-14 Activity Based Techniques

As is illustrated in Figure 4-14, when firms transfer over to ABT, leaving behind or keep a financial driven costing system, the first step is to develop an activity dictionary which is a prerequisite to the process of installing any activity-based technique (Cooper and Kaplan, 1998). Based on this, different levels of ABT could be developed according to the depth of the use of the activity dictionary, the most simple level is activity analysis. Activity analysis (AA) is defined by Gosselin, (1997, pp.106–107) as "the first and most simple level, consists of identifying the activities and procedures carried out to convert material, labor and other resources into outputs. Activities that do not contribute to the value of those outputs may be removed, replaced or diminished. AA does not require cost analysis and does not necessarily lead to a new overhead allocation method". Different types of ABT could be applied based on the activity analysis. Firms could apply directly a Cost-free strategic ABM system (Johnson's model) or apply different cost driven activity based techniques. The first possible technique is: Activity cost analysis (ACA) which progresses AA "to identify the costs of each activity and the factors that cause them to vary" Gosselin, (1997, p.107). ACA could be progressed to trace costs to products and services (i.e. ABC); to increase efficiency, reduce costs, and enhance asset utilization (i.e. operational ABM); to plan and control organisational activities (i.e. ABB); and/or to apply a cost-driven strategic ABM system (CAM-I model). These different ABT levels represent different levels of integration of ABT into firm strategic and performance evaluation systems (Krumwiede, 1998; Shields, 1995).

In addition to the depth of ABT use and integration, the breadth and frequency of such use is another indicator of the current use of an ABT system. The breadth of ABT use could be measured by the number of different organisational functional areas where ABT information is used in (Swenson, 1995). Regarding the frequency of ABT use, ABT could be used as: a pilot study, occasionally only on a one-off basis, in parallel with other systems (continuous use), or as the main costing system (pure continuous use). In the latter case the frequency of ABC model update could indicate the type of ABC system (conventional versus time-driven).

4.1.5.2 ABT model's level of sophistication

ABT, as a costing a system[17], can vary from the simplistic, consisting of a small number of highly aggregated first-stage activity cost pools and a small number of different types of second-stage cost drivers, to the more complex with many activity pools and differing types of cost drivers (Kaplan and Cooper, 1998; Abernathy, et al., 2001; Drury and Tayles, 2005; Al-Omiri and Drury, 2007). These systems could be classified according to their level of sophistication based on where they fall on a continuum, based on the four main measures for assigning indirect costs (Abernathy, et al., 2001; Drury and Tayles, 2005; Al-Omiri and Drury, 2007):

- the number of activity cost pools (single vs. multiple),
- type of cost pools (whether the system has hierarchal cost pools),
- the number of the second stage cost drivers and
- the number of different types of these drivers.

In addition to the above four measures, the extent to which direct assignment or resource drivers are used in the first stage of the allocation process could be considered a sign of the model's level of sophistication. Figure 4-15 represents a model that classifies ABC systems according to their level of sophistication (Drury and Tayles, 2005; Al-Omiri and Drury, 2007).

[17] The level of sophistication for a managerial oriented ABT system depends on the depth and breadth of the use of the system and its level of integration with other techniques and functions.

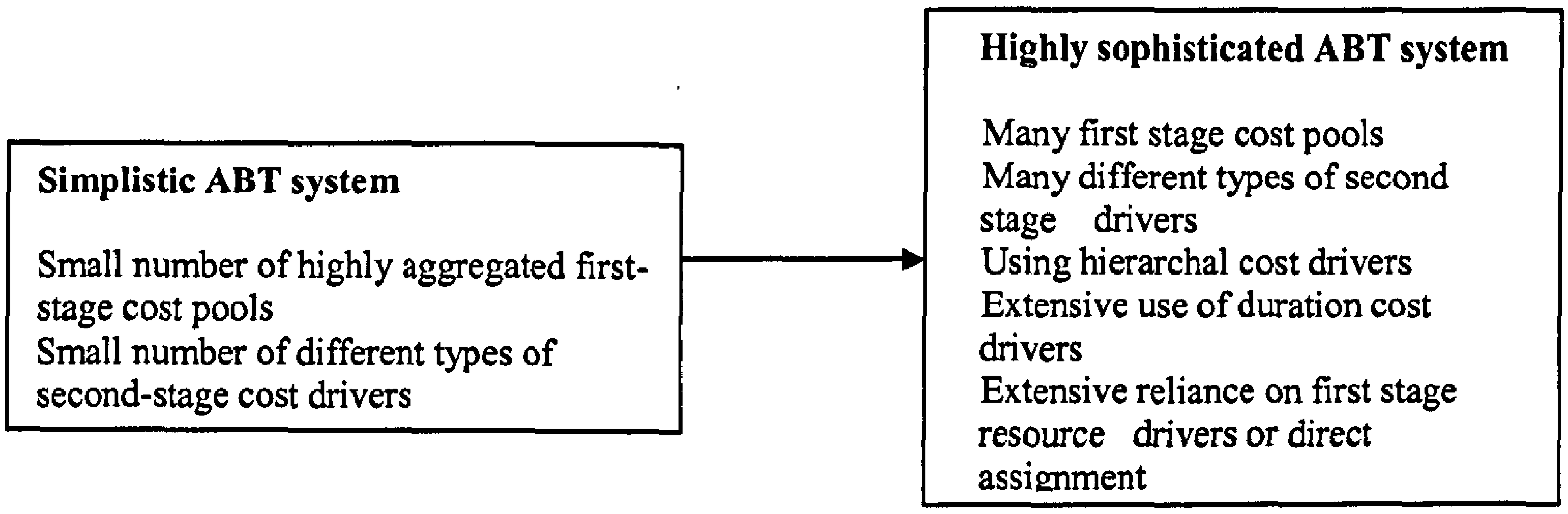

Figure 4-15 Measures determining the level of ABT sophistication

Towards the extreme left of the continuum are the simplistic systems (e.g. small number of highly aggregated first-stage activity cost pools and a small number of different types of second-stage cost drivers). Higher levels of sophistication are assumed to be associated with:

- Increasing the number of activity cost pools based on the premise that creating a greater number of cost pools would enhance the ability of the costing system to capture the variability in resource consumption. Such disaggregation would lead to more reliance on the direct assignment of overhead resource costs to each cost pool or using cause-and-effect first stage drivers (i.e. resource drivers) (Drury and Tayles, 2005; Al-Omiri and Drury, 2007).

- The second measure influencing the level of sophistication relates to the number of different types of activities that are used. Using a hierarchy of activities (e.g. unit, batch, product and customer, and facility sustaining) would increase the complexity and sophistication of an ABC system

(Abernathy, et al., 2001). Furthermore, the number of different types of second stage cost drivers that are used within each of the different hierarchical activities are an indicator of the system's sophistication (Drury and Tayles, 2005). Using a greater variety of cost drivers, which act as the significant determinants of costs, reflect the establishment of cause-and-effect cost drivers for each activity cost pool, that measure more accurately the resources consumed by cost objects (Drury and Tayles, 2005; Al-Omiri and Drury, 2007).

- The level of ABC system sophistication in respect of the third measure relates to the extent to which transaction, duration or intensity (direct-charging) drivers are used in the second stage of the allocation process (Kaplan and Cooper, 1998). The level of ABC system complexity is influenced by the types of cost drivers used as they represent different levels of accuracy. Transaction drivers are measures based on the number of times activities are performed. This type is considered to be the least complex since they assume that the same quantity of resources are required each time an activity is performed. An increase in the level of complexity occurs when duration drivers are used, since they represent measures based on the amount of time required to perform an activity. Intensity drivers are the most complex drivers, since they are based on directly charging for the resources used each time an activity is performed (Kaplan and Cooper, 1998).

ABT systems with many cost pools and different types of cost drivers, that rely extensively on using direct first stage assignments, or resource drivers and a variety of second stage drivers within different hierarchical cost levels, would be located at the extreme right of the continuum.

4.1.5.3 The type of ABC software

Different types of information systems technology have been used as ABC software. Three main types of information systems have been used as an activity based software: general software applications, in-house developed software, and specialized stand alone ABC packages (Innes and Mitchell, 1995). In addition, an enterprise-wide ABC environment emerged in the late 1990s, by integrating analytic ABC applications within ERP systems (Shaw, 1998).

4.1.5.3.1 General Software Applications

The majority (65%) of participants in the Innes and Mitchell's (1995) survey responded that their ABC system was based on a spreadsheet or database package. An *Electronic spreadsheet* "is a worksheet of rows and columns that can be stored on your PC or a network server, or converted to HTML format and stored as a Web page or *web sheet* on the World Wide Web" (O'Brien, 1998, p.185). Examples of electronic spreadsheet packages include Lotus 1-2-3, Microsoft Excel, and Corel Quattro Pro, which are used for business analysis, planning and modelling (O'Brien, 1998). Database management packages like Microsoft Access, Lotus Approach, or Croel Paradox are designed to set up and manage databases on PC, network server, or the World Wide Web (O'Brien, 1998). Basically, four primary tasks are performed by most database managers (O'Brien, 1998):

- Database development: defining and organizing the content, relationships, and structure of the data required to build a database.

- Database interrogation: accessing the data in a database to display information in a variety of formats.

- Database maintenance: adding, deleting, updating and correcting the data in a database

- Application development: developing prototypes of Web pages, queries, forms, reports and labels for a proposed business application. Or using a built-in 4GL[18] or application generator to program the application.

Exploiting Spreadsheet and database management packages enabled companies to build an ABC system that could produce the required cost information.

4.1.5.3.2 Analytical Applications

Innes and Mitchell's (1995) survey indicates that (47%) of ABC users in the UK acquired analytical ABC applications. (29%) of this software consists of specialized stand alone ABC packages and the remaining (18%) are in-house developed systems. These analytical applications are usually easier to implement and use, and facilitate modelling pilot programs (Nair, 1999). Examples of specialized ABC packages include: Acorn, ALG, SAS, Lead, and PeopleSoft. Standard analytical applications "provide value by:

[18] fourth-generation language: programming languages for accessing databases

- Structuring and automating a group of tasks pertaining to the review and optimization of business operations. Software for ABC can automate the process for developing, maintaining, and applying activity models.

- Functioning independently from an organisation's core transactional applications, yet still dependent on such applications for data, they are capable of sending results back to these applications.

- Integrating data from multiple sources, thus supporting a time-based dimension for analysis of past and future trends. For example, a popular output of ABC/M software is the activity driver cost rates that serve as inputs to customer quotation systems." (Shaw, 1998, p.58).

According to Nair (1999), analytical ABC applications can be seen as a step towards an enterprise wide implementation of ABC. Analytic ABC systems are "the prototyping, learning, and training systems prior to an ERP entrance into the ABC/M project" (Nair, 1999, p.59).

4.1.5.3.3 Enterprise-wide ABC systems

This type of ABC system is a result of incorporating ABC in a transaction-based system like enterprise resource planning (ERP) systems. These are defined as follows: 'ERP systems are packages of computer applications that support many, even most aspects of a company's . . . information needs' (Davenport, 2000, p.2; cited in Hyvönen, 2003, p.157), and these packages are single-vendor based (Light, et al., 2001; cited in Hyvönen, 2003, p.157). ERP systems typically include integrated modules on accounting, production management, materials management, sales and marketing, and human resources (Davenport, 1998). Some of the established market leaders in ERP software are SAP, Oracle, PeopleSoft, JD Edwards, BAAN, Computer associates, Scala, SCT, and Geac. ERP systems provide value by creating a wide range of information from their different modules, which gives managers a clearer overview and detailed understanding of their current performance in real-time (Baxendale and Jokinen, 2000). Most of these systems are constructed by having a central database. Figure 4-16 below shows the anatomy of an enterprise system.

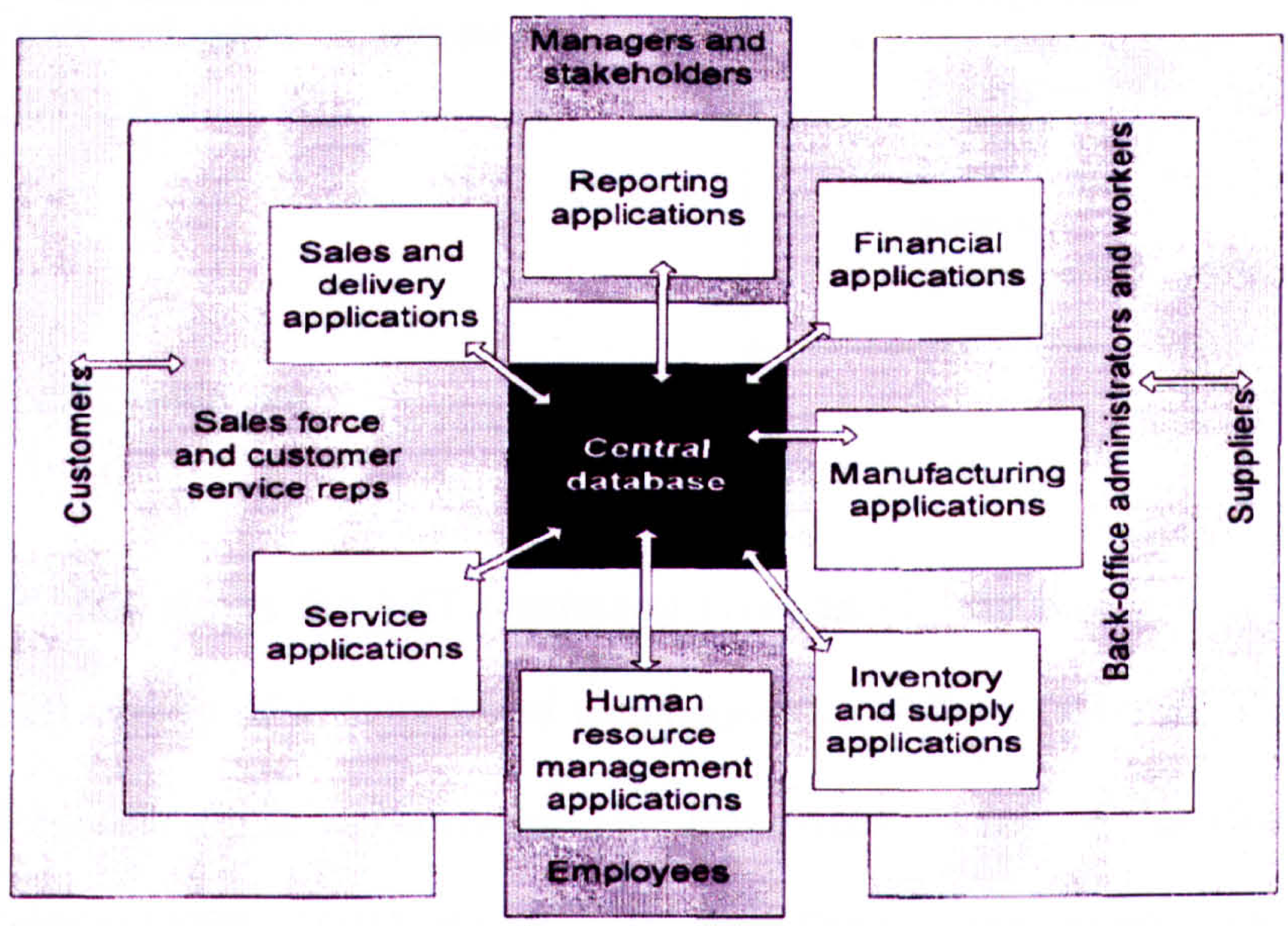

Figure 4-16 Anatomy of an enterprise system (Davenport, 1998)

Considering the type of the ABT software in use in ABT definition would give another indicator of the characteristics of the current ABT system in use.

Therefore, an Activity Based Technique could vary from a simple Activity Analysis (AA) system to a highly sophisticated cost driven Strategic Activity Based

Management (See Figure 4-17). This confirms Ax and Bjørnenak's (2008) and Bjørnenak and Olson's (1999) view of the composite nature of MAIs and therefore explains the usage of a multiplicity of terms to refer to activity based techniques in the literature.

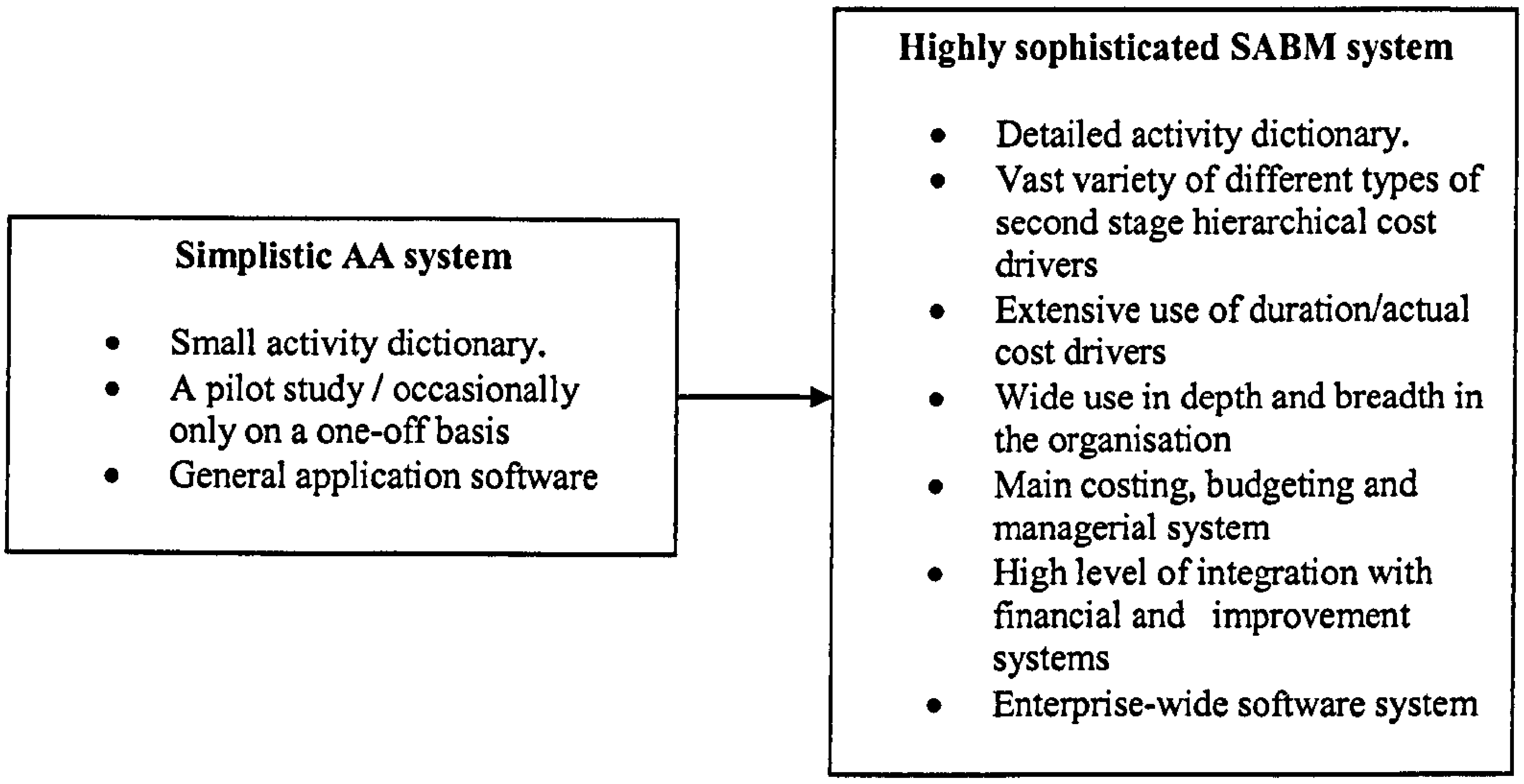

Figure 4-17 ABT continuum

Figure 4-17 that shows the ABT continuum gives an idea on how it is possible to have a great variety of activity based techniques that differ in their sophistication, depth and breadth of use and software. This fact makes the task of classifying ABT using Wolfe's (1989, 1994) six-attribute classification framework, which was presented in chapter 2, a very difficult task. This is because of the varying nature of the ambiguity and diversity of ABT. Table 4-1 shows a suggested classification of ABT as an organisational innovation based on the ABT continuum. As indicated in the table, ABT was characterised as being: *Administrative* with some technical elements (AA, ACA), being related mainly to the administrative arrangements rather than the basic work activity (e.g. new administrative procedures, policies and organisational structures); *Radical* in that it generally implies a completely new organisational subsystem and managerial understanding. However, the level of radicalness of ABT is dependent on the type of use of the adopted technique (depth and breadth); *Central*, as it can affect the major day-to-day work of organisations directly; *Flexible*, as adopting organisations can refine, elaborate, and modify ABT according to their needs and objectives; *Highly uncertain*, as knowledge concerning its outcomes remains underdeveloped; *Unlimited pervasiveness*, as it involves identifying the activities of the adopted organisation, however, again the level of pervasiveness is dependent on the type of use of the adopted technique (depth and breadth).

As Wolfe (1994) highlighted, despite this classification framework being preliminary and subjective, it provides a basis with which to compare ABT to other innovations, thus enhancing the generalizability of the research.

Table 4-1 Suggested classification of ABT related to the six attributes suggested by Wolfe (1994)

Attribute	**Classification of ABT**
Organisational Focus (technical vs. administrative)	***Technical*** ABT ***Administrative***
Radicalness (low vs. high)	***Low*** ABT? ***High***
Centrality (peripheral vs. central)	***Peripheral*** ABT ***Central***
Adaptability (flexible vs. inflexible)	***Flexible*** ABT ***Inflexible***
Uncertainty (low vs. high)	***Low*** ABT ***High***
Pervasiveness (low vs. high)	***Low*** ABT? ***High***

In order to avoid previous research limitations of ignoring the definition of ABT or using a very limited definition that ignores ABT's nature, this study suggests that, as

ABT represents endless levels of practices and understandings, it could be better to study the adoption of ABC techniques as a conversion to or the adoption of the activity philosophy in accounting, management or planning. Accepting the view that organisations could be understood as a series of activities is the cornerstone or the essence of any claim of the usage of ABC, under any possible understanding for this term. So it could be more useful to differentiate between organisations according to their commitment to activity logic rather than using formless, implicit or simple definitions of ABC. The present paper adopts the term Activity Based Techniques (ABT) to refer to any kind and level of management accounting practice (costing, management or budgeting practice) that is based on business' activities' information, and it uses the following definition:

ABT is: *Any management accounting technique that uses business unit's activities as its base. Such techniques include: Activity Analysis (AA), Activity Cost Analysis (ACA), Activity Based Costing (ABC), Time Driven ABC, Activity Based Management (ABM) and Activity Based Budgeting (ABB).*

CHAPTER 5 THEORTICAL FRAMEWORK

This chapter is devoted to the development of a robust theoretical model for studying the adoption and implementation of MAIs. This model was obtained by enhancing a multistage model of the adoption and implementation process and integrating it with a model comprising of multiple groups of the factors that influence the successful transition between the stages of the adoption and implementation process. Integrating these two developed models produced a factor-stage framework that can be used to study any MAI diffusion. In the current study, the model was used to study ABT adoption to gain better understanding of the ABC paradox.

This type of framework was originally introduced to the innovation literature by Kwon and Zmud (1987) and, in the management accounting literature, was adapted by Anderson's (1995) "process theory" case study. Anderson's (1995) findings indicated that each of the major adoption and implementation stages has different decision processes and issues, and the outcome of the decision process at different stages is influenced by different behavioural and contextual factors. These findings encouraged Krumwiede (1998) and Brown, et al., (2004) to use similar frameworks to define their dependent variables in cross-sectional studies. This chapter builds upon those previous studies and systematically develops a generic and more comprehensive factor-stage framework that fulfils the need for heterogonous theoretical frameworks to study MAIs diffusion and implementation. Building this factor-stage framework was achieved in four stages. Firstly, identifying the different theoretical perspectives from the innovation literature to provide a heterogeneous interpretative capacity of the results of this study and then to identify main groups of influential factors. Secondly, the researcher explored innovation literature with the aim of finding the generic and comprehensive factor models to be used as the base of this study model in terms of identifying the factors and groups of factors that were studied. Thirdly, based on the first two steps, a generic-comprehensive factor model was produced. Finally, a generic stage model of the management accounting innovation adoption and implementation that considered the adopted theoretical perspectives was developed. The resulting framework was then customised to study the ABT Paradox.

5.1 Factors influencing the stages of the adoption and implementation process

"The adoption of a single perspective, whatever that might be, limits the scope of a researcher's inquiry and thus limits the extent to which he/she can capture the innovation process, one which is complex, nonlinear, tumultuous, and opportunistic." Wolfe (1994, p.416)

The effort of developing a model of the influencing factors is guided by Wolfe's (1994) call for the use of a heterogeneous factor model that captures more efficiently the innovation process complexity. Innovation research has been dominated by the efficient-choice perspective (Abrahamson, 1991; Wolfe, 1994; Fichman, 2004). Under this dominant perspective it is assumed that certain organisational characteristics and environmental contexts increase organisations' need for innovation and/or their ability to innovate successfully (Fichman, 2004). The dominant perspective represents the intra-organisational and the demand side of the innovation process. Different innovation scholars have urged the utilisation of other recently emerged perspectives that focus on the external forces which influence the innovation diffusion (e.g. Abrahamson, 1991; Wolfe, 1994; Fichman, 2004). These perspectives include the institutional and the management fashion perspectives[19]. These three perspectives were utilised to develop this study's framework.

5.1.1 Efficient-choice perspective

This perspective is based on an efficient choice criterion in which the adopters are assumed to make independent, rational choices guided by goals of technical efficiency (Abrahamson, 1991). That is, "agents, usually organisations or their top management teams, have little uncertainty about (a) their preferences or goals, be they profit maximization, market share growth, competitive advantage, or any other strategic preference, (b) innovations' technical efficiency are measured as the ratio of outputs to inputs. Therefore, given the existing resource constraints, agents rationally choose the innovation that would allow them to most efficiently produce the outputs that are useful for obtaining their goals" (Abrahamson 1991, p.592). This perspective was translated empirically into economic-rationalistic models, "whereby organisations that have a greater *quantity* of what might be called "the Right Stuff"

[19] Notable other perspectives can be found in the literature (e.g. structuration, adaptive structuration, and socio-technical approaches). However, as this study, to a great extent, belongs to the positivist paradigm, the researcher selected perspectives from within the positivist paradigm.

(i.e., greater innovation-related *needs* and *abilities*) are expected to exhibit a greater *quantity* of innovation (i.e., greater frequency, earliness, or extent of adoption)." (Fichman, 2004, p.1). Therefore the focus is placed on factors that affect the economic returns to innovation, and the assumption that managers take these factors into account in a normatively rational way in their innovation decisions (Fichman, 2004). However, the ultimate outcomes or benefits of innovations are hardly considered in studies within this perspective (Fichman, 2004). The efficient-choice perspective was criticised for its assumption of rational adopters making independent and technically efficient choices and, therefore, focusing only on the needs and abilities of the potential adopters. This assumption led to overlooking the impact of the external forces. According to Abrahamson (1991), these limitations mean the perspective fails to explain the adoption of non-beneficial innovations and the rejection of beneficial ones. Different scholars have suggested that the efficient-choice perspective could be complemented by different perspectives including institutional theory (Abrahamson, 1991; Wolfe, 1994; Teo, et al., 2003; Brown, et al., 2004; Zwawi and Hoque, 2008) and management fashion (Abrahamson, 1991; Abrahamson, 1996; Abrahamson and Fairchild, 2001; Fishman, 2004). Both the institutional and management fashion perspectives assume that the decision to adopt an innovation is not characterized by a rationalistic and independent assessment, but relies on the role played by the external environment in influencing the decision process (Fichman, 2004).

5.1.2 Institutional perspective

According to Teo, et al., (2003), "the institutional approach to the study of organisations has led to significant insights regarding the importance of Institutional environments to the organisational structure and actions". According to this perspective, organisations face pressures to conform to the shared notions of appropriate forms and behaviours in their institutional environment, since the violation of them may call into question the organisation's legitimacy and thus affect its ability to secure resources and social support (Teo, et al., 2003). Three types of institutional pressures are distinguished: coercive, mimetic and normative pressures (DiMaggio and Powell, 1983).

5.1.2.1 Coercive pressures

The coercive pressures are defined as formal or informal pressures exerted on organisations by other organisations upon which they are dependent (DiMaggio and Powell 1983). Dependence in terms of resources allows dominant actors to control the organisations that are dependent on them. Consequently, dependent organisations are more likely to comply with decisions taken by the dominant actor (Teo, et al., 2003; DiMaggio, 1988). Dominant actors could be the government, suppliers or customers, and parent corporations (DiMaggio and Powell, 1983; Teo, et al., 2003). From the innovation adoption perspective, Abrahamson (1991) argued that such pressures could be another explanation of adoption of innovations. Under the title of "forced-selection perspective", Abrahamson (1991) highlighted that innovation-adopting organisations could have no free choice in deciding to adopt or reject an innovation as they would experience pressure from organisations outside their own social group. That is, "a number of organisations control sufficient power to dictate which administrative technologies will diffuse across organisations" (Abrahamson, 1991, p.594). Similarly, these organisations, according to their interests and preferences, exert political pressures encouraging the continued use of a technology or to force its rejection (Abrahamson, 1991).

5.1.2.2 Mimetic pressure

Mimetic pressures may cause an organisation to evolve over a period of time to become more similar to other organisations in its environment (DiMaggio and Powell 1983). According to Haveman (1993, cited in Teo, et al., 2003, p.21), "mimetic pressures manifest themselves in two ways: the prevalence of a practice in the focal organisation's industry and the perceived success of organisations within the focal organisation's industry that have adopted the practice." The imitation of the actions of other similar organisations is motivated by the need to acquire status-conferring legitimacy or social fitness in a wider social structure (DiMaggio and Powell, 1983). Moreover, when the organisational decision is related to uncertain solutions, decision makers are likely to comply with mimetic pressures from the environment to economize on search costs, minimize experimentation costs, or to avoid risks that are borne by first-movers (Teo, et al., 2003). From the innovation adoption angle, Abrahamson (1991), under the title of "Fad perspective", highlighted that innovation adoption could occur when organisations within a group imitate other organisations within that group. Thus, under conditions of uncertainty, in order to appear legitimate and to conform to the norms, organisations imitate other organisations that have already adopted certain technologies. The imitated organisations are competitors who are structurally equivalent organisations, which occupy a similar economic network position in the same industry and, thus, share similar goals, produce similar commodities, share similar customers and suppliers, and experience similar constraints (Burt, 1987; cited in Teo, et al., 2003, p.22).

5.1.2.3 Normative pressures

Normative pressures are associated with professionalization (DiMaggio and Powell, 1983). Through different types of relational channels among members of a professional network, the norms and values of that network are shared. "Sharing these norms through relational channels among members of a network facilitates consensus which in turn increases the strength of these norms and their potential influence on organisational behavior" (Teo, et al., 2003, p.24). Normative relational channels include, for example, relational channels with suppliers, customers, organisational associations, professional, trade, business, and other key organisations (Burt, 1982; DiMaggio and Powell, 1983; Powell and DiMaggio, 1991). Therefore, in an innovation adoption context, normative pressures could facilitate or hinder the adoption of an innovation (Teo, et al., 2003).

5.1.3 Management Fashion perspective

Another perspective that could explain innovations adoption is management fashion (Fichman, 2004). This perspective, like the institutional pressures perspective, questions the assumption of rationalistic, independent assessments and it is based on the theory of management fashion (Abrahamson, 1996). Abrahamson (1991) has suggested this perspective to answer the question of what might provoke the diffusion of technically inefficient innovations (Abrahamson, 1991). Drawing on neoinstitutional theory and production of culture literature, Abrahamson (1996) introduced a theory of management fashion arguing that management fashion should not be treated as a special case of aesthetic fashion. Management fashions are the product of management-fashion-setting processes that involves particular management fashion setters who are dedicated organisations and individuals, such as consulting firms, business schools and mass media that produce and disseminate management knowledge (Abrahamson, 1996). The management-fashion-setting process produces a continuous flow of management techniques that are believed to be rational and progressive (Abrahamson, 1996). These techniques should be viewed as rational in order to conform to the societal expectations that managers will use management techniques that are the most efficient means to important ends, and progressive to comply with societal expectations that, over time, managers will use new and improved management techniques (Abrahamson, 1996). To keep the progressiveness look of management fashion, management fashion setters continually redefine both their own and fashion followers' collective beliefs about which management techniques lead rational management progress. Accordingly, management fashion was defined by Abrahamson as "*a relatively transitory collective beliefs, disseminated by the discourse of management-knowledge entrepreneurs, that a management technique resides at the forefront of rational management progress.*" (Abrahamson, 1996, p.257). Therefore, fashion setters can play a central role in the diffusion process of innovations. That is, innovations will tend to diffuse among organisations when organisations in fashion-setting networks promote them (Abrahamson, 1991). Fashion setters might promote only the most technically efficient administrative technologies, in this case, management fashion process will only influence the diffusion of efficient technologies and the rejection of inefficient ones (Abrahamson, 1991). Alternatively, fashion-setters may push the diffusion of inefficient technologies or the rejection of efficient ones when they choose only administrative technologies they believe they can market profitably, regardless of how technically efficient the technologies may be for organisations (Abrahamson, 1991).

5.2 Generic factor models

Plenty of theoretical models containing a wide variety of factors have been used in the innovation literature (Fichman, 2004). However, three generic models that comprehensively classified most of the factors used in the studies in the innovation literature were found: Kwon and Znud (1987); Leseure, et al., (2004) and Askarany (2005). These models are briefly presented and used to guide this study's framework building based on the three theoretical perspectives presented above.

5.2.1 Kwon and Zmud (1987)

Kwon and Zmud (1987) surveyed both empirical and non-empirical studies regarding organisational innovation and IS implementation in order to identify the key forces contributing to successful efforts to introduce technological innovations into organisations. This review identified five major forces which represent organisational as well as environmental considerations. These five forces are: individual factors, structural factors, technological factors, task-related factors and environmental factors. Each of these five forces is comprised of minor factors. Individual factors include job tenure, cosmopolitanism, educational background and organisational role involvement. Studies that considered individual factors have generally focused on the adoption stage. "Attitude, or receptivity, toward change is highly correlated with these variables and with related change behaviours often invoked in an innovation project." (Kwon and Zmud, 1987, pp.233-234).

Structural factors may be both formal and informal and include: specialisation, centralisation, formalisation and informal network. A number of factors were found to influence the introduction of technological innovations. Technological factors represent innovation characteristics, which were found to influence early stages of the innovation process (adoption and adaptation). These include compatibility, relative advantage and complexity. Task-related factors are factors related to organisational tasks and work design principles. This group of factors include task uncertainty, task autonomy, responsibility (significance), variety, identity, and feedback. Finally, environmental factors focus on the influence of organisational environments on the innovation process. These factors include heterogeneity, uncertainty, competition, concentration and inter-organisational dependence. Kwon and Zmud (1987) have linked these factors with a six-stage model of innovation process that include initiation, adoption, adaptation, acceptance, use and incorporation. Table 5-1 shows Kwon and Zmud's (1987) influential factors and their general association with each stage in the innovation process. This model was used in a management accounting context by Anderson (1995), and Anderson and Young (1999) as a framework for their case study research related to ABC implementation in General Motors.

Table 5-1 Kwon and Zmud's, (1987, pp.242-243) influential factors and their general association with each stage in innovation process, from both empirical and no empirical studies

Entity	Attribute	1. Initiation	2. Adoption	3. Adaptation	4. Acceptance	5. a. Use b. Performance c. Satisfaction	6. Incorporation
Individual	job tenure		+			a.⊖ b.⊕/⊖ c.⊖	
	cosmopolitanism	+	+/-	+			+/⊞
	education	+	+			a. - b. +/- c. -	⊞
	role envolvement		+				
	attitude toward change		+	⊕	+	a.⊕/⊖ b.⊕ c.⊕	
Structure	Formal						
	specialization	+	+	+		a.⊖ b. ⊞ c. ⊟	
	centralization	-	+	-		a.⊕ b. ⊟ c. ⊟	
	formalization	-	+	⊕/ -		a.⊕ b. ⊞ c. ⊟	
	Informal						
	network	+	+	+			+
Technology	compatibility		+	+			+/⊞
	relative advantage		+	+			+/⊞
	complexity		+/-	+/-			-/⊟
Task	task uncertainty	⊞	⊟			a.⊕	
	autonomy	⊞				b. ⊞ c. ⊞	
	responsibility	⊞				b. ⊞ c. ⊞	
	variety	⊞	+	+		a. + b. ⊞ c. ⊞	
	identity					b. ⊞ c. ⊞	
	feedback					b. ⊞ c. ⊞	
Environment	heterogeneity		+				⊞
	uncertainty	+	+/⊟	+		a.⊕ b.⊕	⊞
	competition		+				⊞
	concentration		+				⊞
	organizational dependence	+	+	+			+/⊞

Note: 1. + or – : Positive or negative association from studies in the innovation literature.
2. ⊕ or ⊖: Positive or negative association from studies in the OR/MS/MIS literature.
3. ⊞ or ⊟ : Positive or negative association from studies in other fields such as organization, sociology, etc.
4. +/–: Very mixed association.
5. The blanks in the table indicate that there exist no appropriate studies in each corresponding area.

Anderson (1995), customised Kwon and Zmud's (1987) classification by constructing a list of factors previously highlighted from the research literature and from practitioner accounts of ABC implementations and provided evidence on how these factors influence the adoption of ABC in GM. Anderson and Young (1999) have updated the framework with the results of recent studies and reclassified the factors into contextual factors (individual and organisational) and process factors

(ABC project management and team process) to study their influence on evaluation of ABC projects (See Table 5-2).

Table 5-2 Anderson and Young's (1999) framework

Candidate variables	Literature sources(s)[a]	Hypothesized effect on evaluation of ABC[b]	Contextual factors		Process factors	
			Individual factors	Organizational factors	ABC project management	Team process[c]
Individual characteristics						
Disposed to change	A,C,E,F	+,+,+,+	X	–	–	X
Production process knowledge	A	+	X	–	–	X
Role involvement	A,E	+,+,	X	–	–	X
Individual received ABC training	G	0	X	–	–	–
Organizational factors						
Centralization	A,D	+,+	–	X	–	X
Functional specialization	A,B	–,0	–	X	–	X
Formalization/job standardization	D	+	–	X	–	X
Vertical differentiation	D	+	–	X	–	
Formal support in accounting function	B,C	0,+			X	X
Support	A,B,C,E,F,G,H	+,+,+,+,+,0,+	–	–	X	X
• Top management support	–		–	–	–	–
• Local management support	–		–	–	–	–
• Local union support	–		–	–	–	–
Internal communications	A	+	–	X	–	X
Extrinsic reward systems	A,B,E,G	+,+,+,+		X		X
ABC training investments	A,B,E,G,H	+,+,+,+,+	–	–	X	X
Technological factors						
Complexity for users	A,C	–,–	–	–	–	X
Compatibility with existing systems	A,B,C,I	+,0,+,+	–	X	–	X
Relative improvements over existing system (accuracy and timeliness)	A,C,H	+,+,0	–	X	–	X
Relevance to managers' decisions and compatibility with firm strategy	A,B,C,E,H,I	+,+,+,+,+	–	X	–	X
Task characteristics						
Uncertainity/lack of goal clarity	A,B,E,H	–,0,–,0	–	–	–	X
Variety	A	+	–	–		X
Worker autonomy	A	+	–	–	–	X
Worker responsibility/personal risk	A	–	–	–	–	X
Resource adequacy	B,C,E	+,+,+	–	–	X	–
Availability of ABC software	B,C	0,+	–	–	X	–
External environment						
Heterogeneity of demands	A,C,D,H,I	+,+,+,+,0	–	X	–	–
Competition	A,C,H	+,+,+	–	X	–	–
Environmental uncertainity	A,C,D,F,I,	±,–,+,+,+	–	X	–	–
• Likelihood of layoffs	–		–	–	–	–
• Growth opportunities	–		–	–	–	–
• Labor relations	–		–	–	–	–
• Importance of site to company	–		–	–	–	–
External communications/external experts	A,B,	+,0	–	X	–	X

[a] Source legend: A: Anderson (1995). B: Shields (1995); C: Innes and Mitchell (1995); D: Gosselin (1997); E: Foster and Swenson (1997); F: Malmi (1997); G: McGowan and Klammer (1997); H: Krumwiede (1998); I: Chenhall and Langfield-Smith (1998)

5.2.2 Leseure, et al., 2004

Leseure, et al., (2004) have provided a generic comprehensive model of the adoption of promising practices by organisations based on a systematic literature review of 51 papers which were systematically selected out of 285 innovation papers and reports from different disciplines. A generic model of promising practices adoption and implementation was produced by integrating many models found in the reviewed empirical papers. Figure 5-1 shows Leseure, et al.'s (2004) the integrated model of the derivers and antecedents of the adoption decision of promising practices.

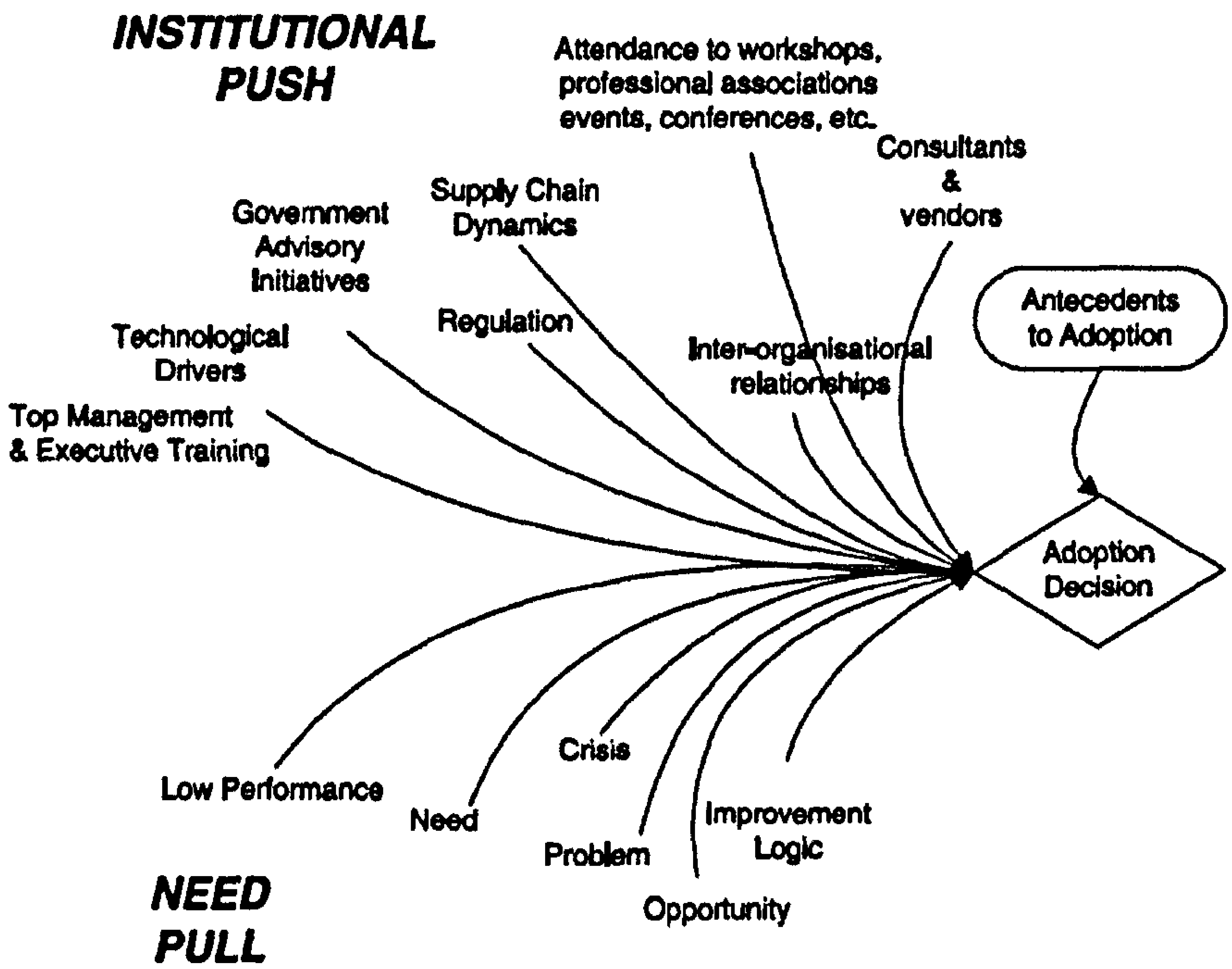

Figure 5-1 Leseure, et al.'s (2004) integrated model

This model identified the inputs (drivers) and antecedents of adoption decision. According to their review, Leseure, et al.'s (2004) suggested that the drivers for the organisational adoption of new management practices can be usefully conceptualised in an 'Institutional Push/Need Pull' framework. Key 'Institution Push' drivers identified from their reviewed evidence were governmental actions, inter-organisational relationships, technological drivers, and management levels of knowledge. Key 'Need Pull' drivers were identified as situations where organisations had low levels of performance, identified a particular need, faced a problem or crisis, saw an opportunity or observed an adoption of a new practice as a logical step in the continuation of improvement. In terms of antecedents, contextual factors which are independent predictors of the decision to adopt, Leseure, et al., (2004) distinguished between internal antecedents and external antecedents to adoption. In terms of internal factors, Leseure, et al's (2004) reviewed literature identifies important features as being current operational performance and industrial sector. External antecedents to adoption relate to the degree of competition intensity and environmental dynamism (Leseure, et al., 2004).

5.2.3 Askarany (2005)

Another comprehensive classification of factors that influence innovation process is provided by Askarany (2005). Deriving from Rogers's diffusion theory (2003), Askarany (2005) developed a general diffusion model (Figure 5-2), which divides the diffusion of innovations into two main streams: 'generation of innovations' and adoption of innovation'. This model further classifies all influencing factors responsible for the diffusion of innovations into three main categories: characteristics of innovations (relative advantage, complexity, triability, observability, and compatibility), characteristics of innovators (organisational structure, culture and strategy) and other influencing factors (factors related to social system, environment etc.).

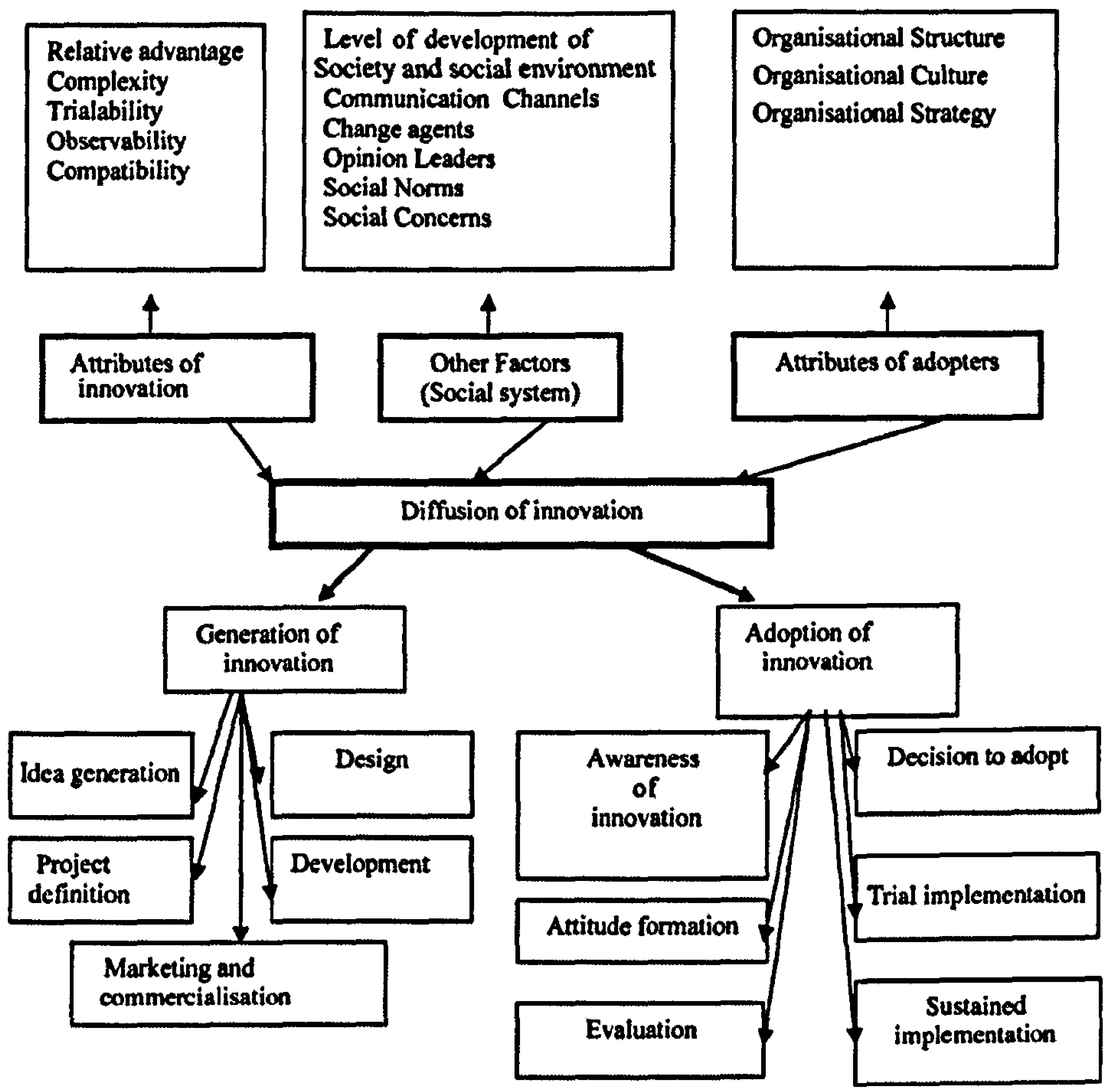

Figure 5-2 Askarany's (2005) general diffusion model

Askarany's diffusion model has included all influencing factors addressed in a wide range of diffusion literature (e.g. Anderson, 1995; Anderson and Young, 1999; Baines and Langfield-Smith, 2003; Booth and Giacobbe, 1998; Chenhall, 2003; Chenhall and Langfield-Smith, 1998; Gosselin, 1997; Guilding and McManus, 2002; Maiga and Jacobs, 2003; Malmi, 1999; Peansupap and Walker, 2005; Rogers, 2003; Villeneuve and Fayek, 2003; Voordijk, et al., 2003; Williams and Seaman, 2001; Yao, et al., 2003). Table 5-3 provides Askarany's (2005) classification of most of the factors studied in the innovation literature into the three suggested categories.

Table 5-3 Askarany's (2005) classification of most of the factors studied in innovation literature

Innovation Characteristics	Innovator Characteristics	Other factors
Availability of innovation, Average years needed, Compatibility with existing systems, Complexity to understand, Cost saving , Divisibility, Maintaining cost of innovation,Observability to see the results, Perceived ease of use, Perceived usefulness , Quality of innovation information, Relative advantage over the current practice, Relevance to manager's decisions, Sales revenue, The amount of investment required to adopt the innovation, The continuity of the innovation progress, The degree of uncertainty associated with the innovation, The extent of economic advantage and profitability of the innovation, The overall benefits of an innovation, Trialability to experience	Adequacy of current system technique, Aggressiveness and innovativeness, Attitudes of employers, worker responsibility/risk, Attitudes of manager , Availability and distribution of resources, Awareness ,Behavioural factors, Capacity to learn ,Centralized decision making ,Commitment, Competition , Cross-functional support, Decentralisation , Degree of decision usefulness of cost information, Degree of lean production system implementation, Degree of potential for cost distortions, Degree of total quality management implementation, Development of technical skills among users, Dissatisfaction with current system, Education , Formalized job procedure, Functional specialization , Heterogeneity of demands , Implementation involvement , Information system quality , Internal communication , Job uncertainty , Level of clarity and consensus for , innovation objectives, Linkage to evaluation , Linkage to quality initiative , Need for change, Number of purposes identified for innovation, Organisational culture , Organisational strategy, Organisational structure, Presence of an internal champion , Pressure from consultants for innovation, Product diversity , Production process knowledge , Prospector strategy , Resistance to change, Resource adequacy, Reward , Situational variables, Size , Sponsorship , Technical Factors ,The information transfer explanation, The learning perspective, Time ,Top management support , Training , Training investments , Users reparation Vertical organisational structure, Voluntariness of use	Compensation, Competition, Diffusion agency, Environmental uncertainty , External communication factors , External financial or cost, Heterogeneity of demands, Market and infrastructure factors, Number of primary applications, Pressure from consultants innovation, Social approval, Social development of society, Social norms associated with that population, Sponsorship, Union support.

The above three generic models, which were developed, based on the extensive reviews of innovation literature, confirm different scholars' observation that innovation research has been dominated by the efficient-choice perspective (e.g. Abrahamson, 1991; Wolfe, 1994; Fichman, 2004). Moreover, they suggested the importance of the external forces (institutional and management fashion pressures) and the perception of the innovation (innovation attributes). In this study these models and perspectives are integrated in a model of six blocks of factors that represent the drivers and antecedents of innovation processes. In this model Institutional push and Need pull factors are considered as the main drivers of the adoption decision. The contextual factors that could affect the adoption and implementation process are classified into four groups of factors: innovator attributes, environment attributes, innovation perceived attributes and implementation process attributes. Institutional push factors represent both institutional and fashion perspectives. Need pull factors, environment attributes, innovator attributes and implementation process attributes represent the efficient-choice perspective. Innovation perceived attributes represent both efficient-choice and fashion perspectives in terms of reflecting decision makers' perceived rationality and progressiveness of adopting an innovation.

5.3 Multistage model of adoption and implementation process

Two patterns of innovation adoption process have been used in previous innovation research: unitary sequence and multiple sequence patterns (Damanpour and Schneider, 2006). The unitary sequence pattern accepts the assumption that the adoption process is systematic and occurs in a linear sequence, on the other hand the multiple sequence pattern assumes that the process is more random and has unpredictable phases and sequences (Damanpour and Schneider, 2006). Both have been found useful in describing innovation generation and adoption processes (Gopalakrishnan and Damanpour, 1994). This study adopts a unitary pattern because previous management and management accounting innovation adoption research (including ABC research) suggests that a unitary pattern adequately describes the adoption processes (e.g. Ahire and Ravichandran, 2001; Bessant, et al., 2003; Ravichandran, 2000; Szulanski, 1996; Anderson, 1995; Krumwied, 1998; Brown, et al., 2004). In addition, it is more appropriate for a large sample study (Damanpour and Schneider, 2006). In general, a unitary sequence adoption process has two main phases: pre-adoption and post-adoption where the adoption decision represents the watershed between the stages that belong to the pre-adoption phase and those that belong to post-adoption phase (Rogers, 2003). The following paragraphs describe the generic model's phases and their sub-stages. Firstly an initial model was created by integrating different generic models from the IS and management literature including Rogers (2003), Wolfe (1994), Kown and Zmud (1987), Cooper and Zmud (1990) and Leseure, et al., (2004). The initial model is presented in Figure 5-3. It is important to highlight that with the exception of Leseure, et al.'s (2004) model, these generic stage models considered the efficient choice perspective only in the initiation phase. In the model developed in this study, the institutional and fashion perspectives were also considered as possible driving forces of initiation of voluntary adoption. In the case of forced-selection, there is no initiation phase; the stage model starts with the implementation process.

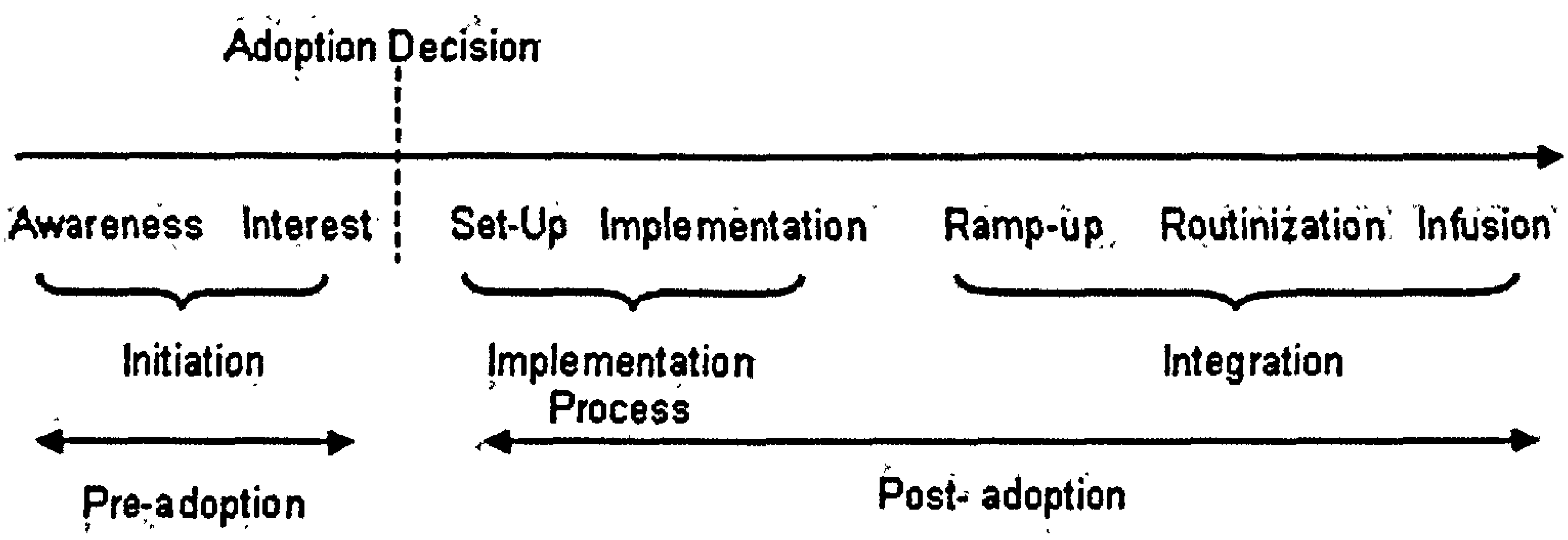

Figure 5-3 Innovation adoption and implementation generic multi-stage model (initial)

5.3.1 The pre-adoption phase

The first stage of an innovation adoption process starts with the *"awareness"* (knowledge/idea conception) of the innovation's existence (Wolfe, 1994). This awareness/knowledge comes via idea and information exchange (Kown and Zmud, 1987). Organisations come to be aware of an innovation through the different types of contacts and sources including consultants and vendors; top management training programs, attendance at workshops, professional association events, conferences, government advisory initiatives, the recommendations of benchmarking with other organisations or other business units in the organisation etc. (Leseure, et al., 2004). Being aware of the existence of the innovation, an *"interest"* in adopting the innovation might follow. This interest could be (a) a result of *matching* effort between problems and opportunities that come to the attention of management (*agenda setting*) against potential innovations (efficient–choice perspective) (Rogers, 2003; Cooper and Zmud, 1990), or (b) a result of the influence of other organisations which creates mimetic behaviour (Fashion, Fad, and social contagion perspectives)

(Greve 1995; Teo, et al., 2003; Abrahamson and Fairchild 1999; Carson, et al., 2000).

5.3.2 Adoption decision

The adoption decision reflects the acceptance of the new idea which leads to allocating resources for its acquisition, alteration and assimilation (Cooper and Zmud, 1990). "In this phase top organisational echelons (managers, committees and boards) decide to adopt the innovation and allocate resources to it." (Damanpour and Schneider, 2006, p.217) This decision could be preceded with some sort of *evaluation* from different perspectives (technical, financial and strategic) and *appraisal* of the costs and benefits of the innovation to consider its suitability for the organisation (efficient–choice perspective) and then *propose* its adoption (Wolfe, 1994; Damanpour and Schneider, 2006).

5.3.3 Post Adoption Phase

This phase consists of five stages classified in two groups *"implementation process"* (set-up, implement) and *"integration"* (ramp-up, routinization and infusion). The *set-up* (adaptation-redefining/restructuring) stage follows the decision to proceed. The aim of this stage is to plan for the implementation of the innovation and the focus is on trying to pre-empt problems which could lead to an implementation failure (Leseure, et al., 2004). Therefore throughout the process the target innovation is often *adapted* to suit the anticipated needs of the organisation, and unforeseen needs or system shortcomings are identified (Cooper and Zmud, 1990). In this stage there is a small window of opportunity when the innovation may be *re-invented/re-defined* and the organisation's structure could be modified (*restructured*) to fit with the innovation in order to achieve a closer fit with the organisational needs and expectations (Rogers, 2003). In this stage organisations use and exploit their previous adoption and implementation experiences and lessons to facilitate the implementation of the new innovation (Szulanksi, 1996). The *Implementation* stage is the direct execution of the plan that is developed at the set-up stage. It "is the launch of the change program and the execution of the short-term actions that have been planned for" (Leseure, et al., 2004, p.75). Therefore "activities that are project-specific, such as the rewriting of procedures, the acquisition of supporting technological infrastructure and the execution of planned structural changes, take place" (Leseure, et al., 2004, p.75). As this stage is most often implemented as a project, there should be no expectation of financial returns or mass-acceptance at this stage (Leseure, et al., 2004). In the light of the results of this implementation effort the adoption decision will be reviewed and *confirmed* (Wolfe, 1994). In that case the innovation, as practice, is released to the organisation at large (Leseure, et al., 2004). Moreover, this stage could contain some background activities aimed at building motivation for the recipients of the new practice to prepare for the next stage, the ramp-up stage. The *Integration Process* starts with the ramp-up stage. This stage begins when the company starts using the new practice. "The overall objective of this stage is to "ramp-up", to performance." (Leseure, et al., 2004, p.87). In order to achieve this objective it is necessary to build *acceptance* of the best practice at all levels of the organisation via securing motivation and involvement and resolving unexpected problems (Leseure, et al., 2004). "Problems should be expected at first, but performance gradually improves, ramping up toward a satisfactory level. This stage (time period), is a brief window of opportunity to deal with the unexpected" (Szulanski, 1996, p.29). By the end of this procedural stage a common understanding of the new practice evolves and uncertainty that surrounds it gradually diminishes and the meaning of the new idea is *clarified* via communication (Rogers, 2003). After the ramp-up stage (level) the innovation rapidly becomes part of the *routine* of the organisation, eventually losing its novelty and its separate identity (Rogers, 2003). At this stage (during this period of time) the new practice becomes institutionalized or entrenched and shared history of using it is built, and actors and actions become typified (Leseure, et al., 2004). Finally, the new practice infuses into the organisation i.e. it will be used to its fullest potential, often in unanticipated ways, to improve work effectiveness and is seamlessly integrated with other organisational systems (Cooper and Zmud 1990; Wolfe, 1994).

In order to make the above initial model comprehensive, the possibility that the innovation process could stop at any time during the above phases or might not start at all was incorporated in the final model, a possibility that was ignored in previous models. Unawareness of the existence of an innovation is possible and leads to non-adoption. If there is no consideration of an innovation after being aware of its existence, the innovation process is stopped in its infancy. Instead of an adoption decision there could be refusal to adopt the new idea i.e. rejecting the innovation as an idea and refusal to make the required resources for its acquisition, alteration and assimilation available. Even when an innovation is adopted as an idea, the possibility for a break in the innovation process still exists. That is an innovation could be abandoned during or at the end of the implementation process when the adoption decision is revisited in the light of the implementation project experience and results.

Finally, the use of an innovation could stop during or after the integration phase if, for one reason or another, the innovation as a practice is aborted. The final model is presented in Figure 5-4. In chapter 8, this model is used to identify the dependent variable of this study, ABT adoption decision.

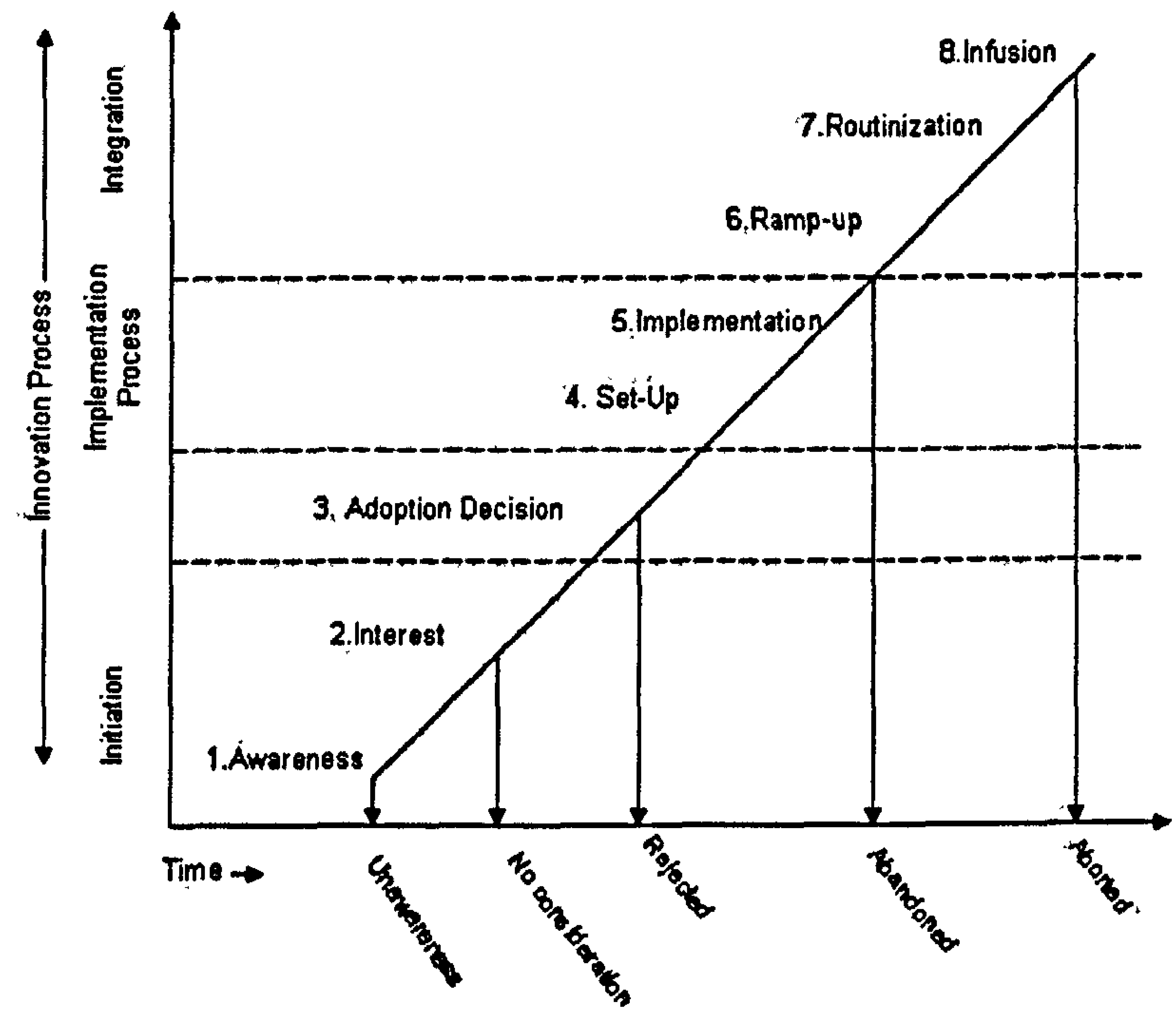

Figure 5-4 Innovation adoption and implementation generic multi-stage model (Final)

5.4 This study's framework

Figure 5-5 represents this study's generic theoretical framework, which is an integration of the six-block factor-model with the multistage model. In order to gain more understanding of the "ABC Paradox" this study is aimed at identifying the determinants of ABT adoption. Therefore, the factors, and combination of these factors, that explain ABT adoption decision should be identified.

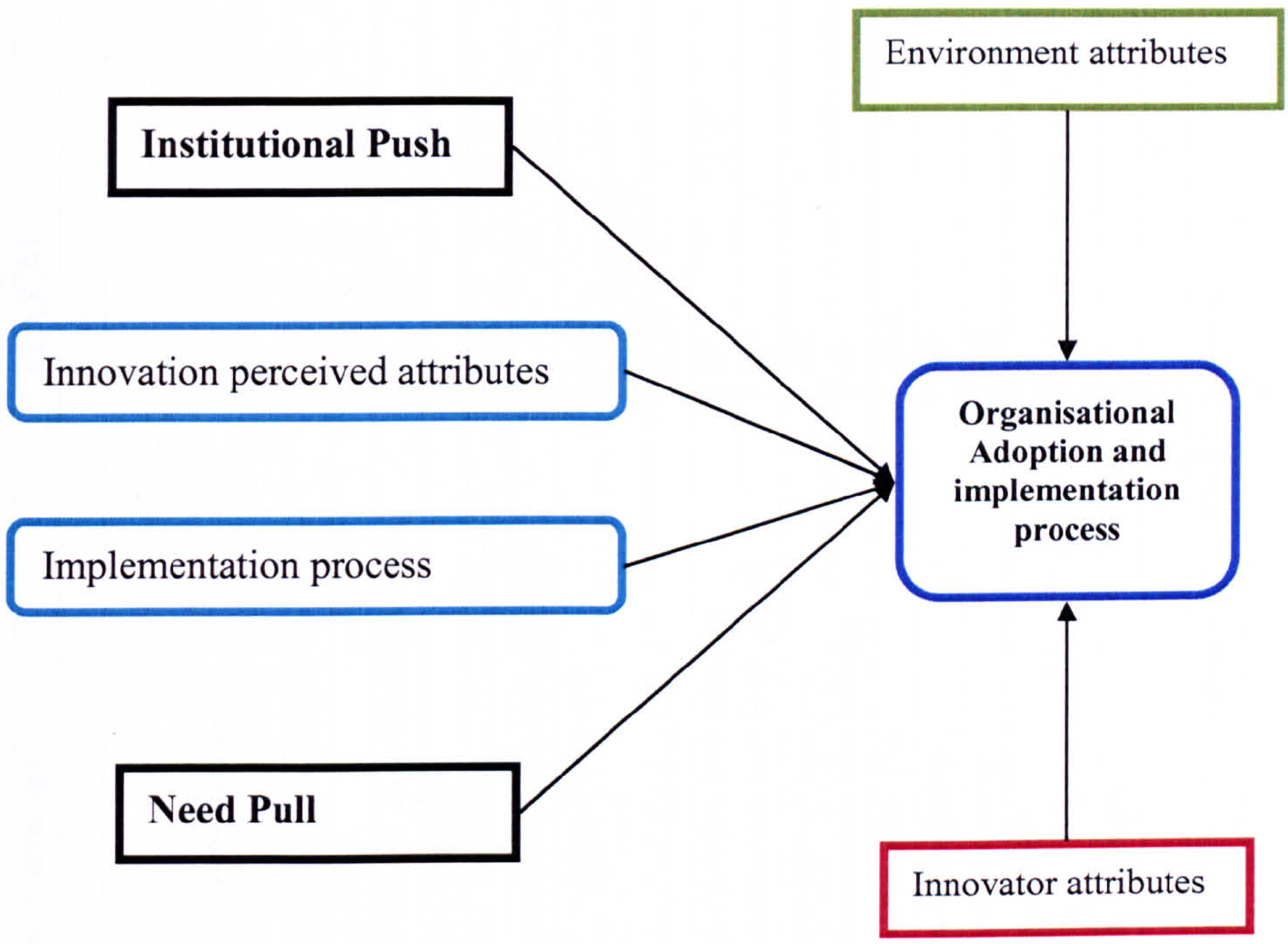

Figure 5-5 The generic theoretical framework

The adoption factors that have been considered in the previous ABC innovation research and in the generic model presented in this chapter were identified and classified according to the six blocks of factors (See Table 5-4). To decide which factors to be included to study ABT adoption in this thesis, factors that are related to the implementation process were excluded.

Table 5-4 The six blocks of factors

Factors	ABC Innovation literature	Factors	ABC Innovation literature
Innovator Attributes		**Innovation perceived attributes**	
Organisational strategy	G	Compatibility	AS,A,K,B1
Organisational structure	G,B3,A, SC	Relative advantage	AS,A,K,AY
• Specialization	-	Ease for use	AS,A
• Centralization	-	Trialability	AS
• Formalization	-	Observability	AS
• Vertical differentiation	-	**External environment**	
Organisational culture	B3	Heterogeneity of demands	A
• Innovation	-	Environmental Uncertainty	A,AY,M
• Outcome orientation	-	Competition	A,B1, M,SC
• Control Tight vs. loose	-	**Institutional and Fashion pressures**	M, ,BG,B
Organisational size	BG,B1,C,K,SC,B4	**Need pull factors**	
IT/IS quality	K	Degree of importance of cost information	K,B3
Other relevant innovations / changes		**Implementation Process attributes**	
• Managerial/ Manufacturing	K, SC,B4	ABC training investments	A,AE
• IS	M	External Expert	A,AE,B,BG,BE
Organisational Leaders attributes		Extrinsic reward systems	A,AY
• Disposed to change	A,AY,M	Implementation team cohesion	AE
• Production process knowledge	A	Implementation team heterogeneity	AE
• Role involvement	A,AY	Implementation team size	AE
Organisational Support	A,B2,K,M,AY	Implementation team training	AE
• Top management support		Implementation Time	AE,K
• Champion support		Project significance	AE
Production characteristics	K,B2,BG,B1,C,SC,B4	Project uncertainty	A,K
• Product diversity		Responsibility	A
• Product line complexity		Variety	A
• Dominance of overhead		Work Autonomy	A
Communication	A,BG,B1		

Source legend: A: Anderson, (1995), AE: Anderson, et.al. (2002), AY: Anderson and Young (1999), AS: Askarany et, al. (2007), B1: Bjørnenak, (1997), B2: Brown, et.al (2004), B3:Bride, et al., (2004), B4:Brierley, (2008), BG: Booth and Giacobbe,(1998), C: Clarke et at, (1999),G: Gosselin , (1997), K: Krumwiede (1998), S: Alsayed (2005), SC: Schoute (2004).

Also, individual characteristics related factors were excluded due to the fact that the examination of such factors in cross-sectional survey studies is problematic (Brown, et al., 2004). Moreover, the availability of well developed measures of the selected factors was considered. Figure 5-6 shows the final model that was tested in this study which contains 25 main factors.

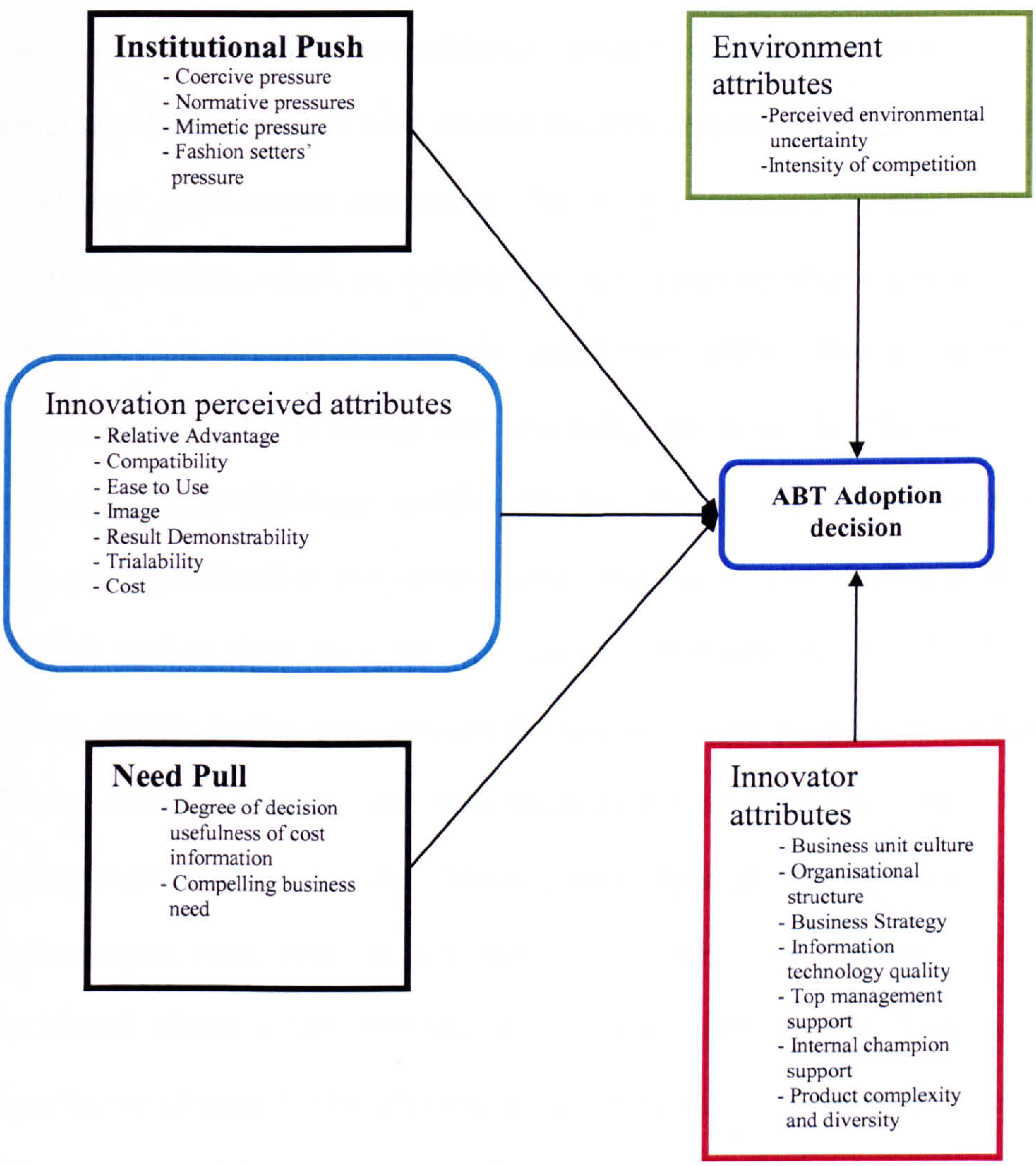

Figure 5-6 The tested model

The remainder of this chapter examines the potential relationships between each of the factors and ABT adoption, based upon either prior findings from the published ABC adoption literature and/or relevant findings from the published IS innovations literature.

5.4.1 Institutional push factors

Institutional push factors represent the institutional and management fashion perspectives that were explored in sections 5.1.2 and 5.1.3. These factors include coercive, mimetic, normative and fashion setters' pressures. A business unit might experience these pressures from external institutions that might therefore lead them to adopt or reject certain innovations. *Coercive pressures* are defined as formal or informal pressures, which are exerted on organisations by other organisations upon which they are dependent (DiMaggio and Powell 1983). *Mimetic pressure* may cause an organisation to change over time to become more like other organisations in its environment (DiMaggio and Powell 1983). *Normative pressures* are associated with professionalization that organisations, that belong to the same professional network tend to share the norms and values of that network (Teo, et al., 2003). Finally, *fashion setters' pressures* are the result of the propagation by management fashion setters to promote new innovations by presenting and marketing them, as management techniques that would lead rational management progress (Abrahamson, 1991, 1996). In ABC innovation research, these factors were studied by Malmi (1999) using Abrahamson's (1991) typology as a framework. As described in Chapter 3, Malmi's (1999) findings provided evidence of the impact of fad (mimetic) and fashion pressures. He found that the pressures from fashion setters have considerable influence in the take-off stage and diminishes in later stages, whilst mimetic behaviour contributes to explaining the diffusion in the later stages.

However, Malmi (1999) found little evidence to support forced selection as a factor that could explain ABC diffusion in Finland. Bjørnenak (1997) and Booth and Giacobbe (1998) investigated fashion setters' pressures in terms of supply side factors. As presented in Chapter 3, their findings suggest the adoption of ABC is more likely to happen when consultants were involved as a source of information about ABC[20]. Similarly Anderson's (1995, p.42) case study showed that "the choice of ABC was profoundly influenced by opinions of external experts". Brown, et al., (2004) also studied the influence of using external consultants on ABC adoption. This factor was found to be significantly positively associated with interest in ABC initiatives but was not significantly associated with ABC adoption ($p < 0.05$ level). Therefore, based on the arguments in the sections and the above paragraph, the following hypothesis was formulated and tested:

H1: The higher the coercive, mimetic, normative and fashion setters' pressures, the more likely it is that business units will adopt ABT.

5.4.2 Need pull factors

Leseure, et al., (2004) identified 'Need Pull' drivers as incidences where organisations had experienced low levels of performance, identified a particular need, faced a problem or crisis, saw an opportunity or viewed the adoption of a new practice as a logical step in continuous improvement. In previous ABC adoption literature, Friedman and Lyne (1999) found that the existence of a compelling

[20] Bjørnenak (1997) did not test the use of consultants statistically, however, he did find that all the firms that implemented ABC had used consultants. Booth and Giacobbe (1998) found that there was a higher use of consultants by firms adopting ABC than those that rejected it, however, the difference was statistically insignificant.

business need is important for a successful adoption of ABT. A more specific factor was introduced by Krumwiede (1998). He argued that the importance of cost management information for decision making could be considered to affect ABC adoption.

5.4.2.1 Compelling business need

Facing a compelling business need can include cases of financial crisis, threat of closure, changed competitive environment and significant strategic change (Friedman and Lyne, 1999). Organisations face such situations by introducing, at times significant, changes to their structures and systems, which could include costing and cost management systems (Friedman and Lyne, 1999). Accordingly ABT could be adopted in order to face situations of compelling business need (Friedman and Lyne, 1999). Therefore, this study tests the following hypothesis:

H2: Experiencing a compelling business need makes it more likely that business units will adopt ABT.

5.4.2.2 Degree of decision usefulness of cost information

The degree to which cost information is needed by an organisation could affect ABT adoption (Bride, et al., 2004). According to Anderson (1995), the need in organisations for accurate cost data for strategic decisions and cost reduction may affect the adoption of ABC. Krumwiede (1998) found a positive relationship between the degree of decision usefulness of cost information and ABC adoption. In cases where cost data are considered an essential factor in the decision making process (e.g. the accuracy of product costs is essential to compete in the market, or that cost data is important for cost reduction efforts, pricing decisions or for special cost studies), decision makers will try to adopt cost management systems that fulfil such needs (Krumwiede 1998). The following hypothesis is, therefore, tested:

H3: The higher the level of the degree of decision usefulness of cost information, the more likely it is that business units will adopt ABT.

5.4.3 Environmental conditions

"Organisations do not exist in a vacuum, but rather, operate in an environment that provides opportunities and imposes constraints." (Fichman, 2000, p.15). Therefore, the attributes of the adoption environment were considered as important predictors of innovation adoption in innovation literature (Kwon and Zmud, 1987; Fichman, 2000). According to Kwon and Zmud (1987), two different perspectives on environment exist: one views the environment as a source of information and another views the environment as a stock of resources. Heterogeneity and uncertainty represent the first perspective and intensity of competition represent the second (Kwon and Zmud, 1987). In ABC adoption research, intensity of competition and perceived environmental uncertainty were empirically studied by Bjomenak (1997), Malmi (1999) and Schoute (2004). These two factors were also studied in the contingency-based research related to management control systems (MCS) design and change (Chenhall, 2003). Therefore, these two predictors are used in this study.

5.4.3.1 Perceived environmental uncertainty

"Uncertainty is related to the variability of organisational environments. This definition encompasses both instability and turbulence." (Kwon and Zmud, 1987, p.240). Govindarajan, (1984) emphasized that decision makers' perceptions of uncertainty, rather than the actual uncertainty, influence the decisions that managers make in response to their organisations' external environment. Hence, perceived environmental uncertainty (PEU) is related to the top managers' perceived inability to predict an organisation's external environment accurately (Milliken, 1987). PEU reflects the rate of change in the environment that occurs unexpectedly (Al-Dahiyat, 2003). Examples include; unexpected changes in customers' demand, competitors' actions or sources of supply, unpredictable shifts in the economy and rapidly changing technology (Miles and Snow, 1978; Mintzberg, 1979; Govindarajan, 1984, cited in Al-Dahiyat, 2003). Innovation researchers have proposed and found positive association between PEU and innovation adoption as organisations, in uncertain environments, tend to seek to 'survive and grow' via adopting innovations (Kwon and Zmud, 1987). Similarly, Oliver (1991) has noted that low uncertainty increases the tendency of organisations to remain stable or to avoid change and, conversely, high uncertainty increases their tendency to seek change. In the contingency-based management control systems research, PEU has been associated with a need for more open, externally focused, nonfinancial styles of MCS (Chenhall, 2003). PEU was studied in the relationship to ABC adoption only by Schoute (2004). Schoute (2004) has proposed that the adoption of ABC is associated with high levels of perceived environmental uncertainty. However, the results of his study did not support the proposed positive relation in the studied sample. This could be due to the relatively weak internal reliability of the composite measure for PEU (Cronbach's alpha = 0.59). Based on the above arguments, and using a more reliable measure for PEU the following hypothesis is tested:

H4: The higher the level of PEU, the more likely it is *that business units will adopt ABT.*

5.4.3.2 Intensity of competition

Competition refers to the intensity of the competition in the market(s) of the company (Fichman, 2000). Innovation researchers have found positive associations between competition and adoption (Kwon and Zmud, 1987). In the context of management control systems of change research, it was found that the intensity of competition is positively correlated with MCS changes (Libby and Waterhouse, 1996; Chenhall, 2003). In ABC research this factor was used by Cooper (1988) to advocate and show the importance of adopting activity based costing. He argued that in highly competitive markets, more sophisticated and accurate costing systems are needed. That is, in such conditions competitors are more likely to take advantage of any costing errors by managers who rely on inaccurate cost information to make decisions related to costing and pricing (Cooper 1988). The influence of competition on the adoption of ABC was studied by Bjørnenak (1997), Malmi (1999) and Schoute (2004). Both Bjørnenak (1997), Malmi (1999) used the percentage of the sales from exports as a proxy for competition, based on the assumption that competition is more intensive in foreign markets than in the home market. Schoute (2004) measured competition as a composite scale, which consisted of three elements: price competition, product competition and marketing competition. Malmi

(1999) and Schoute (2004) found that adopters of ABC faced a higher level of intensity of market competition. However the results of Bjørnenak (1997) gave different results as he found that the adopters of ABC have a lower level of competition and a lower number of competitors than the non-adopters and both effects were not statistically significant. Based on the former arguments, the following hypothesis is formulated:

H5: The higher the level of intensity of market competition, the more likely it is that business units will adopt ABT.

5.4.4 Perceived ABT attributes

According to Rogers (1995, 2003), the diffusion of innovations is affected by the perceived attributes of innovations. Rogers (1995, 2003) suggests that the perceived innovation attributes have the most significant influence on innovation adoption rates as between 49 and 87 percent of variance in innovation diffusion can be explained by those attributes. Rogers (1983, 1995, and 2003) combined these attributes into five main attributes: 'relative advantage', 'compatibility', 'complexity', 'trialability' and 'observability'. Rogers (1995) defined the five perceived attributes as follows: Relative advantage: the degree to which an innovation is perceived as being better than its predecessor; Compatibility: the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters; Complexity: the degree to which an innovation is perceived as being difficult to understand and to use; Observability: the degree to which the results of an innovation are observable and visible to others; and Trialability: the degree to which an innovation may be experimented with, before adoption. Tornatzky and Klein (1982) have identified in their review of 105 articles of innovation research, another five attributes which include: cost, communicability, divisibility, profitability and social approval. Tornatzky and Klein (1982) highlighted that communicability and divisibility are closely related to observability and trialability. Cost refers to the extent with which the innovation is perceived to be expensive (Tornatzky and Klein, 1982). Profitability refers to the level of profit to be gained from adopting the innovation (Tornatzky and Klein, 1982). Social approval refers to the nonfinancial aspect of a reward, as a result of the status that could be gained in one's reference group by the adoption of the innovation (Tornatzky and Klein, 1982). Moore and Benbasat (1991) renamed "social approval" as "image" and highlighted that some researchers including Rogers included "image" as an aspect of the relative advantage attribute. However, Moore and Benbasat (1991) argued that it should be considered a separate factor, based on Tornatzky and Klein's (1982) evidence that the image's (social approval) effect on innovation adoption is different enough from relative advantage to be considered an attribute by itself. Moore and Benbasat (1991) have also noted that the perceived attributes are defined based on the perception of the innovation itself, and not on the perception of actually using the innovation. They stressed that "it is not the potential adopters' perceptions of the innovation itself, but rather their perception of using the innovation that are key to whether the innovation diffuses". Moore and Benbasat (1991) redefined all the attributes accordingly by simply rewarding their definitions to include the word usage of, for example, relative advantage was defined as the degree to which *using* an innovation is perceived as being better than *using* its predecessor. In terms of the influence of an innovation's attributes on its adoption, empirical evidence showed that Relative advantage, Compatibility, Observability, Trialability and Image are positively related to its rate of adoption while the perceived Complexity and Cost of using an innovation are found to be negatively related to its rate of adoption (Tornatzky and Klein, 1982; Rogers, 2003; Moore and Benbasat, 1991).

In ABC innovation literature, Anderson (1995, p.39) found that "Technological factors -complexity of use, compatibility with existing accounting systems and the relative improvement over the existing cost systems - were from the beginning, critical elements in the search for new cost system approaches" which led to adopting ABC in General Motors. These findings were tested empirically by Brown, et al., (2004) in relation to perceived relative advantage only. Based on Anderson's findings, they proposed positive associations between the perceived relative advantage of ABC with both the initiation and adoption stages of ABC. Their regression analysis supported their proposition and provided evidence that relative advantage was positively associated ($p < 0.05$) with interest in and the adoption of ABC initiatives. However, relative advantage was not significantly associated with interest in and the adoption of ABC when controlling other organisational and technological factors that they considered in their study (See Chapter 3 for details). To the knowledge of the author, the only study that attempted to examine the influence of MA innovation's attributes on its diffusion was Askarany, et al., (2007). As described in Chapter 3 Askarany, et al., (2007) had extracted 14 items to measure ABC attributes from a generic 34-item scale that was developed and validated by Moore and Benbasat (1991) to measure the main five innovation's attributes identified by Rogers (1983). Although the authors neither assessed a model fit nor explored the interdependence of the items; their regression analysis findings did suggest a positive relationship between three of the 14 items, (compatibility of the technique with exiting process, the quality of the technique in doing the job, the effectiveness of the technique) and a negative association with the one item (the level of implication of the technique for other processes). Although Askarany, et al.'s (2007) findings showed the importance of investigation of innovation attributes' influence on ABT adoption; they failed to produce clear results that represented the five attributes that they claimed to be measuring and testing. In order to improve our understanding of the influence of the perceived attributes of using ABT on ABT adoption and in line with the above arguments and finding, this study tested the following hypotheses[21]:

H6: The higher the level of the perceived relative advantage, compatibility, ease, image, result demonstrability and trialability of using ABT, the more likely it is that business units will adopt ABT.

H7: The higher the level of the perceived cost of using ABT, the less likely it is that business units will adopt ABT.

5.4.5 Innovator attributes

5.4.5.1 Business unit culture

In a study by Baird, et al., (2004) organisational cultural dimensions were introduced and their association with Gosselin's (1997) activity management levels was explored. Organisational culture is defined as a "pattern of shared and stable

[21] Moore and Benbasat (1991) definitions and measures are used in this study. The used "ease of use" instead of "complexity" construct and "result demonstrability" instead of "observability" construct. The negative association between complexity and innovation adoption becomes a positive one between ease of use and innovation adoption.

beliefs and values that are developed within a company over time" (Gordon and Di Tomaso, 1992, p. 784 cited in Baird, et al., 2004). Organisational culture is often researched and conceptualized as a set of dimensions that, when aggregated, form a shared cultural pattern (Baird, et al., 2004). Baird, et al., (2004) have explored the impact of three organisational culture dimensions: innovation, outcome orientation and tight versus loose control. The first two dimensions were drawn from O'Reilly, et al.'s (1991) Organisational Culture Profile (OCP), and the third from Hofstede, et al.'s (1990) practice-based measure of organisational culture. Baird, et al., (2004) found that these dimensions do have a strong association with the adoption of the three levels of activity management identified by Gosselin (1997).

The first dimension "Innovation", which represents the receptivity and adaptability to change, and the willingness to experiment in an organisation (O'Reilly, et al., 1991, p. 505 cited in Baird, et al., 2004), was found to be associated with the extent of the adoption of Activity Analysis (AA) and Activity Cost Analysis (ACA). This supports the view that business units with more innovative cultures are more likely to experiment with new practices than units with less innovative cultures (Baird, et al., 2004). The second cultural dimension, outcome orientation, refers to the extent to which business units emphasize action and results, have high expectations for performance, and are competitive (O'Reilly, et al., 1991, p. 505 cited in Baird, et al., 2004). Results showed that this dimension is associated with the extent of the adoption of Activity Analysis (AA), Activity Cost Analysis (ACA) and Activity based costing (ABC). This results show that "business units with an outcome orientation culture are likely to be attracted to practices, such as activity management, that claim to facilitate improvements in processes and to enhance performance and competitiveness." (Baird, et al., 2004, p.388). The third dimension is tight versus loose control. This dimension relates to the extent to which an organisation places emphasis on the control of activities and costs (Baird, et al., 2004). A business unit with a tight control culture is extremely cost conscious (Hofstede, 1998 cited in Baird, et al., 2004), exercises extensive and continuous flows of information and "an extremely detailed planning, budgeting and reporting system" (Merchant and Van der Stede, 2003, p.133 cited in Baird, et al., 2004). This dimension was found to be associated with all the three levels of activity management. Therefore, the following hypothesis is tested:

H8: The closer the organisational culture is to being innovative, outcome oriented and having tight control, the more likely it is that business units will adopt ABT.

5.4.5.2 Organisational Structure

The Organisational innovation literature argues organisational structure influences the successful adoption and implementation of an innovation (Kwon and Zmud, 1987; Damanpour, 1991). Organisational structure can be defined as "the formal allocation of work roles and the administrative mechanisms to control and integrate work activities" (Child, 1972, p.2). Organisational structure has a multi-dimensional nature (Damanpour, 1991). These dimensions include: specialization, vertical differentiation, formalization and centralization (Kwon and Zmud, 1987; Damanpour, 1991). The three most widely studied dimensions are vertical differentiation, formalization and centralization (Schoute, 2004). Vertical differentiation represents the number of levels in an organisation hierarchy below the chief executive level (Damanpour, 1991). Formalization reflects the degree of functional differentiation (i.e. developing clear work definition and procedure) and reflects the orgnisational emphasis on following rules and procedures in conducting organisational activities (Kwon and Zmud, 1987; Damanpour, 1991). Centralization refers to the level of concentration of authority and decision making and is the extent to which decision-making autonomy is dispersed or concentrated in an organisation (Kwon and Zmud, 1987; Damanpour, 1991). In ABC innovation research both Gosselin (1997) and Schoute (2004) studied the influence of the three dimensions on ABC adoption. Their results provided some support for the dual-core model, which suggests that the adoption and implementation of administrative innovations is facilitated by mechanistic organisational structure (i.e., high on all three dimensions). More specifically, Gosselin (1997) and Schoute (2004) founded a significantly positive association between vertical differentiation and the adoption of ABC, however, no significant relationship was found with both centralization and formalization. As described in chapter 4, this study classifies ABT as an administrative innovation which could contain technical elements. Therefore, in line with the dual-core model, a positive, possibly weak, relationship is expected between the three structural dimensions and the adoption of ABT, which leads to the following hypotheses:

H9: The higher the level of vertical differentiation, the more likely it is that business units will adopt ABT.

H10: The higher the level of formalization, the more likely it is that business units will adopt ABT.

H11: The higher the level of centralization, the more likely it is that business units will adopt ABT.

5.4.5.3 Business Strategy

Organisational strategy is identified as an important variable in empirical studies targeting management accounting change and innovations (e.g. Libby and Waterhouse 1996; Gosselin, 1997). The impact of strategy on ABT was studied by Gosselin (1997). Gosselin used Miles and Snow's (1978) typology of organisational strategy [22], providing an evidence of the influence of strategy on activity management levels. He showed that a prospector strategy is associated with the adoption of AM approaches. Based on Gosselin's, (1997) findings, the following hypothesis is tested:

H12: Having a prospector strategy orientation will make it more likely that business units will adopt ABT.

5.4.5.4 Business unit size

In general, size has been found to be an important factor influencing the adoption of more complex administration systems (Moores and Chenhall, 1994). Moreover, consistent findings in previous ABC adoption research support the view that larger organisations are more likely to adopt ABT (Innes and Mitchell, 1995; Bjørnenak, 1997; Clarke, et al., 1997; Van Nguyen and Brooks, 1997; Krumwiede, 1998; Brown, et al., 2004; Baird, et al., 2004; Al-Omiri and Drury 2007). A possible reason for this is that larger organisations have relatively greater access to resources to experiment with the introduction of more sophisticated accounting systems (Innes

[22] Miles and Snow (1978) identified four strategic types of organisations according to their way of responding to the environment: prospectors, defenders, analyzers and reactors. A prospector organisation perceives high uncertainty in its environment and seeks new products and market opportunities. On the other hand, a Defender organisation perceives relative stability in its external environment and operates within a narrow and limited mix of products and customers. Analyzer organisation combines attributes of both prospectors and defenders. Reactors do not follow a conscious strategy.

and Mitchell, 1995). Another reason could be that the demand for ABT for planning, control and coordination of activities is greater in larger organisations. Therefore, the following hypothesis is tested:

H13: The larger the size of the organisation, the more likely it is that business units will adopt ABT.

5.4.5.5 Information technology quality

This factor is unique to ABC innovation research and it was introduced by Krumwiede (1998) based on Anderson's (1995) finding that companies with higher quality information systems, in terms of having shared databases that facilitate easy tracking for detailed operational data, finds ABC implementation and maintenance easier than companies that do not have this facility. Therefore, Krumwiede (1998, p.252) argued that "after the decision has been made to adopt ABC, existing IT may be crucial in reaching higher stages of implementation." Testing the influence of IT quality on ABC adoption and implementation by Krumwiede (1998) showed that IT quality plays a role in both ABC adoption and implementation. Statistical logit tests showed no significant relationship between IT quality and reaching of the "approved for implementation stage" i.e. adoption decision. However, it was found that IT quality appears to have a somewhat significant and positive relationship with both "considering then rejected" and "approved for implementation" stages. Also, based on descriptive evidence, it was found that IT quality is relatively high for "considered then rejected" and "implemented then abandoned". Krumwiede (1998, p.264) concluded that "strong IT may serve as a disincentive to adopting ABC or to continuing with its implementation. Presumably, the existing information system is perceived to provide most of the information needed for decision making and therefore ABC is not worth the resources costs". Moreover, as IT quality was found to be significantly higher for "integrated system" companies than the "routine system" group Krumwiede (1998, p.264) concluded that "IT may be critical factor to reaching the highest level of ABC implementation". Therefore, based on the above arguments and findings, this study tested the following hypothesis:

H14: The higher the level of IT quality, the less likely business units will adopt ABT.

5.4.5.6 Top management support

"Top management support is the active and open promotion that upper level executives, such as the Chief Executive Officer or the Chief Financial Officer, give to an innovation." (Brown, et al., 2004, p.336). Published IS innovations literature consistently finds that top management support is positively associated with innovation adoption and implementation (Prescott and Conger, 1995; Fichman, 2000). In ABC innovation research, Krumwiede (1998) tested the influence of top management support on ABC implementation rather than adoption. His findings confirmed that successful ABC implementation projects reach the stage of routinising the system are associated positively with top management support. Brown, et al., (2004) argued that this variable should be tested in relation to the adoption decision. That is, top management support indicates the significance of the innovation within the organisation. Moreover, top management support makes adoption easier by reducing the risk and uncertainty of the initiative through easy access to resources and resolving issues across organisational boundaries (Brown, et al., 2004). Testing the correlation between ABC adoption and the top management support by Brown, et al., (2004) showed that ABC adoption is positively correlated with top management support. However, this relation did not hold after controlling for other variables in their study. Therefore, based on the above arguments this study tested the following hypothesis:

H15: The higher the level of top management support of ABT adoption, the more likely it is that business units will adopt ABT.

5.4.5.7 Internal champion support

"Champion support for an innovation means that someone within the organisation becomes a special advocate for the innovation, taking actions to increase the probability of successful adoption and implementation." (Prescott and Conger, 1995, p.25). A champion plays the role of educating senior managers and users about an innovation and creates awareness about the organisation's need for it (Premkumar and Potter, 1995). Published IS innovations literature consistently find that internal champion support is positively associated with innovation adoption and implementation (Prescott and Conger, 1995; Fichman, 2000). In ABC innovation research, Brown, et al., (2004) tested the relationship between internal champion support and the interest in and adoption of ABC. They argued that a champion is needed to drive any ABC project and facilitate communication within the organisation as ABC projects tends to cut across internal organisational boundaries (Brown, et al., 2004). Their findings indicated that the initial interest in ABC and its adoption decision are both significantly positively associated with the existence of internal champion support, even after controlling for other factors. Therefore, consistent with the published IS and ABC innovation literature findings this study tested the following hypothesis:

H16: The higher the level of internal champion support of ABT adoption, the more likely it is that business units will adopt ABT.

5.4.5.8 Level of Overhead

This innovator attribute is unique to ABC research. ABC was advocated as a more accurate method of overhead allocation (Cooper and Kaplan, 1988). Advocate of ABC argued that traditional volume-based costing systems are not suitable anymore and caused distortions to product cost, as such systems are not able to accurately account for the overhead cost that was becoming an increasingly larger component of product cost. In ABC innovation research, studies that considered this factor, produced apparent contradictory results. Consistent with expectations, Bjørnenak (1997) found a positive relationship. Booth and Giacobbe (1998) found that companies with higher levels of overhead were more likely to initiate interest in ABC, however, no relationship was found with the later adoption stages of evaluation and adoption. However, Clarke, et al., (1999) found no relationship between the level of overhead and the adoption of ABC. Finally, Brown, et al., (2004) also found no relationship between the level of overheads in the organisation and the interest in and the adoption of ABC. The apparent contradiction between these findings could be a result of differences between these studies, in terms of measurement that was used as overheads and using different definitions of adoption. The present study has used Brown, et al.'s (2004) measure of the level of overheads and a clearer categorization of the adoption stages to retest this factor and formulated the following hypothesis:

H17: The higher the level of overheads, the more likely it is that business units will adopt ABT.

5.4.5.9 Product complexity and diversity

Similar to the arguments for the level of overheads, ABC was claimed to be a more accurate system that could capture the impact of high product complexity and diversity on the product cost and avoid the costing distortions of traditional cost systems (Cooper and Kaplan, 1988). In ABC innovation research, again contradictory results were found. A positive relationship between the level of product complexity and diversity and the adoption of ABC was found by Bjørnenak (1997) and Krumwiede (1998). Booth and Giacobbe (1998) found a positive relationship at the initiation of interest stage but not at the evaluation and adoption stages. A negative association was found by Clarke, et al., (1997) while Van Nguyen and Brooks (1997) did not find any relationship. As with the level of overheads, the apparent inconsistencies in findings may stem from different definitions of the stage of adoption, as well as in the measurement of product complexity and diversity. Brown, et al.'s (2004) findings indicated that product complexity and diversity was univariate and significantly positively associated with interest in ABC, but it was not significantly associated with interest in ABC when controlling for the other factors. Also Brown, et al.'s (2004) results showed no relationship with ABC adoption at the adoption stages. The present study has used Brown, et al.'s (2004) measure of the level of product complexity and diversity and a clearer categorization of the adoption stages to retest this factor and formulated the following hypothesis:

H18: The higher the level of product complexity and diversity, the more likely it is that business units will adopt ABT.

CHAPTER 6 RESEARCH METHODOLOGY

Chapter one set forth the aims of this thesis and then the following chapters established, by a discussion of the research literature relating to innovation research and activity-based techniques, a context within which this research is being conducted. Following the current chapter there are three chapters presenting the results of this study and their validity and reliability and discussing the conclusion and contributions of this research. The purpose of the current chapter is to present the research design and data collection strategy. In addition, the main statistical analysis approach, logistic regression, is outlined and clarified.

6.1 The methodological design

In this section, the main features of the methodological design of this research will be illustrated. According to Saunders, et al., (2007), the choice of the research methods and data collection techniques should serve the purpose(s) of the research as identified in the research questions, aims and objectives. Figure 6-1 shows five possible types of research choices.

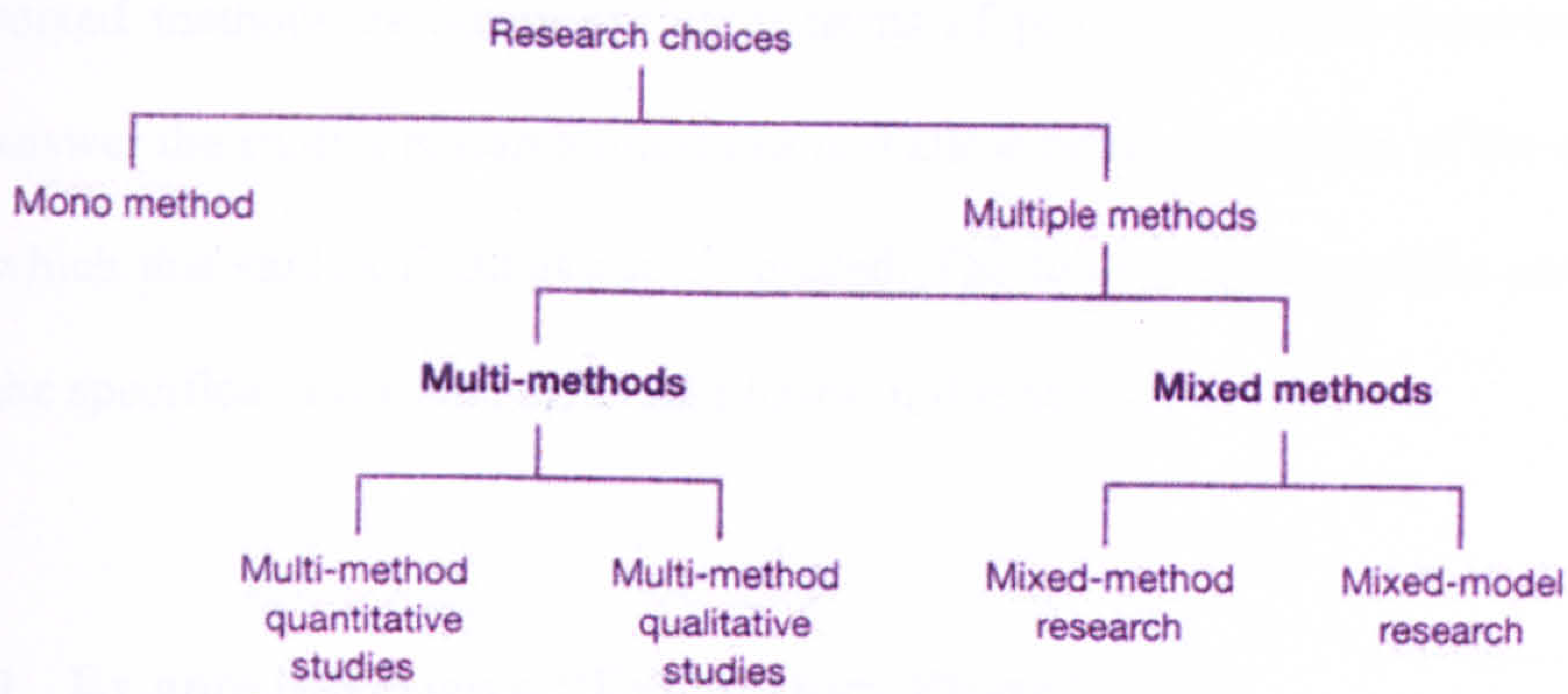

Figure 6-1 Research choices (adapted from Saunders et al., 2007: 146)

This study is mixed methods based on qualitative and quantitative data collection techniques and analysis procedures in a sequential mode without combining them (See Figure 6-2).

Figure 6-2 Research choice: sequential mixed method research

It has three main elements: exploratory, descriptive and explanatory. The findings of the qualitative data collection are used to pave the way for the quantitative data collection (the predominate method of this research) and to support its findings. A postal questionnaire was used to collect empirical data. This facilitated access to a large number of respondents and provided sufficient data for statistical analysis. In addition, face-to-face interviews were carried out to refine the questionnaire ex ante and to check the reliability of the survey results ex post and seek further explanation of some of the responses. Using this mixed methods design is useful in terms of providing better opportunities to answer the study's research questions and allow better evaluation of the extent to which this study's findings can be trusted. The following paragraphs summarize the specifications of the different phases of this study.

6.1.1 Ex ante interviews, "Exploratory Phase"

The first phase of this study involved conducting a series of one-to-one interviews with different director level staff at different strategic business units. The aim of this phase was to explore themes that have emerged from previous quantitative ABC adoption research, explore practitioners' understanding of ABT and explore possible explanations of the ABT paradox. In addition, these interviews served the general purpose of exploring management accounting practice in the UK manufacturing sector and were considered necessary for the researcher to better understand the UK context[23].

To achieve these objectives, non-standardized interviews were conducted. Non-standardized, semi-structured interviews could be advantageous in certain situations (Saunders, et al., 2007). The purpose of this phase of the research is to explore and understand the reasons for decisions related to ABT adoption and implementation that research participants have taken. For this purpose, semi-structured interviews are justifiable (Blumberg, et al., 2005; Saunders, et al.,

[23] As the researcher belongs to a different culture and possesses working experience of a different country's manufacturing sector, it was necessary to have this step to understand the context of the study in order to avoid any assumptions that might affect the research methodology.

2007). This type of interview gives the opportunity to the researcher to 'probe' answers, where the researcher wants his/her interviewees to explain, or to build on their responses (Saunders, et al., 2007). It helps in revealing and understanding not only the 'What' and the 'How' but also to place more emphasis on exploring the 'Why' (Saunders, et al., 2007). Moreover, semi-structured interviews allow open-ended questions to be used to persuade the respondents to elaborate on their answers and give the interviewer the freedom to tailor the interview to suit each respondent as the order and logic of questioning may need to be varied (Saunders, et al., 2007).

6.1.1.1 Practical steps of conducting the interviews

A list of potential interviewees was obtained from previous research conducted by the researcher, to be used for this phase of the current study; the details are in the following paragraphs:

6.1.1.1.1 Choosing the interviewees

The plan was to interview financial controllers/directors from manufacturing business units that represent different stages and experiences in ABT implementation. The endeavour was to explore the ABT adoption and implementation process identified in previous literature in its main stages (including the stage of having no consideration of adoption). A list of 93 UK manufacturing companies from previous research[24] was used to find suitable participants. Thirty three of these companies have experience with ABC adoption or implementation. The aim was to conduct one interview with one representative at each of the main adoption and implementation stages, which results in five cases. In addition to the stage of adoption, different factors were considered in selecting the participants. The time and cost[25] of conducting the interviews played a role in determining the geographical distribution of the cases. This limited possible participants to those within a reasonable distance of the city of Bristol. The characteristics of the possible participants were important as well. The position and the number of years of experience in the same company were considered and potential contacts were limited to financial directors or accountants. Cases that have contact details for other than financial directors or an accounting position were excluded. The minimum number of years of experience considered acceptable was three years. Furthermore, only cases where participants provided their contact details were included. Finally, how recent the experience with ABT in each case was considered. Cases where ABT was first considered after 2000 were preferable and cases where the first consideration of ABT was in the 1990s were accepted only when the experience of the respondent covered that period. These filtering procedures led to 11 cases (see Table 6-1).

[24] MSc dissertation research 2005.
[25] At this point the researcher did not have any support from CIMA.

Table 6-1 Cases considered for interviews

Stage of ABC adoption in 2005	Location	Industry (Primary UK SIC (2003) Code)	Participants' years of experience	Year of the first consideration
Abandonment after implementation	Wharton	3530	8	1995
Abandonment after implementation	Bristol	6532	12	1992
Currently using	Dorset	1596	20	1992
Currently using	Shropshire	2010	6	2000
Assessment	East Sussex	3663	3	2005
Assessment	Chelmsford	3210	13	2003
Assessment	Mansfield	2222	3.5	2002
Rejection after assessment	London	2741	4	2003
Rejection after assessment	Cambridge	2924	7	2000
Rejection after assessment	Kent	0141	7	1999
Rejection after assessment	Bath	5186	16	1999

Regarding cases that do not have any consideration of ABT adoption, two cases were selected randomly from companies having financial directors that worked for them for at least five years and their contact details were available. In addition to the above cases, another interview was arranged with a financial controller of a manufacturing business unit in Bristol during a CIMA event at the University of West of England. Moreover, backup cases were chosen following the above criteria but relaxing the distance condition in case the options in Table 6-1 did not work[26].

[26] In this case a phone interview was conducted because of time and cost constraints.

6.1.1.1.2 Contacting the interviewees

During December 2006 an e-mail to all potential participants was sent. The e-mail described the main features of the research and a formal invitation letter attached (See Appendix 1). As the e-mail stated, phone calls were conducted (two days after sending the e-mail), to check the possibility of an interview during February 2007[27]. This led to the cases shown in Table 6-2:

Table 6-2 Cases contacted for interviews

Stage of ABC adoption in 2005	Location	Industry (Primary UK SIC (2003) Code)	Participants' years of experience	Year of the first consideration
Abandonment after implementation	Wharton	3530	8	1995
Currently using	Shropshire	2010	6	2000
Assessment	Mansfield	2222	3.5	2002
Assessment	Northumberland	1589	15	2001
Rejection after assessment	London	2741	4	2003
No consideration	Bristol	3530	8	-

During January 2007 a final telephone contact with these interviewees was conducted to set up appointments for the interviews. Most of the interviews were conducted during February 2007.

6.1.1.1.3 The interviews

Five interviews with financial directors of five UK manufacturing companies were conducted (four of them were face-to-face and one by telephone). These cases represented different experiences with ABT adoption and implementation.

[27] In only one case a single phone call was sufficient to obtain initial acceptance. In the other cases at least three calls were needed to contact the potential interviewees.

The participants in these five cases belonged to companies that a) were currently assessing the adoption of ABT b) had rejected ABT after assessment c) had abandoned ABT after implementation[28]. For these companies, each interview consisted of two parts: the first part concentrated on identifying the stages that the company went (or is planning to go) through in adopting and implementing ABT. The second part was devoted to identifying the influential factors that affect the outputs of each stage of adoption and implementation. The last of the five cases represented companies that do not have any formal experience with ABT adoption and implementation. The focus of the interview in this case was the reasoning behind their lack of consideration for ABT to date. Appendix 2 presents a sample of the semi-structured interview schedules that were used in the interviews. The interviewees were assured about the confidentiality of the interview and their permission was gained to record the interview. The interviews were taped, digitally recorded and transcribed.

6.1.1.1.4 The main themes emerged from the interviews

The interviewees were drawn from the printing, aerospace, food and chemicals industries. The interviews revealed a number of important issues that affected the theoretical framework and, consequently, the survey instrument. These issues are presented and discussed in the related chapters and can be summarised as follows:

[28] The tow companies that were selected to represent ABC user cases apologised for participating (after one had shown initial interest). In addition to these two cases the researcher tried to contact three more cases. Two apologised because of lack of time and the third did not replay.

- The importance of institutional factors:

These field visits revealed the importance of considering institutional factors as potential factors that might help in explaining and understanding the ABC paradox. It was clear that, in the printing and aerospace industries, customers have very clear expectations as to the manner in which prices will be set and rationalised. In these industries the cost system was obviously affected by these external expectations. Moreover, it was noticeable that the influence of software vendors and management consultants in terms of pushing towards introducing and using ABT was weak or absent.

- The importance of top management and champion support:

The well known factors of top management support and a well-respected project champion were reaffirmed. At one aerospace company the project had an "on-off" status that was dependent upon the interest it generated in key managers.

- The ad-hoc use of ABT:

There were no examples of the "classic" project implementation process; instead there were examples of activity-based ideas being integrated into existing systems. At one company the interviewee became persuaded that he had, in fact, employed activity-based methods in an ad hoc project – although he had not been aware of it at the time!

- The perception of ABT characteristics and the impact of limited resources:

The main perception observed was that ABT is an expensive choice. It was clear that time and resources were important constraints on the implementation of activity-based projects. There was resistance to committing time to a project if there was any doubt that a significant benefit would be gained.

- External and internal communication was clearly seen to have an impact on the awareness of ABT.

- Being convinced that CIMA members are the best to answer the questionnaire.

These themes were used to support the theoretical framework and to help identifying the questions that should be asked in the questionnaire in the next phase.

6.1.2 Questionnaire survey, "Descriptive, Explanatory Phase"

This phase is related to the main research question of this study: why does the ABC Paradox exist? It aims to describe the current status of ABT adoption and to establish the determinants (and configurations of these determinants) of organisational innovativeness as it relates to management accounting innovations in general and ABT in particular. According to Gill and Johnson, (2002), surveys could be used as descriptive and explanatory research tools and are therefore appropriate for this study. Questionnaire surveys are a popular research method in cost management research (Bjørnenak and Mitchell, 2002) and most of the studies on ABC adoption and implementation have used this technique (See for example Shields and McEwen, 1996; Gosselin, 1997; Krumwiede, 1998; Brown, et al., 2004, Alsayed, 2005). Sarantakos (1998) explains why the questionnaire is the most commonly used instrument for collecting data in social research:

- Questionnaires are less expensive than other methods.
- They produce quick results.
- Questionnaires can be completed at the respondent's convenience.
- They offer greater assurance of anonymity.
- They help to avoid bias or errors caused by the presence or attitudes of the interviewer.
- Questionnaires are a stable, consistent, and uniform measure, without variation.
- They offer a considered and objective view on the issue.
- The use of the questionnaires promises a wider coverage.
- They are not affected by problems of non-contact.

Nevertheless, data collection by questionnaire also has limitations. Firstly, it is not flexible; once the administration phase is under way, it is impossible to backtrack. In addition, collecting data by questionnaire also exposes the researcher to the bias of the person making the statements (Thietart, et al., 2001). Moreover, one important limitation of this research method is the lack of direct contact with the phenomenon being researched and the respondent (Innes and Mitchell, 1997). Therefore, in order to minimise these limitations for this study, face to face interviews preceded the questionnaire to refine the questionnaire and e-mail and phone interviews were carried out to check the reliability of the survey results and to seek further clarifications of some of the responses. In addition, the design of this phase of the study's research method was developed and based mainly on the tailored design recommended by Dillman, (2000) in his book "Mail and Internet Surveys, The Tailored Design Method". It was necessary to look for a dependable method to ensure that a good response rate could be achieved. Dillman (2000) sees responding to a questionnaire as social exchange. "People are seen as more likely to complete and return self-administrated questionnaires, if they trust that the rewards of doing so will, in the long run, outweigh the costs they expect to incur" (Dillman, 2000, p.26).

The Tailored Design Method aims to reduce survey error by creating respondent trust and a perception of increased rewards and reduced costs for being a respondent, taking into account features of the survey situation. According to Dillman (2000), this method has been shown to improve response rates to mail survey questionnaires. The method provides guidelines in relation to the format and style of questions, techniques to personalise the survey, and distribution of the surveys. Designing the questionnaire and implementation process according to Dillman's method results in both benefits and costs and also conveys a message of trust that make respondents more likely to respond. This method is mainly based on designing a user friendly questionnaire for potential respondents, having up to five contacts, using stamped addressed envelopes, personalized correspondence, and providing financial/non-financial incentives.

6.1.2.1 Research population and sample boundaries

Oppenheim (1992) states that the term population is defined as all those individuals, companies or cases who fall into the category of concern. The population of this research is defined as all medium and large manufacturing strategic business units (SBU) in the UK that have at least one CIMA member with at least 5 years experience. The justifications for selecting this category of organisations are as follows:

1. Only medium and large organisations are considered in the population of this study, while small companies are excluded. The reason for this is that it is more likely that organisation with larger size will adopt new innovations (Brown, et al.,

2004). Moreover, medium and large firms, employing more than 200 employees, are expected to have sophisticated and well designed management control systems and to employ a clearly articulated business strategy. Small firms are likely to rely more on informal systems and strategies (Gosselin, 1997; Brown, et al., 2004).

2. Consistent with the recommendations to control for certain variables like industry segments, technology and/or size to ensure greater validity for the findings of empirical research, it was decided to include only companies operating in the manufacturing industry. Therefore companies in non-manufacturing industry are excluded from the population. The rationale behind this decision is based on the argument that manufacturing companies may design their management control systems differently from non-manufacturing industries (Fisher, 1995; Drury, 2000). Sampling based only on the manufacturing industry ensures some homogeneity in the type of business operations and provides comparability with earlier research that has focused mainly on manufacturing industry (e.g., Anderson, 1995; Gosselin, 1997; Drury and Tayles, 1994; Krumwiede, 1998). This view is recommended for organisational innovativeness studies as primary determinants *of innovation diffusion* (e.g. innovator characteristics, organisational networks, environmental characteristics) have greater homogeneity within, than across, organisational types so mixing organisational contexts might confound research results (Damanpour, 1991; Wolfe, 1994). Finally, most of the factors that have been studied here are production-related.

3. In order to maintain comparability with previous research, which has indicated that the decision to adopt ABC is made at the strategic business unit (SBU) rather than company-wide level (Gosselin, 1997; Booth and Giacobbe, 1998; Krumwiede, 1998; Brown, et al., 2004), the unit of analysis in the present study is the SBU. Moreover, this study focused on business units, since more than one cost accounting system may exist in large companies (Drury and Tayles, 2005).

4. Because of the specialist nature of the survey, it was necessary to ensure that those completing the questionnaire were qualified to do so. The aim was to select those respondents who were likely to have specialist knowledge relating to the information requested within the questionnaire. Supported by the results of the interviews conducted in the previous phase, CIMA qualified members are believed to be the most appropriate respondents. It was important to ensure that the respondents are most likely to be informed about ABT implementation in their SBU, therefore only SBUs that employed CIMA members with at least 5 years experience were considered. If more than one CIMA member worked for the same SBU, the financial controller was considered as the most appropriate respondent and therefore selected. Financial controllers could be considered as information managers, who generally work across organisational boundaries, in contact with a cross-section of the company's members, and can provide the necessary technical and organisational details required for the present study (Krumwiede, 1998; Brown, et al., 2004).

6.1.2.2 Research sample and sampling frame

Having defined the research population, and the criteria to be used to select a representative sample, it was necessary to identify the sampling frame, which is a complete list of all cases in the population identified for this study (de Vaus, 2007; Saunders, et al., 2007). According to Saunders, et al., (2007) and de Vaus, (2007), the sample frame should be complete, relevant, accurate, up to date, unbiased and of course accessible.

The CIMA database was identified as the most appropriate sample frame for this study as it is the most relevant database in terms of its appropriateness to the population characteristics and the research objectives. The CIMA database contains details of all CIMA members inside and outside the UK with details about their job-titles, their companies' name and address, the size of each company, and their experience. In terms of completeness and accuracy, according to the Financial Reporting Council in its 2007 report "Key Facts and Trends in the Accountancy Profession", CIMA has over 60,000 members worldwide. Almost 20% of them are based outside UK and ROI. Very few CIMA members were employed in public practice at the end of 2006. In early 2007, 70% of CIMA members were employed in industry and commerce. The database is updated constantly by telephone (through the CIMA contact centre) and CIMA has provided the possibility for members to update their details on the database on-line. This database was accessible to the researcher, as he succeeded in obtaining CIMA support for this study via the institute's Seedcorn

Scheme. As the Scheme was new, it took 6-7 months to obtain the required information from the database.

Some rather laborious procedures were followed to filter CIMA data base to obtain the population of this study (See Figure 6-3). The database was filtered according to five steps, as follows: Non-manufacturing companies were excluded resulting in 7,657 business units employing 35,633 CIMA members (Associates, Fellows and Part-qualifieds). Companies that only employ Part-qualifieds were excluded resulting in 5,305 business units employ 20,095 at least one CIMA member (Associate or Fellow). These companies were filtered for their size. All companies with less than 200 employees were excluded resulting in 3,307 business units with 4,814 CIMA members. Further filtering was taken using the post-qualification experience of the CIMA members. All companies that do not have at least one CIMA member with at least 5 years post-qualification experience were then excluded. This resulted in 1,753 different business units with 3,260 members.

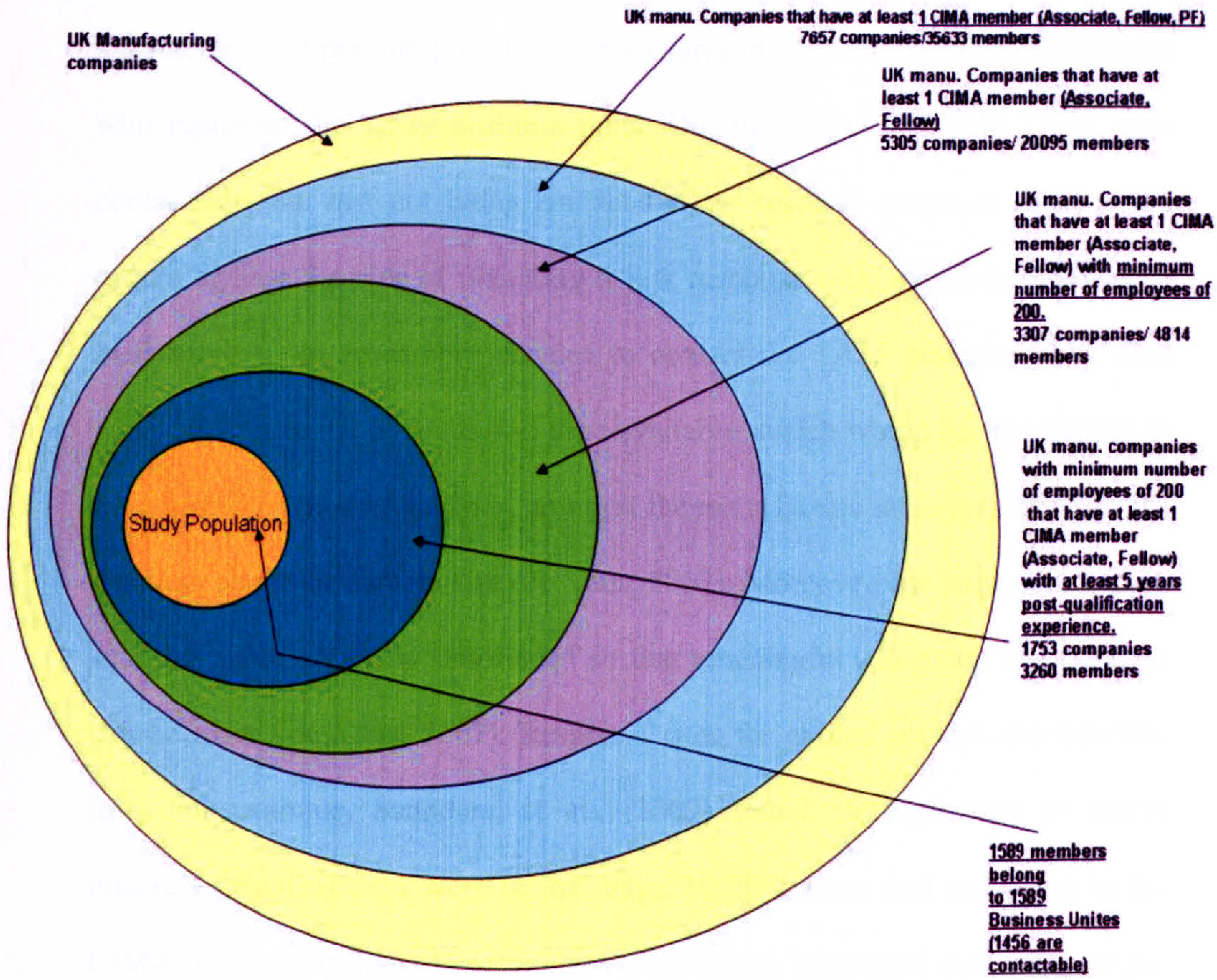

Figure 6-3 The study's population.

The 1,753 business unit's details were examined to ensure that they represent different business units despite some common ownership. This examination involved checking the post code of business units that belonged to the same company. This process reduced the number of business units to 1,589 distinct business units. Finally as the majority of these business units have more than one CIMA member, the objective in this stage of filtering was to identify the one CIMA member who would represent the strategic business unit. The priority was given to the job title in this selection. Priority was to select CIMA members who have the responsibility of Finance Controller within their job title, or secondly of

Finance Director/manager. If there were no members with the above titles available, the priority was given to the post-qualification experience with consideration of that job title. These procedures identified 1,589 CIMA members who represent the 1,589 business units. Out of these 1,589 only 1,456 were contactable, the rest not being contactable for research purposes. To try and ensure against the risk of obtaining a low response rate, which is common in mail surveys, the researcher decided to contact the 1,456 business units. This was viable in terms of funds and time available, which would be, in addition to the planned method of analysis, amongst the main factors to be considered when deciding about the sample size (de Vaus, 2007). Moreover, the larger the sample size, the more it can be subdivided so that meaningful sub-group comparisons can be made (de Vaus, 2007). Response rates for mailed surveys are typically low. For example, Saunders, et al., (2007) found response rates to recent business postal surveys were in the range 10-20 percent and according to the CIMA data management department, recent CIMA sponsored surveys have got response rates as low as 6%[29]. The method used in this study aimed to ensure that a viable number of responses would be received.

6.1.2.3 Survey Implementation

"The questionnaire is only one element of a well-done survey" (Dillman, 2000, p.149). According to Dillman (2000), the implementation process of the survey has much greater influence on response rates. This study followed Dillman's tailored method in administrating the survey. In 1978 Dillman (1978) developed

[29] CIMA surveys have recently achieved a very low response rates. For example, a survey of a new management accounting innovation has received 6 % response rate in 2007.

a general method of implementation, known as the Total Design, which is known to achieve high response rates. Since then, he expanded this design and re-named it "The Tailored Design". According to Dillman (2000), in the design of mail surveys, questionnaire design is only one element of survey implementation. He argues that several attributes related to the communication process like using multiple contacts, the contents of letters, appearance of envelopes, incentives, personalization, and sponsorship "have significantly greater collective capabilities for influencing response rates than does questionnaire design." (Dillman, 2000, p.149). The Tailored Design was followed in this study in order to ensure that an acceptable response rate could be achieved.

The Tailored Design consists of five elements including:

- a respondent-friendly questionnaire,
- up to five contacts with the questionnaire recipient,
- inclusion of stamped return envelopes with real first-class stamps,
- personalized correspondence, and
- a token financial incentive that is sent with the survey request.

This method should be refined for specific situations (Dillman, 2000). The rest of this chapter is devoted to showing how these five elements were applied in this study's survey.

6.1.2.3.1 Questionnaire construction and pre-testing

Improving response rate and reducing or avoiding measurement error could be considered the main objectives of questionnaire design (Dillman, 2000). The Tailored Design aims at producing a respondent-friendly questionnaire which is easy and clear to understand, has relevant question order, comprehensible, and has a "user-friendly" layout design. The design features should be used to improve rewards by making the questionnaire appear interesting and important, to reduce costs by making the questionnaire easy to manipulate and complete and to encourage trust by giving attention to detail that makes the questionnaire look and seem important (Dillman, 2000).

6.1.2.3.1.1 Questionnaire's format

Certain questionnaire formats should be avoided. Examples include unusual folds or shapes, printing pages in a landscape orientation and printing on both sides of sheets of paper with a staple (Dillman, 2000). Such kinds of formats increase the time and the effort that a respondent needs to answer a questionnaire because of the time that will be needed to work out how to handle the material. Dillman's experiments related to questionnaire format showed that the vertical book or booklet, with pages taller than they are wide, is the most appropriate format for most western cultures. That is for two main reasons: familiarity and ease. Booklet format is the standard reading format for western people so they are familiar with it and handle it automatically. Booklets are also easy to set up and print compared with other, especially unusual, formats (Dillman, 2000). Therefore a booklet format was adopted for this study questionnaire. This study's questionnaire was a ten-page questionnaire printed as a booklet consisted of three A3 sheets of high quality paper, folded in the middle and stapled to form a booklet. It was printed on both sides of the page in full colour to use less paper and make the questionnaire appear shorter and more professional which would motivate respondents to participate.

6.1.2.3.1.2 Questions types and order

Three different ways are available to structure a survey question, the open-ended and close-ended with either ordered or unordered response categories. (de Vaus, 2007; Dillman, 2000). An open ended question is one for which respondents formulate their own answers, while a close-ended or forced-choice question is one in which a number of alternative answers are provided for respondents to choose from (de Vaus, 2007). According to de Vaus, (2007, p.100) "There is no right or wrong approach" it depends on respondent motivation to participate, method of administration, type of respondents and type of question content. Well developed forced-choice questions are recommended when a self-administrated questionnaire is long or people's motivation to answer is not high. That is because this type of questions is quick to answer and, in addition, it does not discriminate against less talkative and less articulate respondents. Moreover, from a researcher's point of view this type of questions is easier to code and misclassification is less likely compared with open-ended questions (de Vaus, 2007).

In this research, the main type of question used in constructing the questionnaire was the forced-choice type. In addition, a few open questions in the form of others (please specify)" or "please describe" were used in questions 1, 24 and at the back cover of the questionnaire to give respondents the opportunity to express their views on specific questions or to add additional insights or comments. Also open questions were used in questions 12, 17, 18, 20 in order to obtain specific and short answers about the business unit type of operations, number of hierarchical levels, cost structure and ERP system details. Open questions were also used in questions 26-29 for personal details of the respondent. This is consistent with Saunders, et al.'s (2007) recommendation to use open questions in circumstances where questions require short and specific answers or the list of all possible answers is so large that is impractical to put a check box response for each one.

Forced-choice questions could be used in questions of six types: list, category, ranking, rating, quantity and grid (Saunders, et al., 2007). Due to the comprehensiveness of the questionnaire, and the complexity of research variables, three types of closed questions were used in the questionnaire. Category questions are designed so that each respondent's answer can fit only one category. These questions are useful when collecting data about behaviour or attributes (i.e., about respondent's, or their organisation's, practices or characteristics) (Saunders, et al., 2007). This type of question was used in section A of the questionnaire in questions 2,3,4,5 where the respondents were asked to indicate whether or not they faced certain pressures to change their costing/cost management systems, and in question 7 where the respondents were given fifteen statements and asked to select the one that represented their organisations' current stage in ABT implementation. Also it was used in section B question 13, where respondents were asked to select one statement of three that describe different organisational strategy styles and in question 20 where respondents were asked to classify their business unit as an ERP user or non-user. Finally, category questions were used in the last section of the questionnaire in questions 25 and 29 which are concerned with respondent's location in the organisation structure, respondent approval to be contacted for further information and request for research results respectively.

The second type of closed questions used in this research was quantity questions which are numbers that give the amount of a characteristic (Saunders, et al., 2007). Questions 10, 11 and 18 in section B; and 27, 28 in section D are quantity questions asking about business unit size, cost structure and working experience of the respondent respectively.

The main type of closed questions used in this questionnaire was rating questions. Rating questions include a list of alternatives that range from not much of a particular attribute or opinion to a great deal of that same attribute or opinion (Saunders, et al., 2007). Rating scales are structured in different ways including: Likert scales, Horizontal rating scales, Semantic differential and Vertical rating ladder (de Vaus, 2007). Rating scales are often used in terms of a Likert scale in which respondents indicate how strongly they agree or disagree with a statement or series of statements by ticking a box or number (Saunders, et al., 2007). Likert scale questions could be presented as a single item question or as a set of questions arranged in a grid format (de Vaus, 2007). The grid format has the advantage of listing different statements that do not require much space and are quicker for respondents to complete and for researchers to code (de Vaus, 2007). This type of question was used throughout this questionnaire to measure the main research variables including institutional pressures, ABT attributes, importance of cost information, diversity of manufacturing operations, and organisational structure. Following Dillman's (2000) recommendations, both positive and negative statements were included for the rating questions (e.g. questions 14.1, 14.2) to ensure that the respondents read each statement carefully and thought about which number to tick. Semantic differential scales were also used in questions 14, 22, 24 to measure the different organisational culture values, competition intensity and external/internal communication respectively. This form of scale involves selecting two words or phrases to represent two ends of a continuum and respondents are asked to mark their choices usually on a seven-point scale (de Vaus, 2007).

Finally, although the length of scales is a debatable issue, seven-point scales were used throughout the questionnaire. This decision was based on two reasons. First, seven point scales seem to be preferable to either shorter or longer scales (Alwin and Kronick, 1991). Shorter scales do not give the respondents enough options and tend to make them either give a random answer or go to the middle alternative. So having longer scales is claimed to be more reliable because they reduce random guessing (Alwin and Kronick, 1991), and more points on a scale provide an opportunity for greater sensitivity of measurement (Roberts,1999). However, very long scales, with more than seven points, have the problem of ambiguity in the meanings of the scale points which is likely to increase measurement errors (Alwin and Kronick, 1991). Second, most previous ABC studies that used questionnaires have used seven point scales (e.g. Krumwiede, 1998; Clarke, et al., 1999; Brown, et al., 2004; Baird, et al., 2004).

In addition, consistent with the argument that attaching verbal labels would increase the reliability of the measurement as it helps in clarifying the meanings of the scale's points (Alwin and Kronick, 1991), scales used in this study were labelled throughout the questionnaire. This would provide more information and help respondents to develop and hold the same frame of reference as they complete the questionnaire (Emory and Tooper, 1991).

Ordering the questions is vital because question order has a significant influence on the overall survey success (Dillman, 2000). According to Dillman (2000), questions should be grouped by topic following certain criteria. Question topics and questions should be grouped from most relevant to least relevant, in relation to what the respondent has been told in the cover letter. To do so, this study's questionnaire was divided into four sections; each section focusing on one main topic. The first section contained questions related to the title of the survey itself "Management Accounting Innovations" and this is what would be expected by the respondent. Nine questions were asked to measure the level of management accounting innovativeness of the business unit and to gain details of its experience with ABT and related factors. Choosing the first question is a crucial decision to make when designing a self administrated questionnaire (Dillman, 2000). It is very likely "to determine whether that questionnaire is destined for a mailbox or the garbage" (Dillman, 2000, p.92). Therefore, the first question was designed and chosen to be applicable to all respondents, easy, interesting and connected to the survey purpose. It asked the respondents to indicate the extent to which their business units use a number of different management accounting innovations. A list of fifteen techniques was provided and their definitions were given in a separate sheet.

The second section was titled: "About your business unit" and contained eleven questions covering all the variables related to the business unit like size, software used, structure and culture. The third section was titled "About the external environment" and contained two questions about perceived environment uncertainty and competition intensity. Finally the last section, "About yourself" was designed to collect information about the respondent and his/her level of communication with CIMA and other possible resources of management accounting awareness.

6.1.2.3.1.3 Questionnaire's pages

Dillman (2000) argues that a successful self-administrated questionnaire should achieve the goal of a common stimulus for all respondents. To do so, using computer capabilities, the navigational path for reading all the information presented on each page of the questionnaire should be defined, visual navigational guides should be created to assist respondents in adhering to the prescribed navigational path and correctly interpreting the written information and finally, additional visual navigational guides should be developed to redirect respondents if needed (Dillman, 2000). Dillman, (2000) has provided a detailed list of principles which are essential to implement the above steps.These principles were carefully followed in designing this study's questionnaire.

6.1.2.3.1.4 Questionnaire's cover pages

Although the impact of having cover pages on the response rate is debatable, front and back covers were designed and used in this study. There is no clear cut conclusion regarding the effects of questionnaire cover pages on response rate (Dillman, 2000). However, Dillman (2000, p.137) does recommend having them "for reasons of practicality and the need for a place to convey critical information".

6.1.2.3.1.4.1 The front cover

The front cover is used to make the questionnaire distinguishable and should be designed in a way that creates a positive first impression that encourages respondents to go further (Dillman, 2000). Following Dillman's principles, the front cover was designed by using simple and neutral graphical design. This would make the questionnaire memorable and retrievable at the time of follow up. Above the graphical design a short and simple title was included "Management Accounting Innovations Survey". This title is used as a means to identify the questionnaire in any correspondence with the respondent. Finally, in order to foster trust that the survey is legitimate and useful and being sent from a well-known and legitimate source, the front cover had the logos of University of

Bristol (top) and CIMA (bottom) with a statement assuring the confidentiality of the information collected.

6.1.2.3.1.4.2 The Back cover

Consistent with Tailored Design Method recommendations, the back cover was simple. It consisted of an invitation to make additional comments, a thank you, the name and address of the researcher, with a plenty of white space to be used by the respondents if they wish to give any comments or suggestions[30].

6.1.2.3.1.5 Pre-testing

Although the questionnaire was subject to very thorough discussions and revisions between the researcher and his supervisor to ensure that the final version was adequate, the researcher also decided to follow pre-testing procedures. After all of the questions had been written and ordered, pre-testing of the questionnaire was undertaken. The version of the questionnaire that was pre-tested was fifteen-pages long, printed as a booklet consisted of five A3 sheets of high quality paper, folded in the middle and stapled to form the booklet. This version of the questionnaire contained more sections and questions. The extra five pages, which were removed after the pre-testing, contained questions about the detailed features of any claimed ABT system and questions that aimed to identify the reasons behind not considering or abandoning ABT. Six directing boxes were used to direct respondents towards the questions that they should answer based on their answer to a previous question that determined their stage

[30] 13 respondents did use this space.

of using ABT (question 7). The definitions of the management accounting techniques were presented at the last two pages of the questionnaire.

Consistent with the Tailored Design Method recommendations, pre-testing was planned to go through four stages: review by knowledgeable experts, interviews with persons who are similar to the respondents in the targeted sample, a small pilot study, a final check.

The first stage of pre-testing was conducted with seven academics: three professors and four lecturers in different subjects including accounting, organisation theory, management and sociology at the University of Bristol, Manchester Business School and Essex University. Three of these academics have publications related to ABT. A letter describing the purpose of the research and containing a table of all the variables used was sent alongside the questionnaire to all the academics. Useful comments were received from this group including suggestions for changes of the wording and scales of some questions. For instance, one professor commented on question number two in section A relating to the existence of compelling need for change. He suggested that the duration that the question covers be reduced from ten years to two years as he thought that "Surely most are likely to say yes". This was considered in the final version of the questionnaire. Another professor suggested that the phrase "please answer if relevant" be added to question number eight. This question asked for different dates related to ABT implementation process but not all respondents might need to answer. The phrase was added in the final version. All the academics contacted commented on the length of the questionnaire. For example, a professor commented that: "such a long questionnaire does run the risk of getting only a very low response rate". These comments made the researcher consider shortening the questionnaire considerably. Other comments were merely related to stylistic issues and a few typographical errors. In general, the comments indicated that there were no significant problems with the questionnaire and that it was consistent with the objectives of the research. Moreover, some encouraging comments were received regarding the professional design of the questionnaire.

The questionnaire was then sent to all the professionals who have participated in the first phase of the research, the exploratory interviews. They were asked to provide their comments and whether it was possible to spare some time to discuss these comments. Three out of five agreed to help in this stage of pre-testing and the others apologised due to lack of time. Two of them returned the questionnaires with their comments and the third participant was prepared to be interviewed to discuss the questionnaire. Two main comments came from the first two professionals. The first one suggested that question number seven "ABT stages" was "a bit confusing" and the second comment was a suggestion to have the definitions of management accounting techniques, presented in question number one, on a separate sheet to make it easier for the respondent to read while answering the first question if needed. In addition, one of these two participants commented on the length of the questionnaire and suggested that it should be shortened.

At this stage of pre-testing a decision was taken to split the questionnaire. The main questionnaire became ten pages only, by leaving only those questions that all respondents should answer, avoiding directing boxes and making the questionnaire simpler (See Appendix 5). A short questionnaire was also designed to be sent to SBUs that have an ABT system seeking more details of the system[31]. Although there is a widespread view that long questionnaires should be avoided (Dillman, 2000), there is little research to support this assumption (Bogen, 1996 cited in de Vaus, 2007, p.112). As we "do not know the thresholds at which length on its own affects response rates", (de Vaus, 2007, p.112) advice regarding questionnaire length is that a questionnaire should not be "longer than is really necessary but not to be obsessed with length". De Vaus, (2007) argues that the length would become a relatively unimportant factor in determining response rate if all other aspects of survey design were carefully accomplished in a way that ensures that they minimise the respondents' burden.

An appointment was then arranged with the third professional who is a CIMA member and a financial controller of a large UK aerospace company. The aim of this meeting was twofold, to obtain feedback from persons similar to the respondents in the targeted sample, and to ask for evaluation of the shorter questionnaire. This meeting lasted about two hours and the researcher went through the questionnaire's questions one by one with the participant and thoroughly discussed the content of the questionnaire and the administration of the survey. Significant benefits and comments were obtained from this meeting

[31] This short questionnaire consisted of fourteen questions printed on two A4 sheets (double sided) and stapled together with a front cover identical to the front cover of the main questionnaire. This short questionnaire was sent to ABT adopters and users. Due to time shortage and word limits of this thesis the researcher decided to concentrate this thesis on ABT adoption decision and the analysis of the short questionnaire will be presented in another piece of work.

and the researcher concluded that no significant changes were required in terms of the wording and order of the questions. The following are some of the comments made during the meeting:

- The questions were clear and understandable and the layout and structure of the questionnaire was excellent.
- The participant was impressed with the questionnaire's professional look.
- The questionnaire took a long time to be completed, but the shorter version is reasonable.
- It was advised that sending a questionnaire by CIMA e-mail should be avoided.
- The selected time to send the questionnaire is "perfect".
- CIMA members should have sufficient knowledge for answering all the questions in the survey. This provided some assurance regarding the appropriateness of respondents to answer this survey.

The researcher has compared the answers provided in the questionnaire of this respondent with the notes that have been taken from the semi-structured interview with the same participant was conducted seven month earlier. This comparison showed that this instrument was able to catch what was happening in that business unit in terms of ABT implementation stage and different factors affecting this implementation.

The third stage of the pre-testing was a small pilot study. The researcher planned to conduct a small pilot study that targeted 50-100 CIMA members. This endeavour was cancelled as the researcher was now convinced that the questionnaire, which had been subject to different pre-testing stages and revisions prior to reaching its final state, in its present state was suitable for the main survey and that an additional pilot survey would not provide any significant improvements. This is also consistent with Dillman (1978, p.158) argument that "if the other pre-tests have been done adequately, a pre-test survey probably provides very little additional insights into questionnaire defects." Moreover, lack of enough resources, mainly time, was a factor in this decision. This is because previous pre-testing procedures consumed a very long time. The planned date to send the pre-notice letter (the first contact planned in this survey implementation) was fixed as the 15th of October 2007 and the interview with the financial controller was on the 2nd of October. There was only enough time to update the final copy of the questionnaire and prepare it for printing.

Finally, the finished version of the questionnaire was ready for the last pre-testing procedure. A group of three PhDs and two MSc students were asked to read through the questionnaire completely. Consistent with Dillman's, (2000) recommendation, these students had nothing to do with the development or revision of the questionnaire and related material. The PhDs specialised in economics, finance and sociology and the MSc students in law and finance. The feedback obtained from this group resulted in no changes in the questionnaire. Also they commented on the clear presentation and layout of the questionnaire.

6.1.2.3.2 Multiple contacts with the questionnaire recipient

The Tailored Design method requires up to five contacts with the questionnaire recipient. This is because there is evidence that shows that multiple contacts do increase response rates (Dillman, 2000). With these multiple contacts repetition should be avoided, in an effort to increase their effectiveness with non-respondents. Tailored Design provides a general system of five contacts as a reference point which includes: a pre-notice letter, a questionnaire mailing that includes a cover letter, a thank you postcard, a replacement questionnaire and a final contact (Dillman, 2000). This system was refined to consider CIMA conditions regarding contacting CIMA members and because of limited resources. Four contacts only were possible for this study: Pre-notice letter, The Questionnaire mail-out, Thank you/remainder by e-mail, Thank you/remainder by post.

6.1.2.3.2.1 Pre-notice letter

A pre-notice letter, on CIMA stationery and signed by the CIMA Research and Development Department, explained the importance of the study and was sent on the 15th of October 2007. Consistent with Dillman's (2000) recommendations, this letter was brief, personalized, positively worded, aimed at building anticipation and sent by first-class mail (pre-paid white Royal Mail envelopes). The letter is presented in Appendix 3.

6.1.2.3.2.2 The questionnaire mail-out

On the 22nd of October the questionnaire was sent to the study population by first class mail. October was recommended by interview participants and some researchers in the same field as a good mail-out date considering financial year dates and avoidance of holiday dates in the UK. This mailing contained a covering letter, the questionnaire, management accounting techniques' definition sheet and a return envelope. Both the main envelope and return envelope had Bristol University franking. Consistent with the recommendations mainly suggested in Dillman (2000, pp.158-164), the covering letter was written on a single white page with CIMA and University of Bristol official letterheads. The first paragraph started by reminding the respondent of the CIMA invitation to participate in the pre-notice letter followed by providing information about the aim of the study and its importance to respondents' organisations. It was considered necessary to begin the letter with such information in order to establish in the respondents' mind that the study is important and to encourage them to read the rest of the letter.

The second paragraph was devoted to emphasising the importance of their participation in the study and how it was essential to its success, to let them know why and how they were selected and to assure them that their answers would only be used for academic purposes and would be treated as "strictly confidential". An offer to send a report of the study findings was provided in this paragraph as an incentive to participation.

The third paragraph consisted of a thank-you statement, mentioned the enclosure of a stamped return envelope and an invitation to contact the researcher or his supervisor with any enquiries. Full address with phone numbers and e-mails were provided at the end of the letter. To personalize the letter, names of respondents with their appropriate salutations were used instead of "Dear CIMA member" and the signature of the researcher and his supervisor was printed in colour that contrasted with the black type (See Appendix 4).

6.1.2.3.2.3 Additional contacts

It was necessary to have extra contacts as the main mail-out was preceded by a postal strike so in order to ensure that the entire sample received a copy of the questionnaire additional contacts were used. These contacts served both as a thank-you to those who had responded and as a friendly and courteous reminder to those who had not. The first additional contact was an e-mail sent to the participants by CIMA directly two weeks after the main mail-out. This e-mail was followed, after ten days, by a reminder letter by first class post to all respondents who did not reply by that time. The e-mail and letter reminder offered alternatives to the respondent. Respondents were given the choice of either contacting the researcher to send them another copy by post or to enter to an electronic version of the questionnaire on the Bristol University website[32] or to download a printable version of the questionnaire to be sent back to the researcher address (See Appendix 6).

6.1.2.3.3 Response profile

The data collection continued till the middle of December. Figure 6-4 shows the distribution of replies over the eight weeks of the data collection. The impact of the reminder letter is observable. Most of the responses were received by post. Within about four weeks of mailing the main survey, 127 responses had been received.

[32] The electronic version of the questionnaire was designed by expert CIMA personnel.

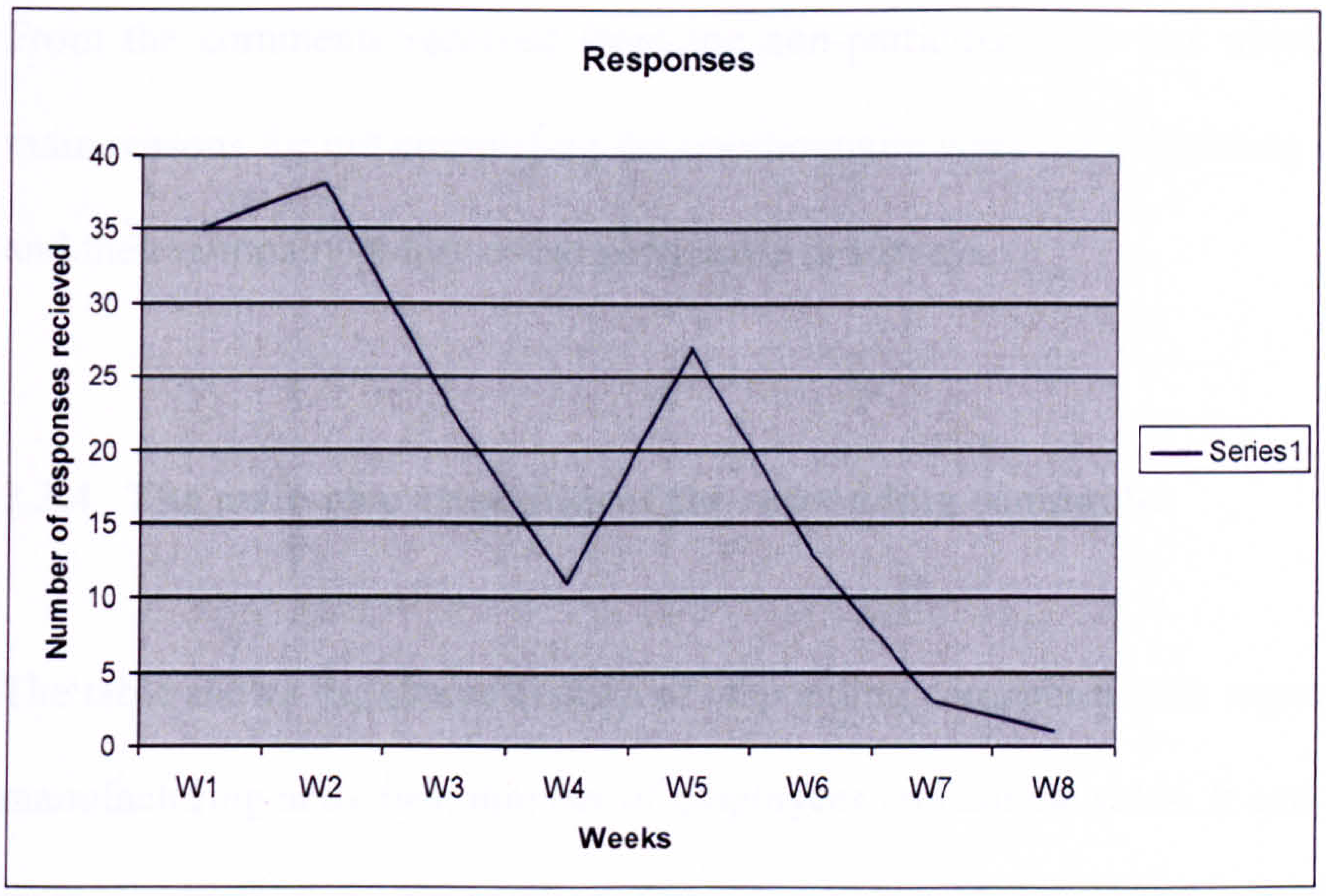

Figure 6-4 Responses' distribution

This included 107 useable questionnaires and 20 returned either not completed or completed by respondents operating in non-manufacturing companies. As a result of the reminders another 70 responses were received including 45 usable questionnaires and 25 unusable questionnaires, raising the total usable responses to 152 and the final response rate to 11%[33]. The composition of the survey responses is shown in Table 6-3.

Table 6-3 Survey response profile

	Main Survey	Follow up		Total
	Post	Post	Web	
Useable Response	107	33	12	152
Non-existent/Unreachable	133	17	0	150
Ineligible/non-manufacturing	5	3	0	8
Refusals/Apology/Decline participation	14	0	6	20
Total	259	53	18	330
Total response rate	%16	%3	%1	%21
Usable response rate	%7	%2	%1	%11
Total number of questionnaires mailed out : 1456 questionnaires				

[33] Response rate =Total response / (Total in sample - unreachable - ineligible).

From the comments received from the non-participants, it was noted that the main reasons for not completing the questionnaire were the unyielding workload and their company policy not to participate in surveys.

6.1.2.3.4 The main characteristics of the responding companies

The table shows the characteristics of responding companies with regard to their manufacturing activities, number of employees and annual sales. It can be noted from Table that the responding firms cover a wide range of manufacturing activities including food and drinks, industrial machinery, chemicals and pharmaceuticals, electronics, motor vehicles and engineering products, paper, steel and fabricated metal and aerospace and defence equipment. No one industry is dominant or exceeds 14% of the total sample. The mean number of employees was 842 and mean annual sales was £131 million. Thus, these profiles indicate that the respondents are suitable and represent a sample that serves the purpose of this study.

6.1.2.3.5 Characteristics of responding executives

Table 6-4 shows the characteristics of respondents with regard to their job title, location at the organisational level, years in current position and working experience.

Table 6-4 Key characteristics of the responding firms

1. Manufacturing activity/industry	Frequency	Percent
Aerospace, Aircraft and defence Manufacturing	4	3
Manufacture of food products and beverages	21	14
Manufacture of tobacco products	1	1
Manufacture of textiles	3	2
Manufacture of wearing apparel; dressing and dyeing of fur	3	2
Tanning and dressing of leather; manufacture of luggage…	2	1
Manufacture of wood and of products of wood and cork, except	6	4
Manufacture of pulp, paper and paper products; publishing an	6	4
Publishing, printing and reproduction of recorded media	5	3
Manufacture of coke, refined petroleum products and nuclear	4	3
Manufacture of chemicals and chemical products	17	11
Manufacture of rubber and plastic products	9	6
Manufacture of other non-metallic mineral products	1	1
Manufacture of basic metals	3	2
Manufacture of fabricated metal products, except machinery a	10	7
Manufacture of machinery and equipment not elsewhere classified	14	9
Manufacture of office machinery and computers	3	2
Manufacture of electrical machinery and apparatus not elsewhere	6	4
Manufacture of radio, television and communication equipment	4	3
Manufacture of medical, precision and optical instruments, w	11	7
Manufacture of motor vehicles, trailers and semi-trailers	3	2
Manufacture of other transport equipment	4	3
Manufacture of furniture; manufacturing not elsewhere classified	4	3
Other products including glass, bricks, toys...	8	5
Total	152	100
2. Size/ Annual Sales (Mean =£131 million)	Frequency	Percent
Less than 20 mil	21	13.82
20-40	28	18.42
40-60	33	21.71
60-100	31	20.39
100-500	35	23.03
more than 500	4	2.63
Total	152	100
3. Size/Number of Employees (Mean 842 employees)	Frequency	Percent
less than 200	34	22.37
200-600	75	49.34
600-1000	17	11.18
1000-2000	17	11.18
2000-4000	5	3.29
More than 4000	4	2.63
Total	152	100

It can be noted from the characteristics listed in the Table 6-5 that the respondents occupied senior positions in their firms and 80% were located at the operating units/SBUs or divisional level. In addition, they were highly experienced in their profession with a mean number of years of working experience of over 24 years, and in their current positions for over 6 years.

Table 6-5 Key characteristics of responding executives

1. Respondent job title	Frequency	Percent
Director of Finance	42	28
Finance manager	25	16
Financial controller	39	26
Management accountant	12	8
Financial officer	5	3
Business analysts/controller	4	3
Cost accountant	2	1
Other, including general manager, commercial manager	23	15
, plant manager, production accountant, accountant		
Total	152	100
2. Location at organisational level	Frequency	Percent
at group head office	17	11
at divisional head office	29	19
at an operating unit	92	61
no group structure	14	9
Total	152	100
3. Experience in current position Mean 6.25	Frequency	Percent
2 years or less	45	30
3 to 5 years	38	25
6 to 10 years	44	29
11 to 15 years	14	9
16 years and more	10	7
Not responded to	1	1
Total	152	100
4. Work Experience Mean 24.5	Frequency	Percent
6 to 10 years	5	3
11 to 15 years	13	9
16 to 20 years	36	24
21 to 25 years	32	21
More than 26 years	66	43
Total	152	100

This provides sufficient evidence that the respondents were more than adequately knowledgeable about their companies and able to provide reliable responses to the questionnaire items.

6.1.3 Ex post interviews

To check the reliability of the survey results and seek further explanation of some of the responses a number of e-mail interviews were conducted. Mainly, these interviews were used in responses where the answer to question 1 regarding ABT extent of use did not match the answer to question 7 regarding the stage of implementation. Table 6-6 gives the details of these cases and the correction action taken in the light of the interviews.

Table 6-6 Cases contacted for ex post interviews

Case ID	Answer to Q7	Answer to Q1[34]	Correction Action	
			Q7	Q1
1254	No serious consideration	5	Ad hoc use	-
910	No serious consideration	4	-	1
809	No serious consideration	4	Ad hoc use	-
384	No serious consideration	4	Ad hoc use	-
236	No serious consideration	5	Ad hoc use	-
140	No serious consideration	5	Ad hoc use	-
76	No serious consideration	4	Ad hoc use	-

In one of these seven cases (910) the respondent misinterpreted the scale and circled score number 4 to give a neutral answer instead of circling point 1 to

[34] Higher values indicate later stages of implementation.

indicate no use of ABT at all. Thus a correction was made to the question 1 answer. In the rest of these cases ABT is in use on an ad hoc basis. Respondents of these six cases misread question seven and used the option of "no serious consideration" to indicate ad hoc use of ABT. One of the respondents commented: "I would say we are dipping our toe into ABT more by luck than judgment". Therefore the correction action was to change these response answers to add hoc use of ABT.

6.2 Check of non-response bias

As noted in previous paragraphs, the profiles of the responding companies indicate that the respondents were suitable and represent a sample that serves the purpose of this study. Regardless of this discovery, further steps were taken to ensure that the findings of the survey are generalisable by identifying whether the data obtained from the respondents was representative of the targeted population. The generalisabilty of the survey findings is impaired if respondents' characteristics are systematically different from non-respondents (Saunders, et al., 2007). According to Kervin (1992, p.419) non-response bias exists "when cases with certain characteristics are more likely to be refusals or non contacts." Therefore, responses for participants and non-participants were compared using Chi-square and Mann-Whitney U non-parametric tests in terms of industry type and the number of years of being CIMA member[35]. These statistical tests were also used to determine whether there was a significant difference between the two groups of respondents (early and late respondents) in respect of the characteristics of industry type, number of employees and annual sales. There

[35] Industry type and number of years of being CIMA members were the only complete information about the non-respondents which was available from the CIMA database. Information about the size of the business unit was not adequately complete.

was no evidence of non-response bias. The results of these tests are reported in the tables below. The results show no significant differences between the participants and non-participants in the terms of industry type and number of years of being a CIMA member. Also no significant differences between 'early' and 'late' respondents regarding industry type, number of employees and annual sales were found. The results therefore suggest that non-response bias does not apply and that the findings of this survey can be generalised within the boundary of this research population.

Table 6-7 Chi-square test comparing industry type in early and late respondents

Industry Type		Response: Non-respondent	Response: respondent	Total
Aerospace, Aircraft and defence Manufacturing	Count	32	4	36
	Expected Count	32.2	3.8	36
Other products including glass, bricks, toys...	Count	65	8	73
	Expected Count	65.4	7.6	73
Extraction/Manufacturing of coke, refined petroleum products and others.	Count	62	4	66
	Expected Count	59.1	6.9	66
Manufacture of food, beverages and tobacco products	Count	192	22	214
	Expected Count	191.7	22.3	214
Manufacture of textile, wearing apparel; and leather products	Count	62	8	70
	Expected Count	62.7	7.3	70
Manufacture of wood and paper products.	Count	54	12	66
	Expected Count	59.1	6.9	66
Manufacture of electrical machinery, radio, TV and communication equipments.	Count	77	10	87
	Expected Count	77.9	9.1	87
Manufacture of motor vehicles, trailers and other transport equipment.	Count	122	7	129
	Expected Count	115.5	13.5	129
Publishing, printing and reproduction of recorded media	Count	93	5	98
	Expected Count	87.8	10.2	98
Manufacture of chemicals and chemical products	Count	110	17	127
	Expected Count	113.7	13.3	127
Manufacture of rubber and plastic products	Count	65	9	74
	Expected Count	66.3	7.7	74
Manufacture of other non-metallic mineral products	Count	17	1	18
	Expected Count	16.1	1.9	18
Manufacture of basic metals	Count	53	3	56
	Expected Count	50.2	5.8	56
Manufacture of fabricated metal products, except machinery a	Count	64	10	74
	Expected Count	66.3	7.7	74
Manufacture of machinery and equipment not elsewhere classified	Count	83	14	97
	Expected Count	86.9	10.1	97
Manufacture of office machinery and computers	Count	59	3	62
	Expected Count	55.5	6.5	62
Manufacture of medical, precision and optical instruments, w	Count	58	11	69
	Expected Count	61.8	7.2	69
Manufacture of furniture; manufacturing not elsewhere classified	Count	29	4	33
	Expected Count	29.6	3.4	33
Unknown/No answer	Count	7	0	7
	Expected Count	6.3	0.7	7
	Count	1304	152	1456
	Expected Count	1304	152	1456

Table 6-8 Chi-Square test statistics

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.313(a)	18	.179
Likelihood Ratio	25.112	18	.122
Linear-by-Linear Association	.044	1	.834
N of Valid Cases	1456		

a. 4 cells (10.5%) have expected count less than 5. The minimum expected count is .73.

Ranks

Table 6-9 Mann- Whitney test comparing years of membership in respondents and non-respondents/ Ranks

	Response	N	Mean Rank	
Years as a member	Non-respondent	1304	722.25	941814.00
	respondent	152	782.12	118882.00
	Total	1456		

Table 6-10 Test statistics (a)

	Years as a member
Mann-Whitney U	90954.000
Wilcoxon W	941814.000
Z	-1.661
Asymp. Sig. (2-tailed)	.097

a) Grouping Variable: Response

Table 6-11 Mann- Whitney test comparing size in early and late respondents/ Ranks

	Returning TIME	N	Mean Rank	Sum of Ranks
Annual Sales Turnover	before reminders	107	74.81	8004.50
	after reminders	45	80.52	3623.50
	Total	152		
Number of employees	before reminders	107	76.19	8152.00
	after reminders	45	77.24	3476.00
	Total	152		

Table 6-12 Test statistics (a)

	Sales	Number of employees
Mann-Whitney U	2226.500	2374.000
Wilcoxon W	8004.500	8152.000
Z	-.731	-.135
Asymp. Sig. (2-tailed)	.465	.892

a) Grouping Variable: Response time

6.3 Statistical method used for data analysis

Binary logistic regression was used to analyse the collected data. This technique was used to answer this study's main research question: What factors predict the adoption of ABT? The aim is to predict ABT adoption/non-adoption from the several predictor variables identified in previous chapters: "institutional push pressures", "need pull circumstances", "environmental conditions", "organisational characteristics", and "perceived characteristics of ABT"[36].

6.3.1 Logistic regression: An overview

The goal of any model-building technique is "to find the best fitting and most parsimonious, yet biologically[37] reasonable model to describe the relationship between an outcome (dependent or response) variable and a set of independent (predictor or explanatory) variables" Hosmer and Lemeshow (2000, p.1). Logistic regression was chosen over linear (Ordinary Least Square) regression[38] mainly because of the nature of the dependent variable. The conceptualisation of the ABT adoption path decision process used in this study, resulted in a dependent variable with a binary (dichotomous) nature (ABT adoption: No/Yes, coded 0/1). Unlike linear regression where the dependent variable is assumed to be continuous; logistic regression fits this type of dependent variable (Hosmer and Lemeshow 2000; Field, 2005). Logistic regression can be considered as a

[36] Previous ABC innovation studies have used logistic regression as the main analysis tool (for example, Gosselin 1997; Krumwiede, 1998; Brown, et al, 2004).

[37] One would expect the same criteria to apply in non-biological settings.

[38] Both Probit regression and Discriminate analysis could be an option for analysing this study's data. Probit analysis will produce results similar to logistic regression and the choice of probit versus logit regression depends largely on individual preferences (UCLA, 2008). Discriminant analysis usually will have more power than logistic regression as well as yield a quicker solution when all assumptions of OLS regression are met, such as multivariate normality and equal variance-covariance matrices (Garson, 2009)

replacement for OLS regression when the equation to be estimated has a binary dependent variable. "Over the last decade the logistic regression model has become, in many fields, the standard method in this situation" Hosmer and Lemeshow (2000, p.1). It is customary to code a binary dependent variable either 0 or 1. For example, the gender of a person could be coded as Male=1, Female=0. Coding like this has the following implications (Pampel, 2000):

- The *mean* of the distribution is equal to the *proportion* of 1s in the distribution. For example if there are 100 people in the distribution and 20 of them are coded 1, then the mean of the distribution is .20, which is the proportion of 1s.

- The mean of the distribution is also the *probability* of drawing a person labelled as 1 at random from the distribution. That is, if a person was taken randomly from the sample of 100 described above, the probability that the person will be a 1 is .20. Therefore, *proportion* and *probability* of 1 are the same in such cases.

- When the data is plotted, instead of having a cloud of points (where a line through the middle of it would minimize the sum of squared deviations), two parallel sets of points would emerge where fitting a straight line is inappropriate.

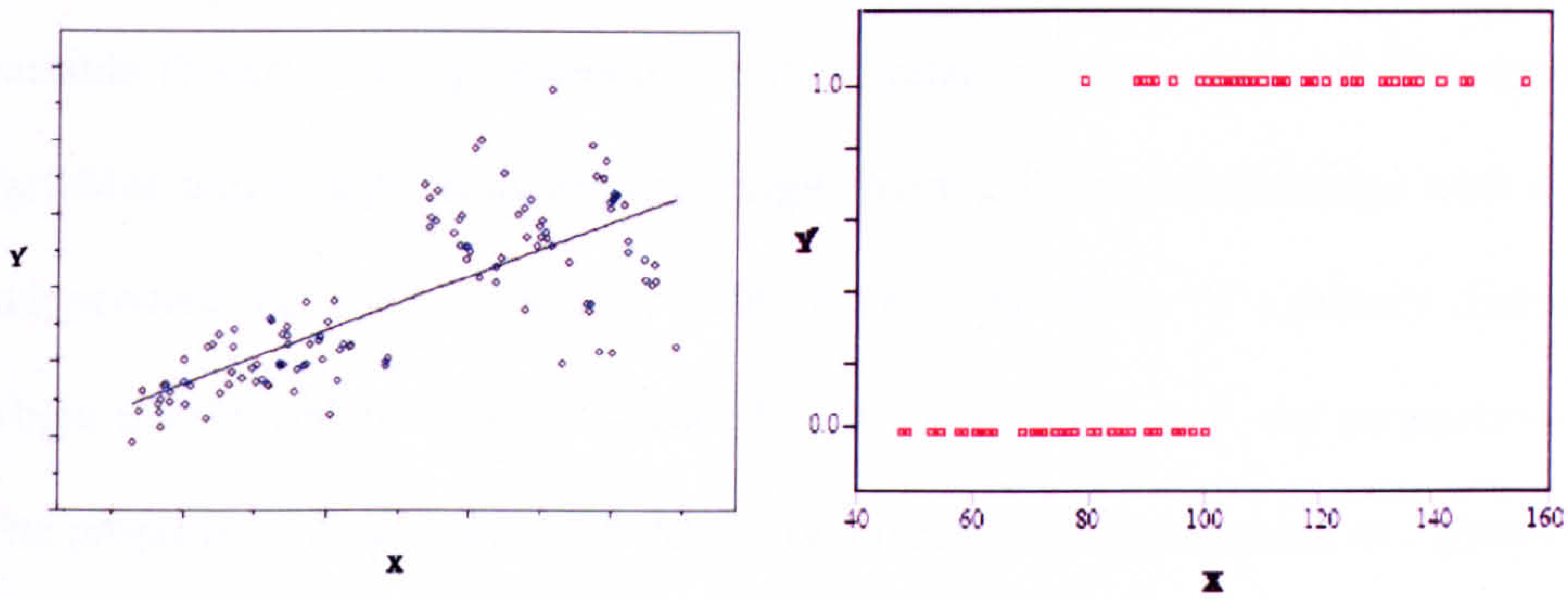

Figure 6-5 OLS regression vs. Logistic regression

With linear regression we predict an outcome Y (measured at the interval or ratio level) using one or more predictor variables (X's) also measured at the interval or ratio level. The relationship between Y and X's is a linear relationship. But this would not hold when the dependent variable is binary. According to Pampel, (2000), using OLS regression with a binary dependent variable would face both conceptual and statistical problems. In short[39], the conceptual problem with OLS regression with a binary dependent variable emerges from the fact that probabilities have maximum and minimum values of 1 and 0. Yet, OLS regression often results in values of the dependent variable taking values of less than zero or greater than one when X values move far enough on the X-axis. Such values are theoretically inadmissible (Pampel, 2000). The statistical problem stems from the fact that regression with a binary dependent variable violates the assumption of normality (that errors of prediction (Y-Y') are normally distributed) and homoscedasticity (the variance of Y is constant across values of X) of OLS regression (Pampel, 2000).

[39] For a detailed explanation of these problems see Pampel, 2000 pp:3-10.

To overcome the above conceptual and statistical problems a mathematical concept, logit transformation, was utilised. Logit transformation transforms a dependent variable (binary) having inherent nonlinear relationships with a set of independent variables into a dependent variable (logit) having linear relationships with a set of independent variables" (Pampel, 2000, p.18). The mean of a binary distribution where the dependent variable is coded as 0/1 is denoted as P, the proportion of 1s. The proportion of zeros is (1-P). As the two parallel lines presented in Figure 6-5 are difficult to describe with an ordinary OLS regression equation, one may instead use the mean of the dependent variable (P) in the regression model. The resultant plot is a sigmoidal or S-shaped curve, See Figure 6-6.

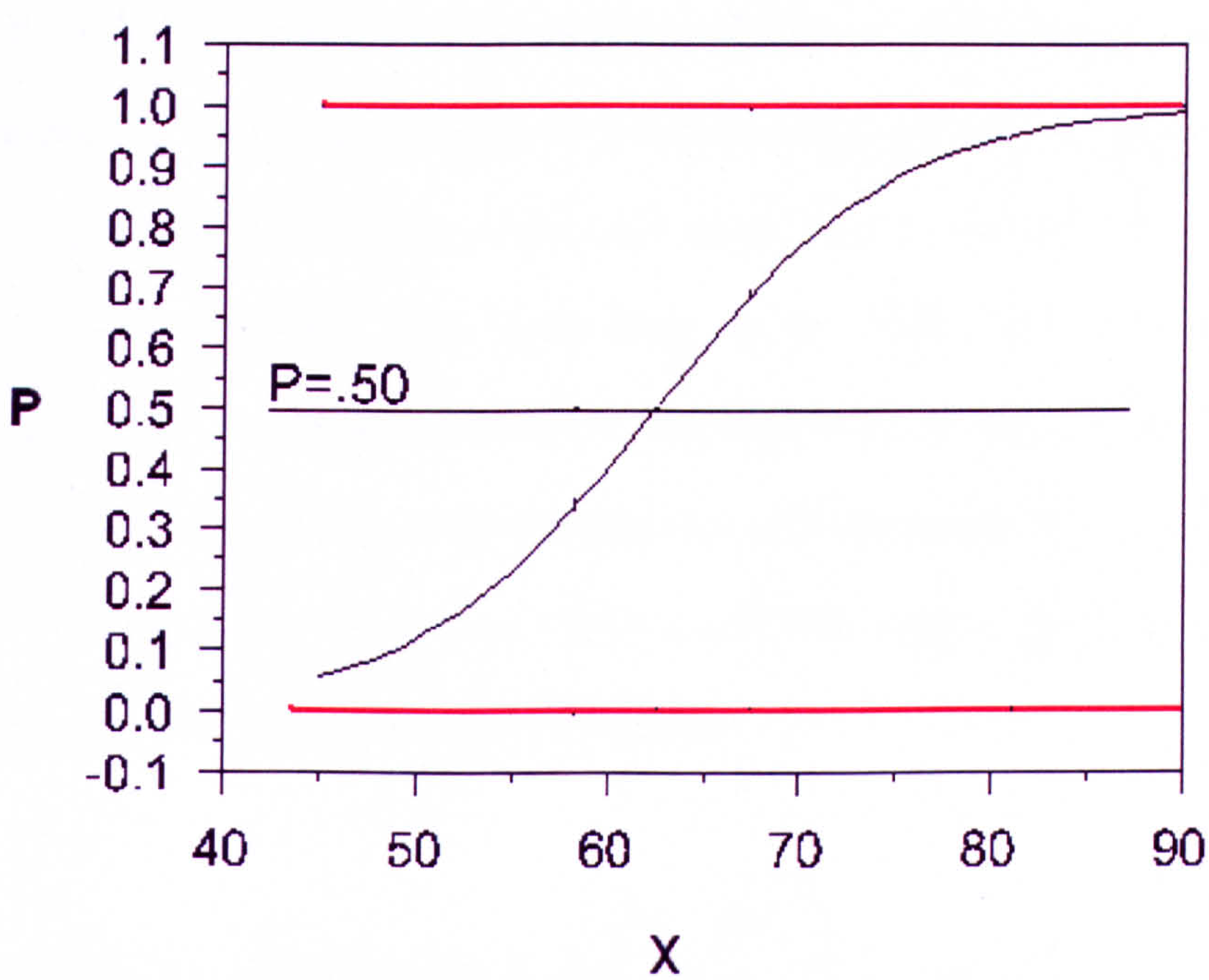

Figure 6-6 The Logistic curve

This S-shaped curve is called the logistic curve and can be described by the following equation:

$$P = \frac{e^{a+bX}}{1+e^{a+bX}} \quad (1)$$

or

$$P = \frac{1}{1+e^{-(a+bX)}} \quad (2)$$

P is the probability of a 1 (the proportion of 1s, the mean of Y), *e* is the base of the natural logarithm (2.718) and *a* and *b* are the parameters of the model. The value of *a* yields P when X is zero, and *b* adjusts how quickly the probability changes in response to changing X by a single unit. Because the relation between X and P is nonlinear, *b* does not have a straightforward interpretation in this model as it does in ordinary linear regression. To present this nonlinear relationship between the probabilities of Y and its predictors X in a linear way, logistic regression models estimate the linear determinates of the logit rather than the nonlinear determinates of probabilities (Pampel, 2000, p.18; Peng, et al., 2002). In essence, logistic regression predicts the logit of Y from X. The logit is the natural logarithm (ln) of odds of Y, and odds are ratio of probabilities (p) of Y happening to probabilities (1-p) of Y not happening (Peng, et al., 2002, p.4)[40]. The logistic model fitted in the univariate analysis has a general form as follows:

$$\log(\text{odds}) = \text{logit}(P) = \ln\left(\frac{P}{1-P}\right) = a + bX \quad (3)$$

[40] Logit transformation involves two steps: transforming probabilities into odds which eliminates the ceiling of 1 and taking the natural log of the odds which eliminates the floor of 0 (Pampel, 2000).

The direction of the relationship between X and the logit of Y is determined by the value of the coefficient b. When b is greater than zero, larger (or smaller) *X* values are associated with larger (or smaller) logits of *Y*. Conversely, if b is less than zero, larger (or smaller) *X* values are associated with smaller (or larger) logits of *Y*. Extending the logic of the simple logistic regression to multiple predictors (say X1, X2) one can construct a complex logistic regression for Y as follows:

$$\log(\text{odds}) = \text{logit}(P) = \ln\left(\frac{P}{1-P}\right) = a + b_1X_1 + b_2X_2 \qquad (4)$$

Where p is the probability of the event, α is the *Y* intercept, bs are regression coefficients, and *X*s are a set of predictors. The maximum likelihood (ML) method is typically used to estimate a and *b*s (Peng, et al., 2002; Field, 2005). "The ML method is designed to maximize the likelihood of reproducing the data given the parameter estimates" (Peng, et al., 2002, p.5)[41].

"The null hypothesis underlying the overall model states that all *b*s equal zero. A rejection of this null hypothesis implies that at least one *b* does not equal zero in the population, which means that the logistic regression equation predicts the probability of the outcome better than the mean of the dependent variable Y. The interpretation of results is rendered using the odds ratio for both categorical and continuous predictors." (Peng, et al., 2002, p.5)

[41] According to Hosmer & Lemeshow (2000), there are two other methods: noniterative weighted least squares and discriminate function analysis. However, the maximum likelihood (ML) method is used in the major software packages which include SPSS. For more details about these methods see Hosmer & Lemeshow (2000) pp 21-23.

According to Pallant (2005), logistic regression allows assessment of how well the set of predictors predict or explain the binary dependent variable. It gives an indication of the adequacy of the model by assessing the 'goodness of fit'. It provides an indication of the relative importance of each predictor variable, or the interaction among the predictor variables. It provides a summary of the accuracy of the classification of the cases based on the model, allowing the calculation of the sensitivity and specificity of the model.

6.3.2 Evaluation of logistic regression model

Scholars have suggested a series of procedures to be used in order to evaluate the effectiveness of logistic regression models expressed in Equation 4. In this section four main procedures are described and they were used to evaluate the final logistic regression model of this study.

6.3.2.1 Overall model evaluation

"A logistic model is said to provide a better fit to the data if it demonstrates an improvement over the intercept-only model (also called the null model)" (Peng, et al., 2002, p.5). An intercept-only model in logistic regression contains no predictors and assumes that all observations would be predicted to belong to the largest outcome (Peng, et al., 2002; Field, 2005). An improvement in prediction over this baseline is examined by using an inferential statistical test called the likelihood ratio[42]. The likelihood ratio is the chi-square difference or the improvement in the log likelihood of the final model relative to the null model (Pampel, 2000). The likelihood ratio can be computed as follow (Field, 2005):

$$\chi 2 = 2[\text{LL (New)} - \text{LL (Baseline)}]$$

In other words, it is the result of comparing the baseline log likelihood with the model log likelihood (Pampel, 2000; Field, 2005). LL (Baseline) represents the likelihood of producing the observed data with parameters for the independent variables equalling zero while LL (New) represents the likelihood of producing the observed data with the estimated parameters for the independent variables (Pampel, 2000). The larger the likelihood ratio, the larger the improvement in the model due to the predictors (Pampel, 2000).

6.3.2.2 Statistical tests for individual predictors

The statistical significance of individual regression coefficients (i.e., *b*s) is tested using the Wald chi-square statistic (Peng, et al., 2002; Field, 2005). "Like the t-test in linear regression, the Wald statistic tells us whether the b-coefficient for the predictor is significantly different from zero" (Field, 2005, p.224). Predictors that have coefficients significantly different from zero can be assumed to make a significant contribution to the prediction of the dependent variable (Field, 2005). The test of the intercept merely suggests whether an intercept should be included in the model (Peng, et al., 2002).

[42] Two other techniques could be used: score, and Wald tests, however SPSS uses the likelihood ratio test.

6.3.2.3 Goodness-of-fit statistics

Goodness-of-fit statistics are used to assess the fit of a logistic model against actual outcomes. One inferential test and two descriptive measures are used to assess logistic regression models (Peng, et al., 2002; Pallant, 2005; Field, 2005). The inferential goodness-of-fit test is the Hosmer–Lemeshow (H–L) test. "The H–L statistic is a Pearson chi-square statistic, calculated from a 2 × g table of observed and estimated expected frequencies, where g is the number of groups formed from the estimated probabilities. Ideally, each group should have an equal number of observations, the number of groups should exceed 5, and expected frequencies should be at least 5" (Peng, et al., 2002, p.6).

Additional descriptive measures of goodness-of-fit are two R^2 indices. These indices have been suggested by Cox and Snell (1989) and Nagelkerke (1991) as an attempt to create an equivalent measure to the R^2 concept defined for the OLS regression model (Peng, et al., 2002; Field, 2005). None, however, delivers the meaning of variance explained (Long, 1997, pp. 104–109 cited in Peng, et al., 2002), corresponds to predictive efficiency or can be tested in an inferential framework (Menard, 2000). "For these reasons, a researcher can treat these two R^2 indices as supplementary to other, more useful evaluative indices, such as the overall evaluation of the model, tests of individual regression coefficients, and the goodness- of-fit test statistic." (Peng, et al., 2002, p.6).

6.3.2.4 Evaluate the predictive accuracy of the model

The final model can be evaluated for extent to which it is able to predict the correct category for each case and, by comparing with the baseline model, how much improvement has accrued as a result of including the predictor variables (Pampel, 2000; Pallant, 2005). Moreover, additional statistics can be used to evaluate predictive accuracy: the sensitivity, specificity and the positive predictive value of the model (Pallant, 2005). The sensitivity of the model is the percentage of the group that has the characteristic of interest that has been accurately identified by the model (Pallant, 2005, p.168). While the specificity of the model is the percentage of the group without the characteristic of interest that is correctly identified (Pallant, 2005, p.168). The positive predictive value is the percentage of cases that the model classifies as having the characteristic that is actually observed in this group (Pallant, 2005, p.168).

6.3.3 Interpreting logistic regression coefficients

There are different ways to interpret the effects of the independent variables in logistic regression. These include interpreting the effects for probabilities, odds, and logged odds (logit) (Pampel, 2000)[43]. "Logistic regression coefficients provide a simple linear and additive summary of the influence of a variable on the logged odds of having a characteristic or experiencing an event, but lack an intuitively meaningful scale of interpretation of change in the dependent variable." (Pampel, 2000, p.39). The recommended way is the interpretation of the effects of the

[43] Other ways are also exist. For a thorough preview of these ways see Pampel, (2000) pp 18-39.

independent variables on the odds (Pampel, 2000, p.19). That is because the effects on the odds, as opposed to probabilities and logit, have a more intuitive appeal and can express effects in single coefficient (Pampel, 2000). Therefore, this study adopts this method of interpreting the coefficients in the final model. The logistic regression coefficients are transformed so the independent variables affect the odds rather than the logged odds of the dependent variable (Pampel, 2000). This transformation is based on raising e to the coefficient b as presented below:

$$\ln(p/1-p) = a + b1x1 + b2x2$$
$$e^{\ln(p/1-p)} = e^{a+b1x1+b2x2}$$
$$p/1-p = e^{a} * e^{b1x1} * e^{b2x2}$$

This transformation allows interpretation of the resulting coefficient in terms of multiplicative odds or percentage. In terms of a formula, the exponentiated coefficient minus 1 and times 100 gives the percentage increase or decrease in the odds due to a one-unit change in the independent variable (Pampel, 2000, p.23)

$$\%\Delta = (e^{b} - 1) * 100$$

For example, if the exponentiated coefficient for X is 1.14, that indicates that a 1 unit increase in X multiplies or increase the odds of Y by a factor of 1.14. Using the above equation the odds of Y increase by 14% for an increase of 1 unit of X.

6.3.4 Logistic regression analysis' assumptions

There are three assumptions should be considered when using logistic regression: sample size, multicollinearity and outliers (Pallant, 2005). Sample size should be adequate to provide sufficient number of cases in both categories of the dependent variable (Hosmer and Lemeshow, 2000). The literature has not offered specific rules applicable to logistic regression (Peng, et al., 2002). However, it is recommended by multivariate statistics scholars to have a minimum Observation-to-Predictor ratio of 10 to 1, with a minimum sample size of 100 or 50 (Peng, et al., 2002). The main symptom of inadequate sample size is having very high parameter estimates (logistic coefficients) and, in the extreme, it may be impossible to converge on a solution (Garson, 2009). This assumption is particularly important when having categorical variables with limited cases in each category (Pallant, 2005). In this case it is recommended to combine categories or deleting these variable altogether (Garson, 2009).

Regarding multicollinearity, Logistic regression assumes the absence of perfect/high multicollinearity (Pallant, 2005; Garson, 2009). Although high inter-correlation among predictors does not change the estimates of the logistic regression coefficients, it causes the standard errors of the logit coefficients to be inflated and, therefore, change coefficients' reliability (Garson, 2009). To test for this condition in SPSS, collinearity diagnostics procedure can be applied. Having "tolerance values" of the "collinearity statistics" for each independent variable greater than 0.1 is an indication of the absence of multicollinearity (Pallant, 2005). Finally, if there is a problem with the goodness of fit of the logistic regression model, it is very important to identify any outlying cases and explore them and consider removing them or modeling them separately (Pallant, 2005; Garson , 2009).

6.3.5 The logistic regression analysis strategy of this study[44]

STATA 8.2 (2003) and SPSS for windows (version 14) software was used to perform the analysis[45]. All variables used in the analysis have been z-transformed[46] (except dichotomous and categorical predictors). A three-stage logistic regression analysis strategy was employed to examine associations between ABT adoption and five blocks of predictors: "institutional push pressures", "need pull factors", "environment attributes", "innovator attributes", and "perceived attributes of using ABT".

Firstly, a series of univariable logistic regression analyses was conducted to predict ABT adoption. In the second stage, variables identified in step 1 as being significant predictors of adoption were entered into further logistic regression analyses within their blocks. This Within Block analysis identified those variables within each group that are significantly predicting ABT adoption after controlling for the other significant variables within each block. Finally, variables identified from each separate block as significant independent predictors of adoption were regressed in one model. This global analysis resulted in the final model that contains those variables that are significant predictors of ABT adoption.

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[44] This strategy is adopted from a previous study conducted in the sociology discipline. See Samara, (2008).
[45] The analysis was performed using the two software packages separately. Results were almost identical. Using SPSS was laborious.
[46] The deviation from the mean in standard deviation (SD) units ($Z = (x - \xi) / SD$). The mean of a distribution of standardised scores is always 0, and the SD is always 1. This transformation makes the interpretation of the results easier and makes comparison between different scales possible (Samarah, 2008).

In the multivariable analyses (steps 2 and 3), reduced models were identified to allow the maximum amount of data when estimating effect sizes. This was achieved via a backwards elimination process from the initial model of all candidate variables. Following this stage, excluded variables were then tested for re-entry. This allowed a final check on the effect of variables, particularly those excluded at an early stage. Odds ratios and p-values for non-significant variables were estimated by temporarily adding them to the final models. The p value for acceptance into the model was set at 0.10; variables with higher p value were excluded from the following analysis.

6.4 Summary

This chapter provides the research design and data analysis strategy of this study. A mixed-method research is adopted by using qualitative and quantitative data collection techniques and analysis procedures in a sequential mode without combining them. The main research method was by questionnaire survey, where data were collected by mail and online questionnaire of a sample of business units from all medium and large manufacturing companies in the UK, that have at least one CIMA member with at least 5 years membership; with the questionnaire design and distribution based on Dillman's "Tailored Design Method". This survey was preceded by interviews with financial directors from five industries and followed by e-mail interviews seeking further explanation of some of the responses. Logistic regression was adopted to analyse the collected data. Chapter 7 provide an assessment of the validity, reliability and replicability of the results of this research.

CHAPTER 7 RESEARCH VALIDITY AND RELIABILITY

Chapter six presented the research design data collection strategy. In addition, the main statistical analysis approach used in this study was outlined and clarified. Before presenting the main results of this research, this chapter is devoted to the assessment of the validity, reliability and replicability of this work. According to Bryman and Bell (2007), reliability, replicability and validity are the most prominent criteria for the evaluation of business and management research. In this chapter the current study is evaluated for each element of these criteria.

7.1 Validity

In general, "validity is concerned with the integrity of the conclusions that are generated from a piece of research" (Bryman and Bell, 2007, p.41). Three key types of validity are typically distinguished: external, internal and construct/measurement validity (Bryman and Bell, 2007, Modell, 2005; Saunders, et al., 2007).

7.1.1 External validity (Generalizability)

External validity is concerned with the generalizability of the results of a study beyond the specific research context (Bryman and Bell, 2007). In the context of external validity, having a representative sample is always considered a key issue in quantitative/survey research (Bryman and Bell, 2007). In this study, the issues related to external validity were carefully addressed during the process of identifying the targeted population and the sample frame (See section 6.1.2.1 and 6.1.2.2). The whole selected population was contacted and non-response bias tests were implemented. The results suggest that non-response bias does not apply and that the findings of this survey can be generalised within the boundaries of the research population (see section 6.2 for full details).

7.1.2 Internal validity

"The internal validity of a specific study refers to the credibility of the causal relationships between independent and dependent variables inferred from data." (Modell, 2005, p.236). Internal validity is concerned with possible risks in assumed relationships such as spuriousness (Bryman and Bell, 2007). High internal validity can be accomplished by using well-established theoretical frameworks, however a validity threat may still emerge as a result of the causal model being under- or mis-specified (Modell, 2005). To minimize this threat to internal validity, this study used a very comprehensive theoretical framework that contains an extensive set of independent variables. The relationship between these variables and innovation adoption is well established theoretically.

7.1.3 Measurement/construct validity

"Construct validity refers to whether theoretical concepts are adequately reflected by the operational definitions and measures of empirical phenomena." (Modell, 2005, p.237). The level of construct validity depends on the meticulousness of the research design (Birnberg, et al., 1990 cited in Modell, 2005). Construct validity is typically considered to be more problematic in survey research due to the need for abstraction inherent in such research (Modell, 2005). Different types of validity should be considered when a new measure is developed. These include: face, concurrent, predictive, convergent, criterion and content validity (Bryman and Bell, 2007; de Vaus, 2007; Saunders, et al., 2007). This study used measurement instruments which are adequately developed in prior research and their validity has been tested; the main focus in the current study was to ensure the face and content validity. This was done by following Modell's, (2005) recommendation of complementing the development of measurement instruments with qualitative elements. Therefore feedback from practitioners as well as expert researchers who are familiar with the research issues was a vital part of pre-testing procedures employed in this study (see section 6.1.2.3.1.5).

7.2 Replicability and Reliability

Another criterion of research is replicability. Replicability refers to whether a study is capable of replication (Bryman and Bell, 2007). In order to facilitate the replication of a study, researchers are expected to spell out their procedures in great detail (Bryman and Bell, 2007). Therefore a clear and detailed description of the research strategy was presented in previous chapters in order to facilitate the replication of the findings of the study. The replicability criterion is very close to another criterion of research, reliability. "Reliability is concerned with the question of whether the results of a study are repeatable." (Bryman and Bell, 2007, p.40). To have repeatable results, a reliable measurement of theoretical concepts is required (de Vaus, 2007). At its core, reliability is concerned with issues of consistency of measures of concepts (Bryman and Bell, 2007). A measure is considered to be reliable if it is stable over time and its indicators are consistent when the measure is a scale or index (Bryman and Bell, 2007). These characteristics of measurement reliability can be tested by a number of well established methods (de Vaus, 2007). In the following sections these methods are presented and evaluated. In addition, an assessment of the reliability of the measures used in this study is given based on the suggested methods of assessment.

7.2.1 Test-retest

According to de Vaus, (2007), in the case of a single question measure, the 'test-retest' method is the only way to check the reliability of that measure. This method requires asking the same respondents the same questions separately twice and measuring the correlation between the answers (Hussey and Hussey, 1997). A reliable question is one that has a high correlation coefficient (de Vaus, 2007). However, this method was criticised and generally considered as impractical (de Vaus, 2007, Hussey and Hussey, 1997). This is due to the fact that it is often difficult to get respondents to answer the same question twice and there is always the risk that respondents either remember their previous answer or think deeply about the questions on the second occasion and consequently give different answers in the latter case or identical ones in the former (de Vaus, 2007, Hussey and Hussey, 1997). Due to the above limitations of the method, respondents are mainly reluctant to answer the same questions twice, and due to limited resources (especially time), this study has used a modified version of this approach to test the reliability of certain questions. Basically, during the pre-testing stage of this research (see section 6.1.2.3.1.5.) the reliability of single question measures in the questionnaire was tested by comparing the answers of the same Financial Controller who participated in both the semi-structured interviews and answering/commenting on the final version of the questionnaire. This comparison showed that the instrument was able to reflect what was happening in that business unit in terms of ABT implementation stage and different factors affecting implementation. This included measures related to questions 1,2,3,4,5,6,7,8,10,11,12,13,17,18,20,23,25-28. Some answers did slightly change for some questions, due the fact that the time interval was quite long, seven months. For example, in question number 2, where the answer of the respondent was changed to indicate that his business unit now faced a compelling need that might lead to a significant change in the cost management system.

7.2.2 Alternative form approach

Another approach to test for reliability is based on using 'check questions' (Mitchell, 1996 cited in Saunders, et al., 2007). Reliability with the questionnaire can be assessed by comparing responses to alternative forms of the same question i.e. comparing the responses of a question and its check question(s) (Saunders, et al., 2007). This approach should be rarely used and with caution (Saunders, et al., 2007). That is because it is often difficult to ensure that the alternative forms are substantially equivalent, and that there is the risk that respondents can spot these questions and use deliberately the same answer they gave to the first one. In addition, over-use of this approach would lengthen the questionnaire and consequently might reduce the response rate (Saunders, et al., 2007). Therefore, this approach was only used once in the survey instrument, particularly to check the reliability of respondents' answers to question 7 which was concerned with their stage of ABT. The answer to question 7 was compared with their answer to the first question of the questionnaire that asks them about the extent to which they are using management accounting innovations including ABT. The cross-checking of questions 1 and 7 was especially important because these questions provide the dependent varilabe in the study (see also section 7.3.1)

7.2.3 Internal consistency

In order to increase reliability de Vaus, (2007, p.53) suggests that "the best way to create reliable indicators is to use multiple-item indicators". Multiple indicators increase reliability because using a number of questions for the same concept minimises the effect of poorly worded questions (de Vaus, 2007). Moreover, using multiple-item indicators helps to recognise the complexity of the concept, increases the construct validity and enables greater precision (de Vaus, 2007; Bryman and Bell, 2007; Babbie, 2001). The reliability of multi-indicator scales is assessed by testing the consistency of a respondent's answer on a scale item compared with all the other items in the scale, in other words, testing the scale's item-item correlation (de Vaus, 2007; Bryman and Bell, 2007; Babbie, 2001). Cronbach's alpha is the most common test of internal reliability (de Vaus, 2007; Bryman and Bell, 2007) and ranges between 0 and 1. According to de Vaus (2007), Bryman and Bell (2007) and Babbie (2001), alpha should be at least 0.70, as a rule of thumb, to consider a scale reliable. However, Hair, et al., (1998) suggested that the minimum acceptable level is 0.60, which is above the minimum of 0.50 suggested by Nunnally (1978). In this study multiple-item measures were adopted as the main measurement approach. Cronbach's alpha was used to check their internal reliability and levels of 0.50-0.60 are considered as the minimal levels of acceptable reliability. All multiple-item measures in this study went through the item selection procedures that normally precede Cronbach's alpha test. The steps suggested by de Vaus (2007, p.184) are:

1- Testing for inter-correlation by obtaining a correlation matrix of the items of the multiple-item indicator. This matrix provides correlations of each item with each other item in the scale. "Items that belong together in a scale will normally have at least modest correlations with other items in the scale" de Vaus, (2007, p.184). Therefore any item that does not correlate or negatively correlates with other items has to be eliminated from the scale (Babbie, 2001). Moreover, if two items showed perfect correlation (greater than 0.9) with each other, then one of them should be eliminated in order to avoid singularity i.e. having two items measuring the same idea (Field, 2005; Babbie, 2001).

2- Test for unidimensionality: "A unidimensional scale is one in which each item measures the same underlying concept" (de Vaus, 2007, p.184). Item-to-scale coefficient is normally used to test the fit between an item and the rest of the scale (Pallant, 2005). As a rule of thumb, an item with a coefficient less than 0.3 should be eliminated from the scale (de Vaus, 2007; Pallant, 2005).

3- Examining Cronbach's alpha value, if an item is deleted. If the elimination of an item improves the value of Cronbach's alpha, removing that item should be considered (Pallant, 2005).

In addition to the above, constructs that were improved, developed or altered from previous research went through more procedures, as necessary, to insure the validity and reliability of these measures. The rest of this chapter presents the sources and the development of this study's questions and reliability tests for the multiple-item measures.

7.3 Measurement of the variables

Objective data were used for size, business sector, vertical differentiation and cost structure. Size was measured using the annual sales turnover (£ million) for respondents' business units (Q11). Respondents were asked to specify the type of business/industry that their business units engaged with (Q12). In Q17, which was adopted from Gosselin (1997), respondents were asked to specify the total number of hierarchical levels between the strategic business unit's top management and the front line supervisors. The cost structure was measured by indirect costs (general and production overheads) as a percentage of total costs (Q18). Measures of the other variables are presented in the following paragraphs.

7.3.1 Dependent Variable

In order to identify the dependent variable of this study, two questions were developed and their answers were triangulated: question 1 and 7. Question 1 measured the extent to which management accounting innovations, including ABT, are in use in the respondents' business units. Forming a list of management accounting innovations was not an easy task. This was because of two reasons, the great number of new concepts in management accounting that emerged over the last two decades[47] and the element of newness in the definition of an innovation. The starting point in developing this list was best selling management accounting textbooks. A list of nineteen new management accounting techniques was extracted from Drury's (2006) textbook. This list was supplemented with another fourteen innovations extracted from the most recent papers that focused on advanced cost

[47] A simple comparison conducted by Ax and Bjornenak (2007) between the set of concepts listed in the glossaries of the 1982 and 2005 editions of the best selling textbook "Cost Accounting: A Managerial Emphasis" by Horngren (1982) and Horngren et al. (2005) showed that as many as 250 of the concepts listed in the 2005 edition are new compared to the 1982 edition.

management practices and strategic management accounting techniques (e.g. Afonso, et al., 2006; Emlsay et al., 2006; Guilding, et al., 2000; Guilding and McManus, 2002; Simon and Guilding, 2006) (see Appendix 7 for the full list). This long list of innovations was examined by three management accounting academics independently, in order to select the 15 innovations to be included in the first question. The aim was to have a diverse list of techniques that reflected the different elements of management accounting (costing, performance management, budgeting, value management etc.). The final list contained the following techniques: Strategic costing, Activity Based Techniques, Life cycle costing, Target costing, Quality costing, Environmental cost management, Economic value to customer, Economic value added, Competitive position monitoring, Competitor performance appraisal, Value chain analysis, Throughput accounting, Balanced scorecard, Customer profitability analysis, Cash flow return on investment.

The degree of MA innovations usage was measured using the same approach as Cravens and Guilding (2001), Guilding and McManus (2002) and Simon and Guilding (2006). Following the question "to what extent does your business unit use the following management accounting techniques?" the MA innovations were listed together with a Likert-type scale ranging from "1" (not at all), to "7" (to a great extent). In addition, respondents were asked to tick an extra column in the case where the innovation is "still in the process of being implemented". Moreover, an extra box was provided beneath the list to give the respondents the opportunity to specify/describe any other innovations they are using/implementing. A glossary containing definitions of the MA innovations was provided to aid interpretation (See Appendix 8).

Question 7 was developed, based on the generic model that was developed in chapter 4 and tailored to suit ABT research. This was achieved by considering the results of previous ABT qualitative research (e.g. Friedman and Lyne, 1999) and the findings of the series of interviews with financial controllers in different manufacturing business units conducted by the researcher.

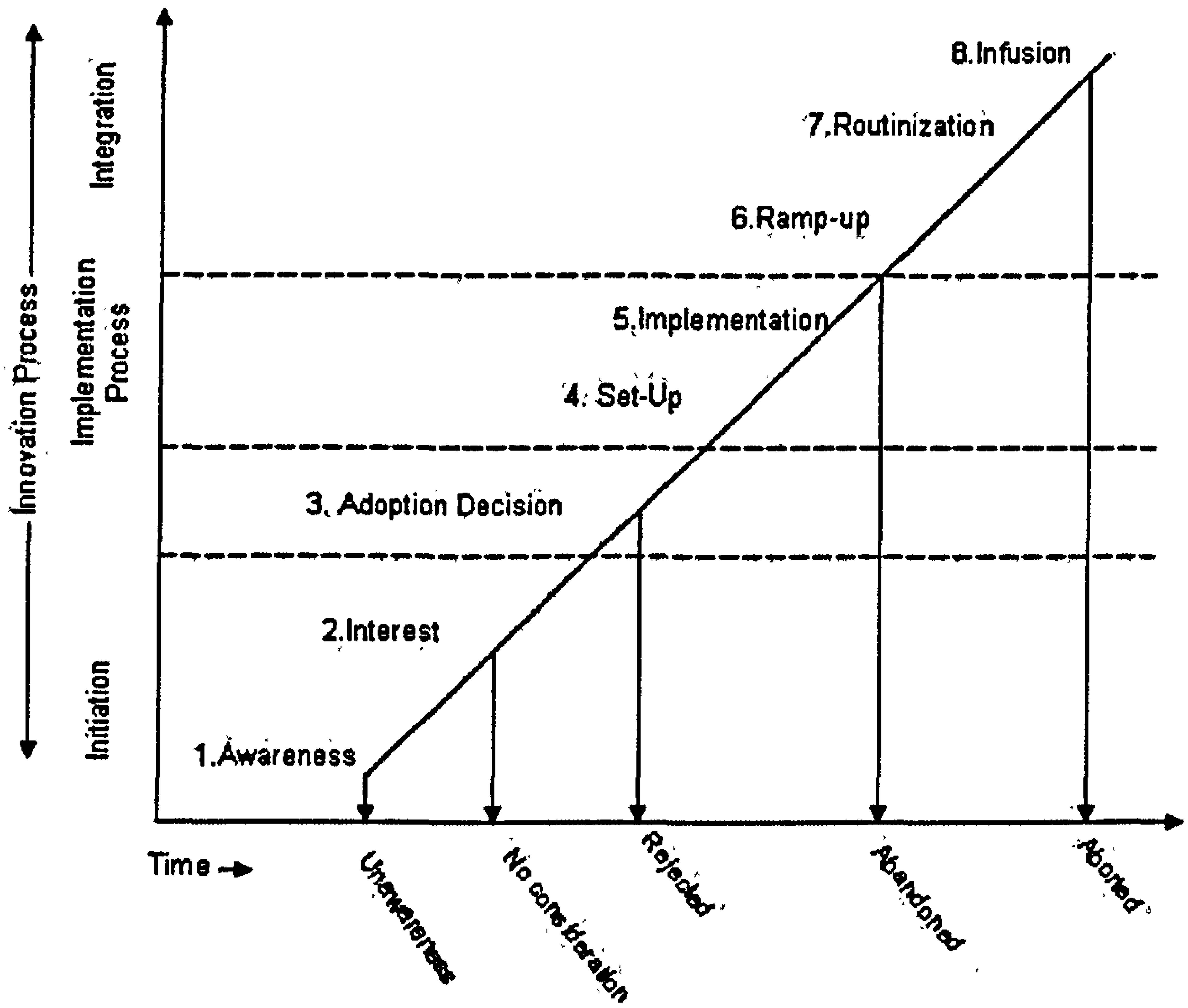

Figure 7-1 Innovation adoption and implementation generic multi-stage model (Final)

The customised model is presented in Table 7-1. In particular, the final model avoids confusing the extent of use of ABT with the process of implementation and, moreover, considers the possible ad hoc use of ABT.

Table 7-1 The multi-stage model of ABT adoption and implementation

Stage	Stage description	ABT implementation process stopped during/by the end of this stage.
Activity Based Techniques have not been **seriously** considered yet.		
1	***Interested:*** We are **seriously** considering ABT. Discussions/investigations are taking place regarding possible introduction.	**Considered but rejected**
2	***Approved:*** Approval has been granted to implement ABT and the necessary resources assigned.	**Stopped after approval**
3	***Set-up:*** Currently planning for ABT implementation, determining project scope and objectives, collecting data, anticipating possible problems and considering necessary changes in the adopted technique and/or in the organisational structure.	**Set up stopped/failed**
4	***Implemented:*** Implementation process is completed and ABT model/project has been piloted. The adoption decision was reviewed and confirmed. The ABT model is available for use.	**Implementation abandoned**
5	***Ramp up***: We started to use the ABT model. The acceptance of the new practice is being built gradually in the organisation, and unexpected problems are being dealt with. A common understanding of ABT is emerging.	**Ramp up stopped/failed**
6	***Using:*** ABT used after following most or all of the above stages.	**Use ceased**
ABT used without following most or all of the above stages.		**Use ceased**

Based on the respondents answers to question 1, the extent of using ABT, and question 7, the stage of adopting and implementing ABT, the dependent variable was identified as a binary variable of two groups: the first group (non-adopters) was identified as all business units that have not considered ABT seriously yet and do not claim any level of use of ABT. The second group (ABT adopters) was identified as all business units that are voluntarily using ABT (systematic or ad hoc use) and business units that are still progressing in the implementation process after the approval of ABT implementation. Triangulating the answers of questions 1 and 7 is unique to this study and makes the final analysis more reliable.

7.3.2 Independent Variables

7.3.2.1 Institutional and fashion setters pressures

A reliable measure for the institutional and fashion setters pressures used in this study (coercive, normative, mimetic and fashion setters pressures) was not found in the management accounting literature in general or ABC literature in particular. Studies in management accounting that have used institutional theory were mainly based on qualitative research (e.g. Soin, et al., 2002). Ibrahim's (2007) quantitative study could be the only exception. In that study coercive pressure by regulatory accounting bodies on the Syrian public manufacturing sector was measured. This measure was not of great help to this research study as it was developed to measure the coercive pressure in a very particular context. Literature from other disciplines, therefore, had to be consulted. Searching the IS/IT literature identified Teo, et al.'s (2003) instrument. In addition to the field interviews, this instrument was used as a starting point in developing this study's measures.

7.3.2.1.1 Coercive pressure

The measures for coercive pressures were developed based on the field interviews and the extant literature (DiMaggio and Powell, 1983; Teo, et al.,2003). The perceived recommendation/promotion of ABT adoption by the parent company, the main supplier and the main customer were measured by using three items (Q6 7,8,9).

Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree" and an additional option "don't know" was also provided. The "Don't know" option was provided so those who are not aware of the position of their parent company, main supplier and main customer regarding ABT adoption can state that clearly. Although studies are inconclusive as to whether a "don't know" option increases accuracy of responses (Alwin and Krosnick, 1991), the researcher is convinced, based on the field interviews, that a "don't know" option is essential in this case, where respondents may simply not have an opinion or awareness about the question. The conformity with parent company's practices was measured in Q4 by a binary variable indicating whether the parent company uses ABT (1 = yes, 0 =no, N/A). Finally, drawing on Abrahamson's (1991) concept of forced-selection of using an innovation, two binary questions, Q3 and Q5 that reflect business environment and the possibilities of imposition of ABT on SBUs were asked. The first question was concerned with whether there is any regulation (by the government or any other regulatory authority) that imposes ABT in the respondent's industry (1 = yes, 0 = no). The second question was concerned about whether the parent company imposed ABT in the respondent's business unit (1 = yes, 0 = no, N/A)

7.3.2.1.2 Normative pressures

The measures for normative pressures were developed based on the field interviews and the IS/IT literature (Abrahamson and Rosenkopf, 1993; DiMaggio and Powell, 1983; Srinivasan, et al., 2002; Teo, et al., 2003; Wu and Lee, 2005). Normative pressures were measured in terms of the extent of existing ABT use by an organisation's suppliers and customers, and the perception of the extent to which professional (CIMA) and trade associations promote ABT. These four items (Q6 3, 4,11,12) were coded in the same way as the coercive pressures.

7.3.2.1.3 Mimetic pressure

Drawing on Teo, et al.'s (2003) instrument and based on field interviews, four items were developed to measure mimetic pressures. The first two items measured the perceived extent of use of ABT by competitors (Q6 1) and other business units in the respondent's company (Q6 2). The other two items measured the perceived success of ABT adoption by competitors. "The theoretical rationale is that extent of adoption by competitors is not necessarily correlated with the perceived success of adoption by competitors" (Teo, et al.'s, 2003, p.27). A seven-point scale was used to gauge the *perceived* extent of adoption by competitors, with 1 (strongly disagree) reflecting zero or very low extent and 7 (strongly agree) reflecting 100 percent or high extent. The latter items were operationalized by asking respondents to indicate on a seven-point scale the extent to which competitors that have used ABT had benefited greatly (Q6 5), and had been perceived favourably by others in their industry (Q6 6). A "Don't know" option was provided as interview evidence suggests this possibility.

7.3.2.1.4 Fashion setters' pressure

Based on Abrahmson's, (1991) fashion perspective which was used by Malmi (1999) to study the influence of management fashion and fads on ABT adoption and drawing on Bjørnenak (1997) and Booth and Giacobbe (1998) that considered the supply side on ABT diffusion, three items to measure fashion setters pressures were developed. The fashion setters in the case of ABT were identified, with the help of the field interviews and reference to the historical evolution of ABC, as three main players: a) consulting/auditing companies, b) professional journals and magazines and c) software vendors. Therefore respondents were asked, Q6 13, 14, 15, to rate the extent to which each of the above players is promoting the use of ABT. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree" and additional option "don't know" was provided as well.

7.3.2.2 Perceived ABT attributes

It was a challenge to find a proper instrument to measure the perceived characteristics of using ABT proposed in this study. The only study that attempted to examine the influence of MA innovation's attributes on its diffusion is Askarany and Smith's (2003) conference paper which was published recently as Askarany, et al., (2007). In that paper, the authors extracted 14 items to measure ABC attributes from a generic 34-item scale that was developed and validated by Moore and Benbasat (1991) in order to measure the main five innovation attributes identified by Roger (1983). Table 7-2 shows Moore and Benbasat's (1991) generic scale beside the 14 items extracted by Askarany, et al., (2007). In the current study, the 14 items were considered to be inadequate and more modification of the original scale was needed.

Moore and Benbasat (1991) developed a generic instrument to measure the perceived characteristics of *using* an innovation. Their instrument included 34 items in seven scales: relative advantage, compatibility, image, ease of use, result demonstrability, visibility and trialability. The scales had good reliability as measured by Cronbach's alpha. The instrument was developed and validated thoroughly[48] and was worded and tested with respect to a particular IT innovation, the Personal Work Station, in a particular context: organisational work. Moore and Benbasat (1991) stated that this instrument should be reworded and other factors should be considered, when it is used for different innovations and in different contexts. Rogers (1995) noted that the instrument could be adapted to any innovation and, in this research, an instrument was developed based on the original Moore and Benbasat scales and the work of Askarany, et al., (2007) and Booth and Giacobbe (1998). Booth and Giacobbe's (1998) study was particularly useful because they identified a series of specifically ABT related issues that might indicate the perceived relative advantage of using ABT. Table 7-2 compares the instruments used in previous studies and sets out the instrument employed in the current study.

[48] See Moore and Benbasat (1991) pp, 198-209 for the details of the instrument development process.

Table 7-2 Perceived attributes of ABT measurement development

Moore and Benbasat (1991)	Askarany and Smith (2003) , Askarany, et al., (2007)	Booth and Giacobbe (1998)	The current Study
Relative Advantage			
Using a PWS enables me to accomplish tasks more quickly. Using PWS enables me to accomplish tasks more quickly Using a PWS improves the quality of work I do. Using a PWS makes it easier to do my job. Using a PWS enhances my effectiveness on the job. Using a PWS gives me greater control over my work.	Can get the job done quicker. Can improve the quality of service. Can do the job easier. Can do the job more effectively. Can achieve greater control over work processes.	ABC is a: a. Better pricing policies b. Better cost management c. Better performance measurement and control d. Better allocation of overhead e. Better stock valuation f. Costing system g. To identify cost reduction targets h. To focus on activities that create costs i. To replace inaccurate costing systems j. To improve the budgeting process k. To complement our Just in Time production systems l. To complement our Total Quality Management approach m. To provide more accurate determination of transfer pricing n. To improve outsourcing decisions o. To improve forecasting p. To improve capacity management and capital investment decisions q. To complement value-based management tools, such as EVA	Using ABT: 1. Costing is better than current practice. 2. Cost management is better than current practice. 3. Budgeting is better than current practice. 4. Pricing is better than current practice. 5. Performance measurement is better than current practice. 10. Improves outsourcing decisions. 11. Improves forecasting. 12. Improves capacity management and capital investment decisions. 13. Better complements our value-based management tools, such as EVA. 14. Better complements our Just in Time production systems. 15. Better complements our Total Quality Management approach.
Compatibility			
Using a PWS is compatible with all aspects of my work. I think that using a PWS fits well with the way I like to work. Using a PWS fits into my work style.	Is compatible with existing processes.		6. Is compatible with our business unit existing. processes/practices. 7. Is compatible with our business unit's culture.

Table 7-2 (continued)

Moore and Benbasat (1991)	Askarany and Smith (2003) , Askarany, et al., (2007)	Booth and Giacobbe (1998)	The current Study
Ease to Use My interaction with a PWS is clear and understandable. I believe that it is easy to get a PWS to do what I want it to do. Overall, I believe that a PWS is easy to use. Learning to operate a PWS is easy for me.	Is easy to implement. Can be learned quickly and easily.		16. Is conceptually easy to learn and understand. 17. Is easy to implement.
Image People in my organisation who use a PWS have more prestige than those who do not. People in my organisation who use a PWS have a high profile. Having a PWS is a status symbol in my organisation.	Enhances the profile and reputation of the company.		8. Enhances the profile and reputation of the business unit. 9. Is a sign of a modern dynamic company.
Result Demonstrability I would have no difficulty telling others about the results of using a PWS. I believe I could communicate to others the consequences of using a PWS. The results of using a PWS are apparent to me. I would have difficulty explaining why using a PWS may or may not be beneficial.	Advantages/benefits are clear and demonstrable. Outcomes are easily reported/communicated.		18. Has clear and demonstrable advantages/benefits.

Table 7-2 (continued)

Moore and Benbasat (1991)	Askarany and Smith (2003) , Askarany, et al., (2007)	Booth and Giacobbe (1998)	The current Study
Trialability Before deciding whether to use any PWS applications, I was able to properly try them out. I was permitted to use a PWS on a trial basis long enough to see what it could do.	Able to trial the technique to ensure it does what it said it would.		19. Could be tried/piloted before deciding to adopt.
Cost			20. Is expensive to implement. 21. Is expensive to maintain.

Booth and Giacobbe's (1998) scale consisted of seventeen items, where respondents are asked about their perception of the benefits that their SBU would gain if they were to use ABT. From Table 7-2 it can be seen that the items relating to relative advantage are based on those of Booth and Giacobbe (1998) but with two main changes. First, it was decided to reduce the number of the items to eleven by eliminating items that could be combined under one holistic item. Therefore, items d,e,g,h,i were considered to be under one item which is a better costing system than the current practice (Q9 1) and items a and m were combined in a general item that states that using ABT for pricing is better than the current practice (Q9 4). Second, the wording of the question and the items were adjusted to make them clearer. Hence, the final measure was an eleven-item summated scale (Q9 1-5, 10-15). Respondents were asked to indicate the extent to which they agree with the eleven statements *from the perspective of the time when ABT was first considered.* Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". In the current study the Cronbach's alpha coefficient was

0.91. The rest of the characteristics (perceived compatibility of using ABT, perceived ease of using ABT, perceived demonstrability of using ABT results, perceived trialability of ABT, perceived improvement of the SBU image) were developed by taking Askarany, et al.'s (2007) reworded items and adding more items from the original scale where appropriate. Table 7-2 shows the final scales. Finally, to measure the perceived cost of using ABT, which is not available from prior research, a two item scale was developed based on the interviews which were undertaken in the exploratory phase of this research. The first item measured the perception of the extent to which using of ABT would be expensive to implement and the second item focused on the perception of the cost of maintaining an ABT system. Each item in the created/developed scales was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". Inter-correlation matrices and Item-to-scale coefficient test result are presented in Appendix 9. None of these tests suggested that any of the above scales' items should be eliminated. The internal consistency test resulted in Cronbach's alpha values of: relative advantage 0.91, compatibility 0.85, ease of use 0.66, cost 0.88, image 0.86, all considerably more than the acceptable level of 0.60.

7.3.2.3 Innovator's attributes

7.3.2.3.1 Business unit culture

The measurement of business unit culture dimensions were adopted from Barid, et al., (2004). Barid, et al.'s (2004) measurement of innovation and outcome orientation were developed from the 26-item version of the Organisational Culture Profile of O'Reilly, et al., (1991). The innovation dimension was measured by the sum of five cultural value items, Q14 (1-5). Outcome orientation similarly was measured by the sum of another five cultural value items Q14 (6-10). Respondents were asked to indicate the extent to which each item was valued in their business unit. A 7-point Likert scale with the anchors of 1 "not valued at all" and 7 "valued to a very great extent" was used and the scores for each dimension were calculated as the sum of responses. Lower (higher) scores represented lower (higher) values on the dimensions. According to Barid, et al., (2004), the innovation dimension and outcome orientation scales have good internal consistency, with Cronbach's alpha coefficients reported of 0.78 and 0.86 respectively. In the current study the Cronbach's alpha coefficients were 0.86 and 0.81 respectively. The third business unit culture dimension, tight versus loose control, was measured with an eight-item summated scale (Q16 10-17) developed by Barid, et al., (2004) from Merchant (1985). Respondents were asked to indicate the extent to which they agree with eight statements in the scale which reflect practices within their business unit. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree" so that higher (lower) scores represented tighter (looser) control. According to Barid, et al., (2004), this dimension scale has good internal consistency, with a Cronbach's alpha coefficient reported of 0.90. In the current study the Cronbach's alpha coefficients was 0.86. Inter-correlation matrix and item-to-scale coefficient tests results are presented in Appendix 9. None of these tests suggested that any of the above scales' items should be eliminated.

7.3.2.3.2 Organisational Structure

The three dimensions of organisational structure studied by Gosselin, (1997) were investigated in this research. As mentioned above, vertical differentiation was measured in Q17 using an objective measure, which was adopted from Gosselin (1997). Respondents were asked to specify the total number of hierarchical levels between the strategic business unit's top management and the front line supervisors. For *centralization*, Gosselin (1997) adapted an instrument which was taken from Pugh, et al., (1968), Kandwhalla (1972), Gordon and Narayanan (1984) and Hull and Hage (1982). This instrument measures centralization using a series of twelve standard decisions and identifies, from line supervisor to head office manager, the level at which decisions are made. Gosselin (1997) also adapted an instrument from Robbins (1983) to measure *formalization*. This instrument consisted of four statements about the extent to which rules, procedures and policies are standardized. Gosselin's (1997) approach in the measurement of these two dimensions was not adopted in the current study for two reasons. First, the internal consistency of these measures was not reported clearly in Gosselin's (1997) paper. Second, from a questionnaire design perspective, this approach was not viable as it needs almost three pages to present the two instruments. Searching for an established, well validated and relatively more concise instrument, led this researcher to Ramamurthy's (1990) nine-item scale from the IS literature and was used and validated by Al-Dahiyat's (2003) management control systems research. The centralization scale consisted of six items (Q16 1-6) developed to capture the locus of decision making responsibility for capital budgeting, new product introduction, pricing policies, penetration into new markets, major changes or new manufacturing processes and personnel policies (Ramamurthy, 1990; Al-Dahiyat, 2003). Formalization was measured by the remaining three items (Q16 7-9). These items focus on measuring the extent of operating procedure documentation and the degree of adherence to documented rules and procedures (Ramamurthy, 1990); Al-Dahiyat , 2003). Respondents were asked to indicate the extent to which they agree with the nine statements in the scale on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". According to Al-Dahiyat, (2003) the centralization and formalization scales have good internal consistency, with a Cronbach's alpha coefficient reported of 0.79 and 0.81 respectively. In the current study the Cronbach's alpha coefficients were 0.72 and 0.85 respectively. Inter-correlation matrix and item-to-scale coefficient tests results are presented in Appendix 9. None of these tests suggested that any of the above scales' items should be eliminated.

7.3.2.3.3 Business Strategy

Business strategy has been operationalised by the use of two main approaches in empirical quantitative research: the multidimensional measurement approach and the self-typing or paragraph approach (Langfield-Smith, 1997, 2007; Al-Dahiyat, 2003). The multidimensional approach is based on measuring a series of variables and conducting large-scale statistical analyses of associations (Langfield-Smith, 1997). Although the multidimensional approach is common to strategy and marketing research, it is criticised for making the outcomes of these studies very complex, thus making it difficult to detect the internal logic of a particular strategy (Langfield-Smith, 1997). This approach is exemplified in management accounting research mainly by Govindarajan's (1988) instrument which was developed to measure Porter's (1980, 1985) generic strategies (differentiation and low cost). The paragraph approach was developed by Snow and Hrebiniak (1980) to measure Miles and Snow's (1978) strategic types of prospector, defender, analyzer and reactor. This approach requires the respondent to read short unlabeled paragraphs that describe the different strategic types and select the paragraph that best describes their organisation. As Miles and Snow's (1978) typology was adopted in this study, the latter approach was used to measure business strategy. In addition, this choice was considered to be more appropriate from a questionnaire design perspective. The business strategy question, question 13, was used right in the middle of the questionnaire, page 5, to provide a break for respondents from the multi-item questions which dominated the questionnaire. Moreover, using this measure provides the basis for comparison to a previous ABT study by Gosselin (1997). The wording of these paragraphs was taken from Gosselin's (1997) instrument, with minor changes to some words to comply with British English.

7.3.2.3.4 Information technology quality

Question 19 was devoted to measuring a Business Unit's information technology quality. This measure consisted of 5 items adopted from Krumwiede's (1998) instrument. Respondents were asked to indicate the extent to which they agree with five statements in the scale which reflect the quality of their Business Unit's information systems. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". The statements in this scale were adjusted to British English. Inter-correlation matrix and item-to-scale coefficient test results are presented in Appendix 9. None of these tests suggested that any of the above scales' items should be eliminated. According to Krumwiede (1998), this scale has good internal consistency, with a Cronbach's alpha coefficient reported of 0.84. In the current study the Cronbach's alpha coefficient was 0.88.

7.3.2.3.5 Top management support

This variable was measured by a three-item summated scale (Q9 22-24) used by Brown, et al., (2004) which was adapted from the IS literature (Grover, 1993 and Premkumar and Potter, 1995). Respondents were asked to indicate the extent to which they agree with three statements in the scale which reflected the level of support ABT receives from top level management in their business unit. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". The inter-correlation matrix showed excellent correlation (0.92) between the first two items. It was decided to eliminate the first item in order to avoid singularity. Cronbach's alpha coefficient for the final scale in the current study was 0.92, almost equal to Brown, et al.'s, 0.95.

7.3.2.3.6 Internal champion support

This variable was measured by a three-item summated scale (Q9 25-27) used by Brown, et al., (2004) which was adapted from the IS literature (Grover, 1993). Respondents were asked to indicate the extent to which they agree with three statements in the scale, which reflects the existence of an ABT champion and the level of support ABT receives from them. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". The inter-correlation matrix showed very high correlation between all the three items (over 0.9). Deleting any of the three items would not change the final Cronbach alpha coefficient. Therefore the decision was not to delete any of them. The final scale

Cronbach's alpha coefficient in the current study was 0.97 which is almost equal to Brown, et al.'s (0.96).

7.3.2.3.7 Product complexity and diversity

This variable was measured by a four-item summated scale (Q15 6-9) developed by Krumwiede (1998) and used by Brown, et al., (2004). Respondents were asked to indicate the extent to which they agreed with four statements in the scale, which reflected the diversity and complexity of product lines within their business unit. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". The statements in this scale were adjusted to British English and the last statement was rewritten to make it clearer. In the current study the Cronbach's alpha coefficient was 0.72 which is better than the two previous studies by Krumweide (1998) and Brown, et al., (2004) where Cronbach's alpha coefficients were 0.69 and 0.59 respectively. Inter-correlation matrix and item-to-scale coefficient tests results are presented in Appendix 9. None of these tests suggested any elimination of items in the above scales.

7.3.2.4 Environmental conditions

7.3.2.4.1 Perceived environmental uncertainty

This is the first ABT quantitative research study to investigate the impact of perceived environmental uncertainty on ABT adoption. Therefore management accounting contingency research was consulted to find a suitable measure. Three main instruments were found to measure environmental uncertainty. Khandwalla's

(1972, 1977) instrument which was later improved by Gordon and Narayanan (1984), Miles and Snow's (1978) and Govindarajan's (1984) instruments. Gordon and Narayanan's (1984) instrument consists of seven questions containing, in total, ten items. These questions were designed to measure the respondents' perceptions about the predictability and stability of the industrial, economic, technological, and competitive and customer aspects of their organisation's environment. A seven point Likert scale was used for each of these questions, however each question has its own verbal label. Miles and Snow's (1978) instrument consisted of six environmental factors (suppliers' actions; competitors' actions; customer demand for existing and new products; the capital market; government regulations, laws and policies; and labour union actions) measured by 24 items on a 7 point scale ranging from highly predictable to highly unpredictable. Govindarajan's (1984) instrument is similar to Miles and Snow's (1978). In this instrument, the respondents were asked to indicate on a 5-point Likert-type scale (varying from "highly predictable" to "highly unpredictable") how predictable or unpredictable each of the following factors is in the context of their business unit: manufacturing technology, competitors' actions, market demand, product attributes/design, raw material availability, raw material price, government regulation and labour union actions (Govindarajan, 1984). This latter instrument was adopted for the current study, because this instrument was carefully revalidated recently by Al-Dahiyat, (2003) and its brevity and simplicity was very attractive from a questionnaire design perspective. Al-Dahiyat's (2003) revalidation showed that perceived environmental uncertainty has a multidimensional structure, which is inconsistent with the common belief in management accounting research that PEU is a unidimentional construct (Sharma, 2002, p.115 cited in Al-Dahiyat, 2003). Al-Dahiyat (2003) used Govindarajan's

(1984) scale with two changes. Al-Dahiyat (2003) used a seven point Likert scale instead of five and the item of raw material price was eliminated, as it was believed to be closely related to raw material availability. Factor analysis applied on Al-Dahiyat's (2003) data showed that PEU has two factors: Operational-PEU which contains manufacturing technology, competitors' actions, customer demand and customer tastes, and regulatory PEU which contains labour union actions and government regulations. The internal consistency reliability coefficient measures (Cronbach's alpha) for these two dimensions were 0.73 and 0.56 respectively. Raw material availability was deleted because of cross loading on both dimensions of PEU[49]. The current study duplicated Al-Dahiyat's (2003) procedures but kept all Govindarajan's (1984) items in the scale. As shown in Table 7-3, the result of factor analysis confirmed the existence of the Operational and Regulatory dimensions. In addition, a third dimension which contains raw material availability and raw material price items was extracted and labelled supply oriented PEU. All the factor loadings were much greater than 0.40, ranging from 0.66 to 0.90, and the total cumulative variance explained by these three factors was just above 66%, supporting the multidimensional structure of PEU. The Bartlett test of sphericity (259, $p<0.001$), and Kaiser's measure of sampling adequacy for the factorability of PEU (0.620), indicated that conducting the exploratory factor analysis was appropriate and within acceptable levels (Hair, et al., 1998; Pallant, 2005). In addition, Cronbach's alpha for the three dimensions, operational, regulatory and supply were 0.71, 0.75 and 0.61 respectively, indicating good internal consistency for these measures. Therefore, this multidimensional view of PEU was adopted in the current research and it was

[49] For full details see Al-Dahiyat (2003) chapter7, pp 8-12.

measured by an eight-item seven-point Likert-type scale (varying from "highly predictable" to "highly unpredictable") (Q21).

Table 7-3 Factor analysis for PEU construct

	Component		
	1	2	3
Perceived environment uncertainty/product attributes Q21.4	.751		
Perceived environment uncertainty/customers' demands Q21.3	.745		
Perceived environment uncertainty/competitors' actions Q21.2	.714		
Perceived environment uncertainty/manufacturing technology Q21.1	.664		
Perceived environment uncertainty/raw material prices Q21.6		.903	
Perceived environment uncertainty/raw material availability Q21.5		.848	
Perceived environment uncertainty/goverment regulation Q21.8			.841
Perceived environment uncertainty/labour union actions Q21.7			.838

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 4 iterations.

7.3.2.4.2 Intensity of competition

Intensity of competition was measured using a composite scale adopted from Williams and Seaman, (2001). This scale, which is a modified version of Khandwalla's, (1977) instrument, was used by Libby and Waterhouse (1996). This instrument consisted originally of two scales. One scale rated the intensity of competition for five items (raw materials, technical personnel, selling and distribution, quality and variety of products, and price) on a five-point Likert scale.

A corresponding scale rated the importance of that type of competition to the organisation's long-term profitability and growth. However, pre-testing procedures followed by Williams and Seaman (2001) indicated that there is little variance on the importance scale and this affected the final measure and made it biased[50]. Therefore, Williams and Seaman's (2001) dropped this scale in favour of using a single scale for each item. Williams and Seaman (2001) used anchored five-point Likert scale ranging from 1 (far below average intensity) to 5 (far above average intensity). The current study adapted Williams and Seaman, (2001) scale as it is more concise. However, to maintain the same scale length in the questionnaire, a seven-point Likert scale was used instead of five. In addition, the labelling of the points were reworded to 1 (low) and 7 (extremely high) to correspond with the original scale by Libby and Waterhouse (1996). Inter-correlation matrix and item-to-scale coefficient test results are presented in Appendix 9. These tests show a relatively weak correlation between the items of the scale. Cronbach's alpha for this construct was coefficient was 0.55, which is less than that reported by Williams and Seaman (2001), 0.68. However, it is still within the minimal levels of acceptable reliability (i.e. 0.50 - 0.60). Therefore, this construct was included in the final analysis.

[50] The final measure is calculated by multiplying the two ratings for each item together and the square root is determined then the five products are summed to yield the final score.

7.3.2.5 Need-pull factors

7.3.2.5.1 Degree of decision usefulness of cost information

This variable was measured with a five-item summated scale (Q15 1-5) developed by Krumwiede (1998). Respondents were asked to indicate the extent to which they agree with five statements in the scale, reflecting the importance of cost information in the decision making process within their business unit. Each item was scored on a 7-point Likert scale, anchored on 1 for "strongly disagree" and 7 for "strongly agree". The statements in this scale were adjusted to British English. The inter-correlation matrix showed a very weak correlation between the last item of the scale (Q15/5) and the rest of the items therefore it was eliminated from the final scale. Cronbach's alpha coefficient before deleting the last item was 0.58, which was improved to 0.68 (see Appendix 9). Krumwiede's (1998) alpha for this construct was also 0.68 after eliminating both item numbers 4 and 5.

7.3.2.5.2 Compelling business need

The second question of the questionnaire explored whether the respondent's business unit has faced a compelling business need recently. This question wording was based on Friedman and Lyne's (1999, p.106) presentation of the importance of a compelling business need, for activity based techniques to be successful. Some examples from Friedman and Lyne's (1999) case studies were provided to the respondent to aid understanding. The period considered was restricted to two years as a result of the pre-testing suggestions.

CHAPTER 8 RESULTS AND ANALYSIS

Chapters six and seven presented the research design, the main statistical analysis approach and the main features related to the validity, reliability and replicability of this research. The results of this research are presented and discussed in this chapter. The ultimate aim is to overcome the limitations of previous ABC research that often used underspecified theoretical models which led to inconclusive findings. This research was attained by deriving a model to predict ABT adoption which, though parsimonious, was based on the comprehensive heterogeneous theoretical model that was developed in chapter 5. In chapter nine, these findings are discussed and form the basis of the conclusion of this thesis.

8.1 Descriptive Analysis

In this section all variables that were measured in this study are reviewed and described using charts, tables, cross-tables and descriptive statistics as appropriate.

8.1.1 Extent of use of Management Accounting Innovations

In order to have an overview of the status of management accounting innovations usage at the time of the survey, question 1 was analysed. In general, and regardless of extent of usage, after considering those who scored "1" (Not using at all) and those who ticked the box (implementation process) as non-users, on average BUs use 9-10 management accounting innovations with a maximum of 15 innovations

(21 BUs) and a minimum of none (3 BUs). As Figure 8-1 shows, all the 15 innovations included in question 1 are in use with relatively high numbers of adopters ranging from 45% for EVC to 82% for CPAN[51]. It is noticeable that economic value based techniques (EVC and EVA™) are the least popular, whilst competitor and customer related techniques are the most popular. Costing and performance measurement techniques fall between these extremes.

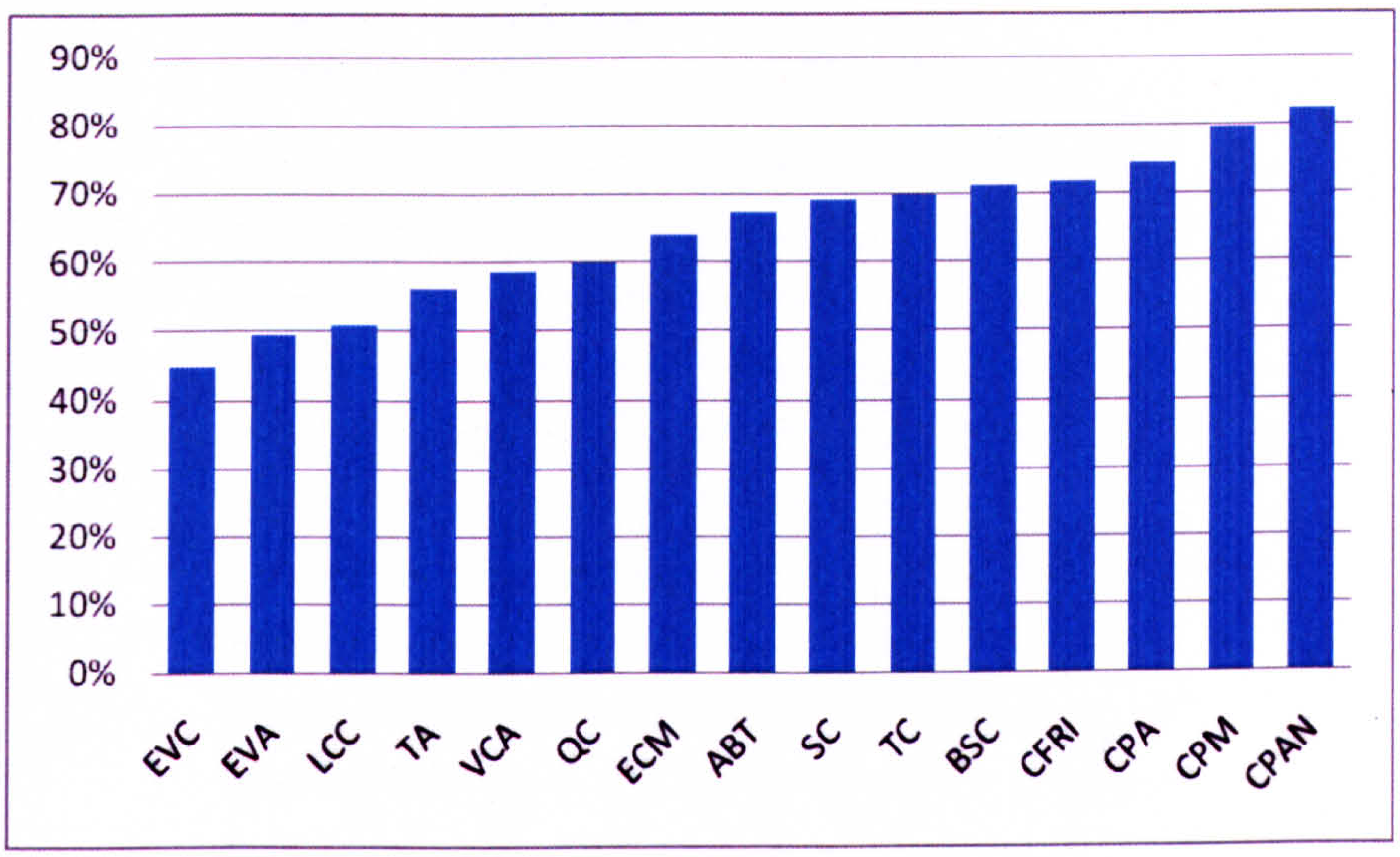

Figure 8-1 Management accounting innovations adoption rates

To report the extent to which these innovations are in use, the seven-point scale used in question 1 was collapsed to five categories: not using at all (1), weak use (2 and 3), moderate use (4 and 5), extensive use (6 and 7) and implementing. On average, the surveyed business units use 5-6 innovations extensively.

[51] ABT: Activity based techniques, BSC: Balanced scorecard; CFROI: Cash Flow Return on Investment, CPM: Competitive position monitoring, CPA: Competitor performance appraisal; CPAN: Customer profitability analysis; EVA: Economic Value Added; EVC: Economic value to customer; ECM: Environmental cost management; LCC: Life cycle costing; QC: Quality costing; SC: Strategic costing; TC: Target costing; TA: Throughput accounting; VCA: Value chain analysis.

Table 8-1 shows that there is a significant minority of BUs (28%, n= 43) that do not use any of the 15 innovations extensively and less than 1.5% of the companies use 10-12 innovations extensively. Most BUs employ between one and five innovations extensively while a small number of BUs employ more that five innovations extensively.

Table 8-1The frequency of extensively used MA innovations

Number of extensively used innovations	Frequency	%
0	43	28.3
1	33	21.7
2	22	14.5
3	12	7.9
4	18	11.8
5	12	7.9
6	4	2.6
7	1	0.7
8	2	1.3
9	3	2.0
10	1	0.7
12	1	0.7
Total	152	100

Consideration of these results reveals the importance of clear definition both of the innovations and their extent of use. If "use" is taken to mean any claim then at least 45% of BUs are using all the innovations. However, if a very strict definition of "use" is employed, for example, demanding that use of an innovation be extensive, then Figure 8-2 shows that "use" then ranges from about 4% (LCC) to 36% (CFRI). To take a specific example, almost 71% (n=108) of the respondents claimed to be using the balanced scored card (BSC). But when the extent to which this technique is used is considered it is found that only around 22% (n=34) of the business units claim to use the BSC extensively.

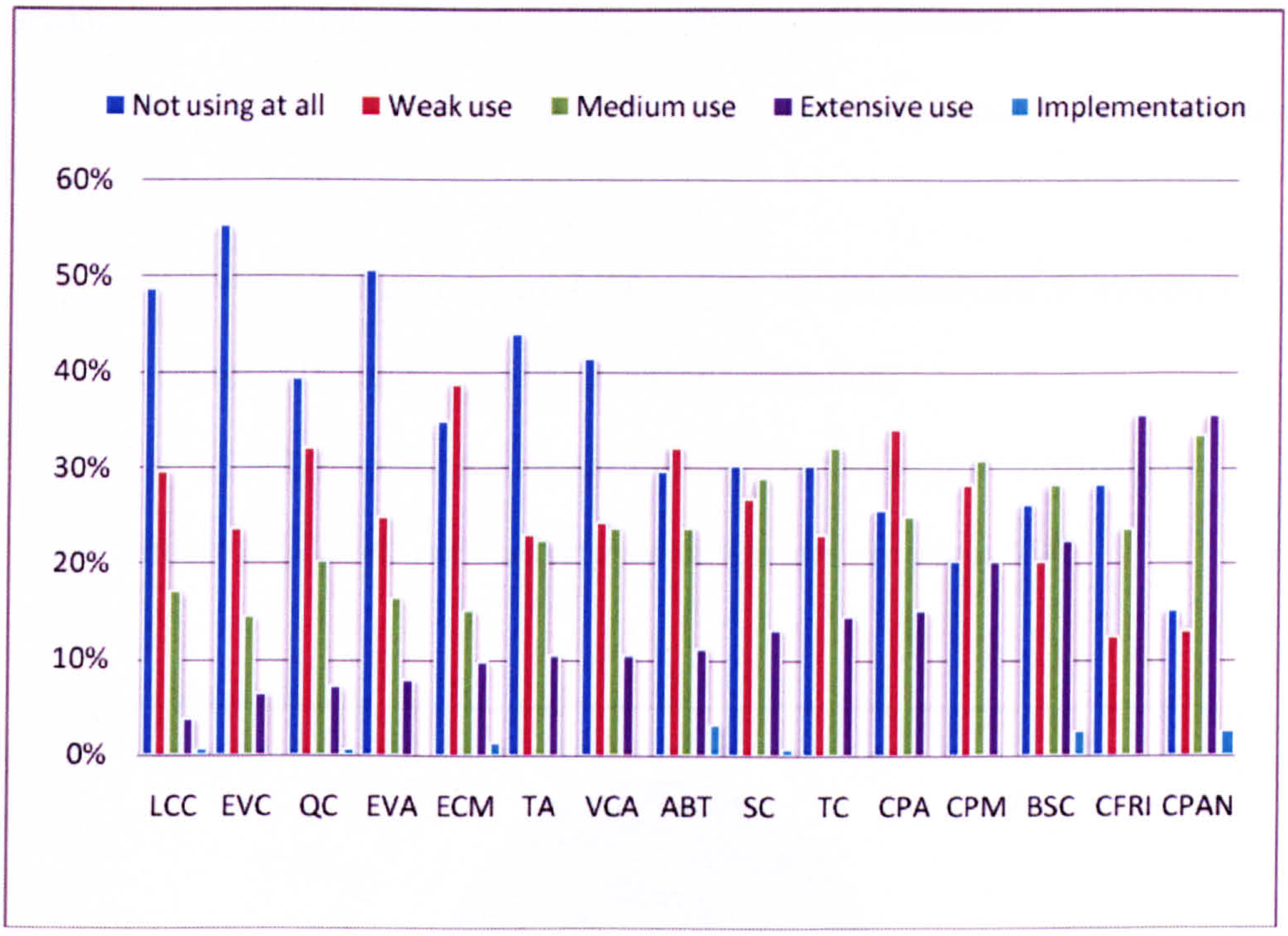

Figure 8-2 Management accounting techniques' extent of use

These observations have important implications for the comparison of research studies. On a very wide definition of "use" this study shows relatively higher rates compared with previous studies. However, if a very restricted definition is employed the reverse would be the case; relatively low rates of use compared with previous studies would be reported. It is therefore important to specify precisely what is being measured in management accounting innovation research.

8.1.2 Activity Based Techniques' adoption and use

As Figure 8-3 shows, 50% (n=76) have not seriously considered introducing any activity based technique. The other 50% is distributed as follows:

- 14% (n=22) claimed to be in the process of implementing activity-based techniques.
- 6% (n=9) have abandoned ABT during the implementation process (7 of them recorded rejection after initial consideration)
- 1.4 % (n=2) have ceased the use of ABT after some period of using it
- almost 28% (n=43) of the surveyed companies are using ABT.

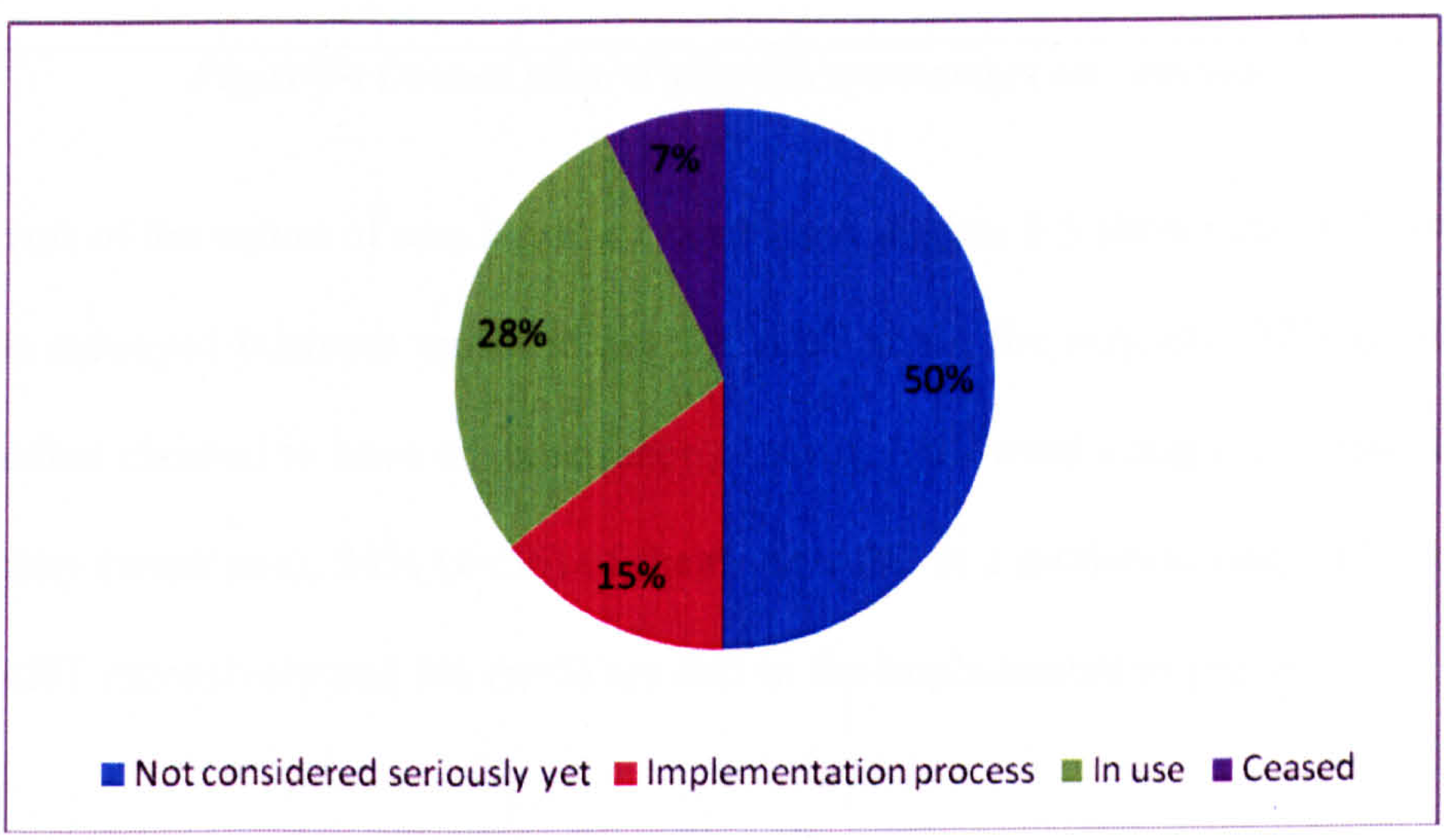

Figure 8-3 Current stage of adoption

Figure 8-4 shows the break down of these percentages based on the fifteen stages presented in question 7 of the survey instrument.

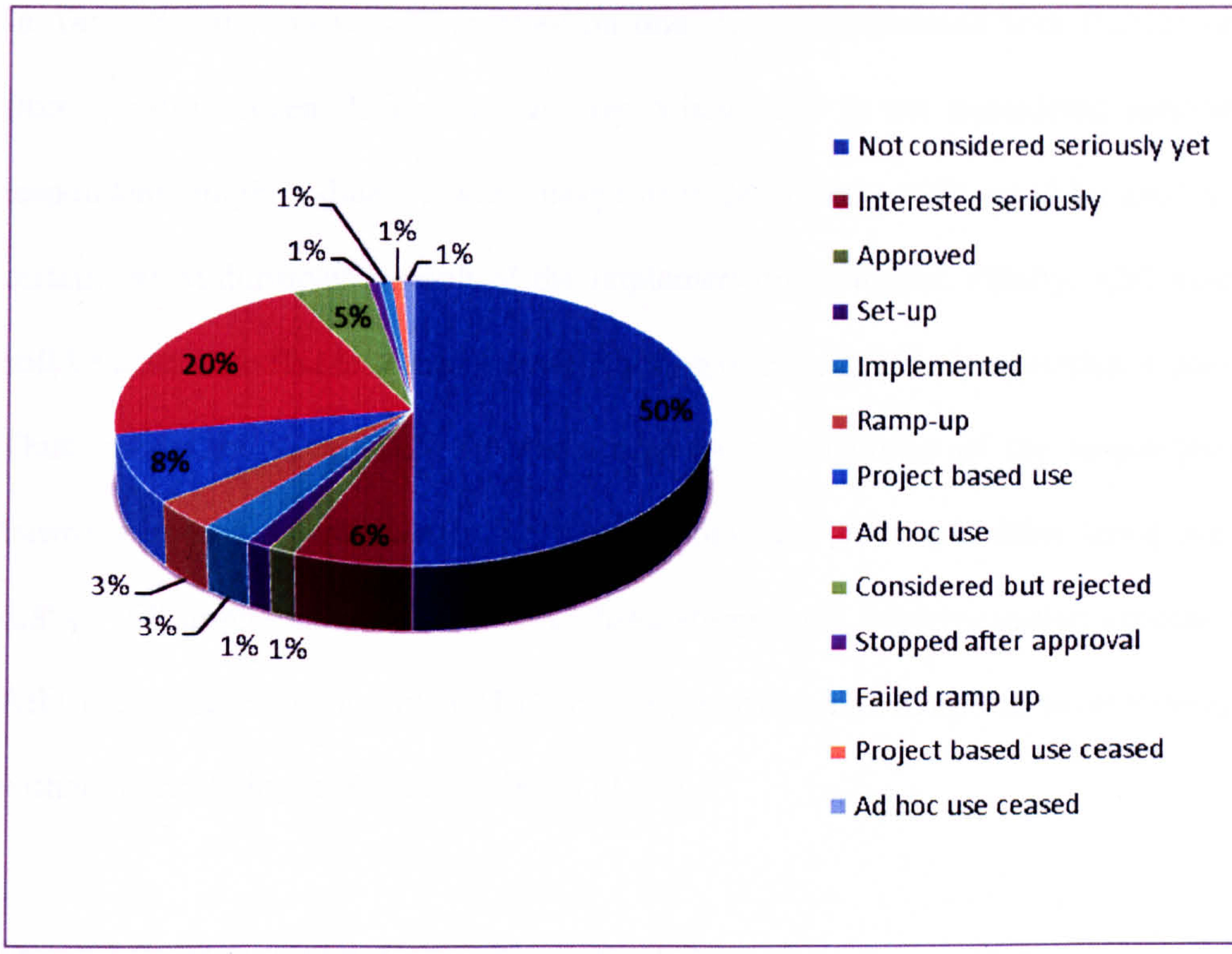

Figure 8-4 Current stage of adoption (percentages are rounded)

In terms of the extent of use, based on question 1, Figure 8-5 shows that 30% (n=45) of the surveyed business units did not use ABT at all, the majority, 32% (n=49) of those that claimed to have an experience of using ABT were using it at a low rate of intensity (weak use), 24% (n=36) of them use ABT at a moderate rate, 11% (n=17) use ABT extensively and 3% (n=5) are still in the implementation process.

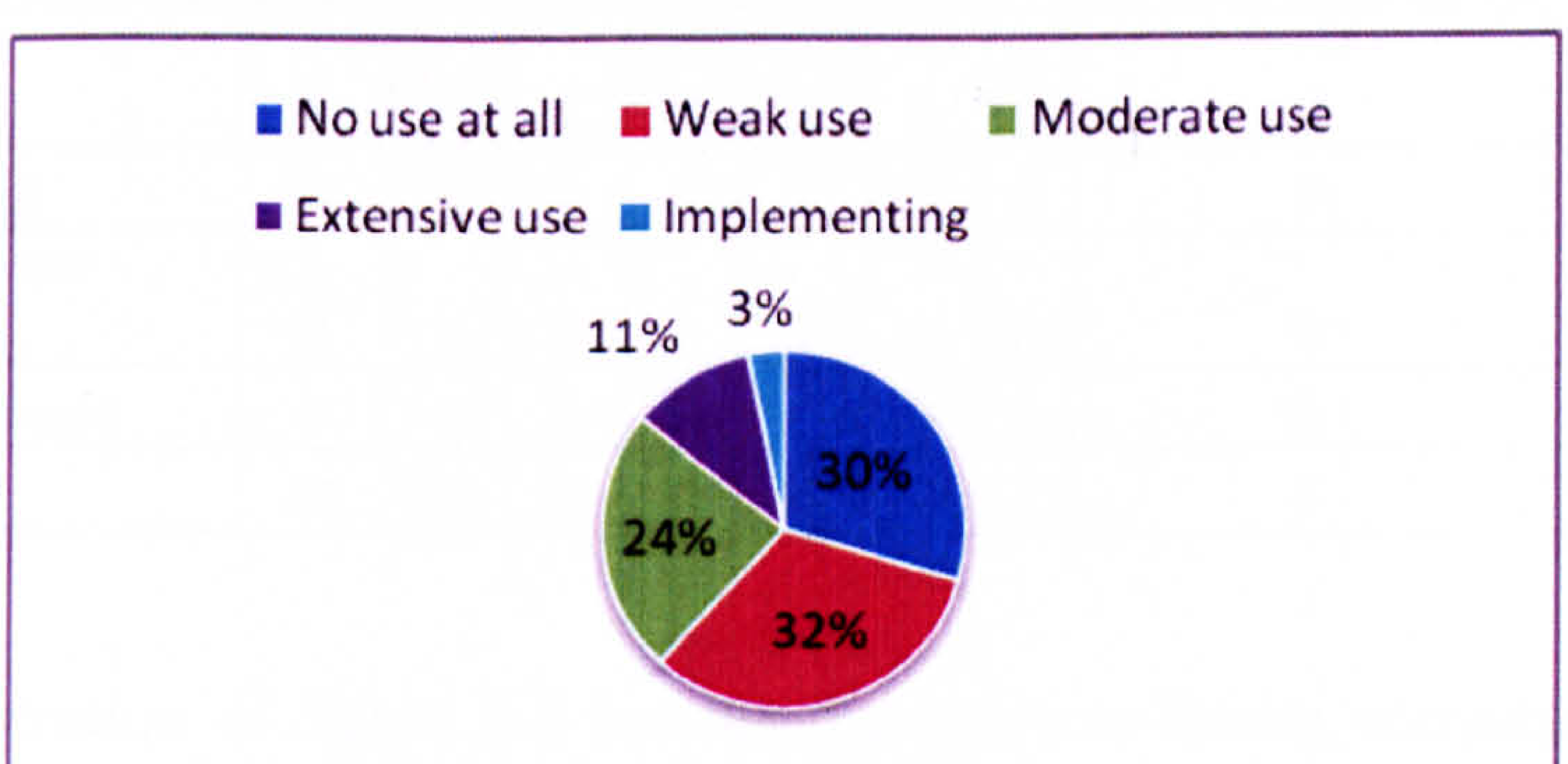

Figure 8-5 ABT extent of use

In Table 8-2 the answers from question one are cross-tabulated with the answers from question seven. It shows that even when ABT is not considered seriously respondents might indicate a weak usage of it. Moreover, ABT could be used to a certain extent during/as a result of the implementation process. Finally, ABT could still be used even if it is ceased formally during or after the implementation process. Thus, as can be seen, ABT is experienced by the majority of the respondents' business units. Approximately 72% of the business units are either using ABT (28%), still implementing ABT (14%), have stopped the implementation process of ABT (6%), ceased the use of ABT (1.4%) or are using ABT at a weak level although without considering its formal adoption (22%).

Table 8-2 Crosstab, stage model vs. ABT extent of use

Stage of ABT implementation (Q7)	ABT extent of use (Q1)									
	1	2	3	4	5	6	7	Implementation process	Total	%
Not considered seriously yet	42	24	10	0	0	0	0	0	76	50.0%
Interested seriously	0	1	2	3	0	0	0	3	9	5.9%
Approved	0	0	0	1	0	0	0	1	2	1.3%
Set-up	0	1	1	0	0	0	0	0	2	1.3%
Implemented	0	0	1	1	0	1	0	1	4	2.6%
Ramp-up	0	0	0	2	2	1	0	0	5	3.3%
Project based use	0	0	1	1	3	4	3	0	12	7.9%
Ad hoc use	0	0	3	8	12	6	2	0	31	20.4%
considered but rejected	2	2	2	1	0	0	0	0	7	4.6%
stopped after approval	1	0	0	0	0	0	0	0	1	0.7%
Failed ramp up	0	0	0	0	1	0	0	0	1	0.7%
Project based use ceased	0	1	0	0	0	0	0	0	1	0.7%
Ad hoc use ceased	0	0	0	0	1	0	0	0	1	0.7%
Total	45	29	20	17	19	12	5	5	152	100%

Casual observation of Table 8-2 reveals that there is strong correlation between SBUs that have not yet considered ABC seriously and the stage of implementation

(1, 2 or 3 with most of the respondents opting for 1). Conversely, those that claim project based or ad hoc use also claim a higher stage of implementation (at least level 3 and most claiming at least level 5). This is, of course, as one would expect. It means that analysis is based on a firm foundation because questions 1 and 7 check each other and reveal good consistency[52]. The use of Table 8-2 in determining which BUs are classified as "non-adopters" and which as "adopters" is further discussed in section 8.2.

8.1.3 Systematic vs. ad hoc use

Figure 8-6 shows that the 34 users consisted of 12 (28%) business units that claimed to have project-based use of the technique and the majority, 31 (72%) business units that used ABT on an ad hoc basis.

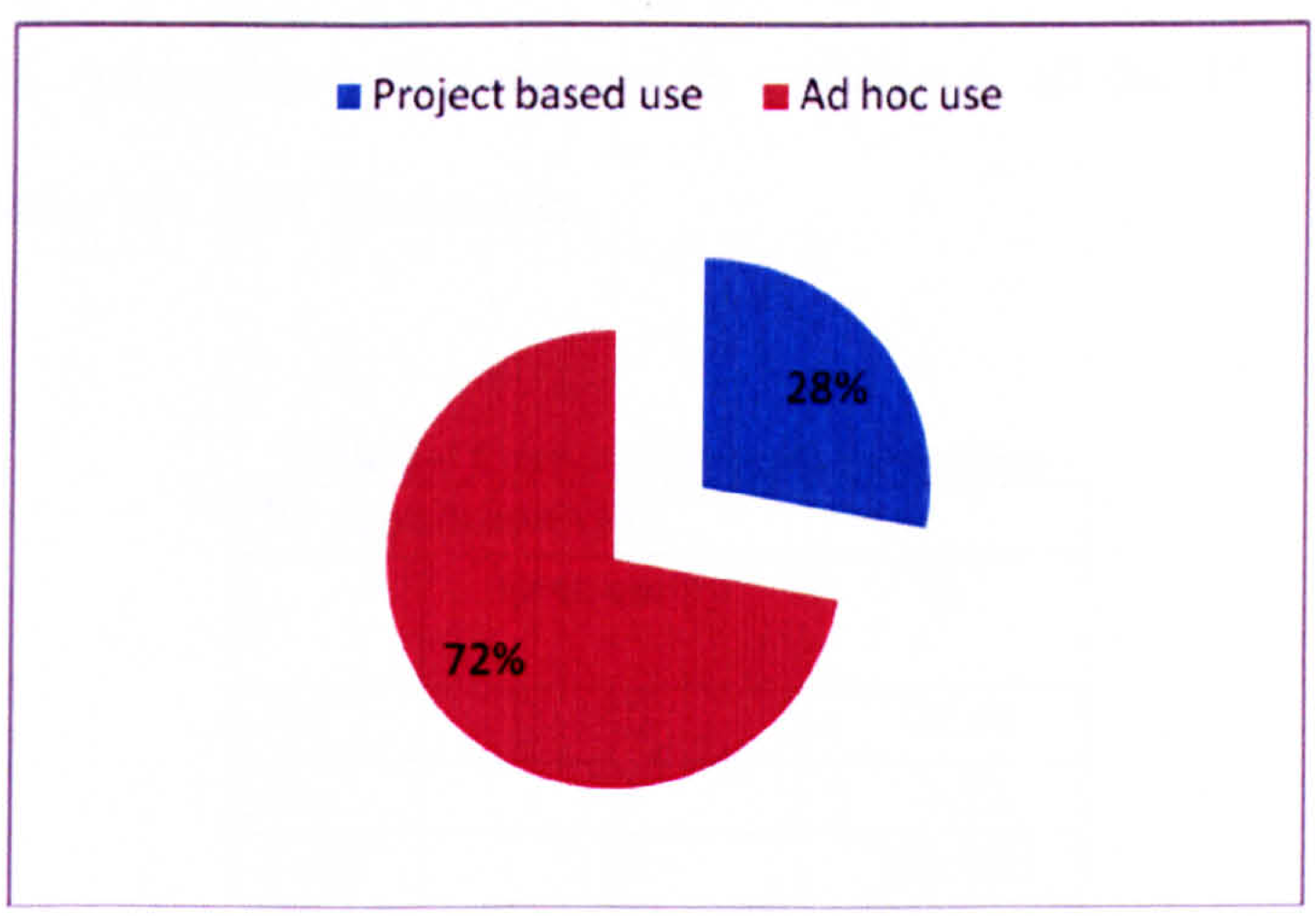

Figure 8-6 ABT users distribution between project based and ad hoc users

[52] Where there was apparent conflict between questions 1 and 7 the researcher contacted the respondents to ensure that the answers were correct. This resulted in few amendments because of respondents misunderstanding (see section 6.1.3).

Comparing the two types of ABT users, ad hoc vs. project-based, in terms of the intensity of ABT use, shows that more project-based users use ABT extensively, 58% compared to 23% of the ad hoc users (see Table 8-3); while more ad hoc users use ABT at a moderate level 57% compared to 33% for project-based users.

Table 8-3 Crosstab between ABT intensity of use and ABT mode of use

	Weak use		Moderate use		Extensive use		Total	
Project based use	8%	1	33%	4	58%	7	100%	12
Ad hoc use	9%	3	57%	20	23%	8	100%	31

8.1.4 Institutional and fashion setters' pressures

Table 8-4 contains frequency tables generated from questions 3 and 5 asking whether ABT had been imposed by regulation or by the parent company. It shows that the possibility that ABT could be imposed on a business unit does exist. In 17 cases ABT was imposed on business units by either regulation (2)[53] or by parent company (15). According to the answers to question 4, all the 15 business units' parent companies use ABT themselves.

Table 8-4 Coercive pressure/imposition

By regulation Q3		
	Frequency	**%**
No	150	98.68
Yes	2	1.32
Total	152	100.00
By parent company Q5		
No	137	90.13
Yes	15	9.87
Total	152	100

[53] Further investigation for more information about the regulation that made ABT obligatory was not possible as the respondents did not provide contact details.

Table 8-5 shows the distribution of these 17 cases according to their industrial sector. It can be seen that chemical and food industries are the main sectors where ABT was imposed.

Table 8-5 The distribution of imposition cases by manufacturing sectors

Industry sector	N
Manufacture of chemicals and chemical products	5
Manufacture of food, beverages and tobacco products	3
Manufacture of machinery and equipment not elsewhere classified	2
Manufacture of medical, precision and optical instruments	2
Manufacture of textile, wearing apparel; and leather products	1
Manufacture of electrical machinery, radio, TV and communication equipments.	1
Manufacture of basic and fabricated metals	1
Manufacture of rubber and plastic products	1
Manufacture of office machinery and computers	1
Total	17

8.1.4.1 Coercive pressure

The perceived coercive pressure was measured by items 7, 8, and 9 in question 6. The seven point scale with "don't know" option was collapsed to a nominal variable of three categories: (0) for those who were uncertain whether they agreed or disagreed (neutral point) and those who don't know, (1) for those who disagreed with the item statement and (2) for those who agreed with it. Figure 8-7 shows that the majority of the respondents are don't know/neutral or do not agree that ABT is recommended/promoted by their parent companies (82%).

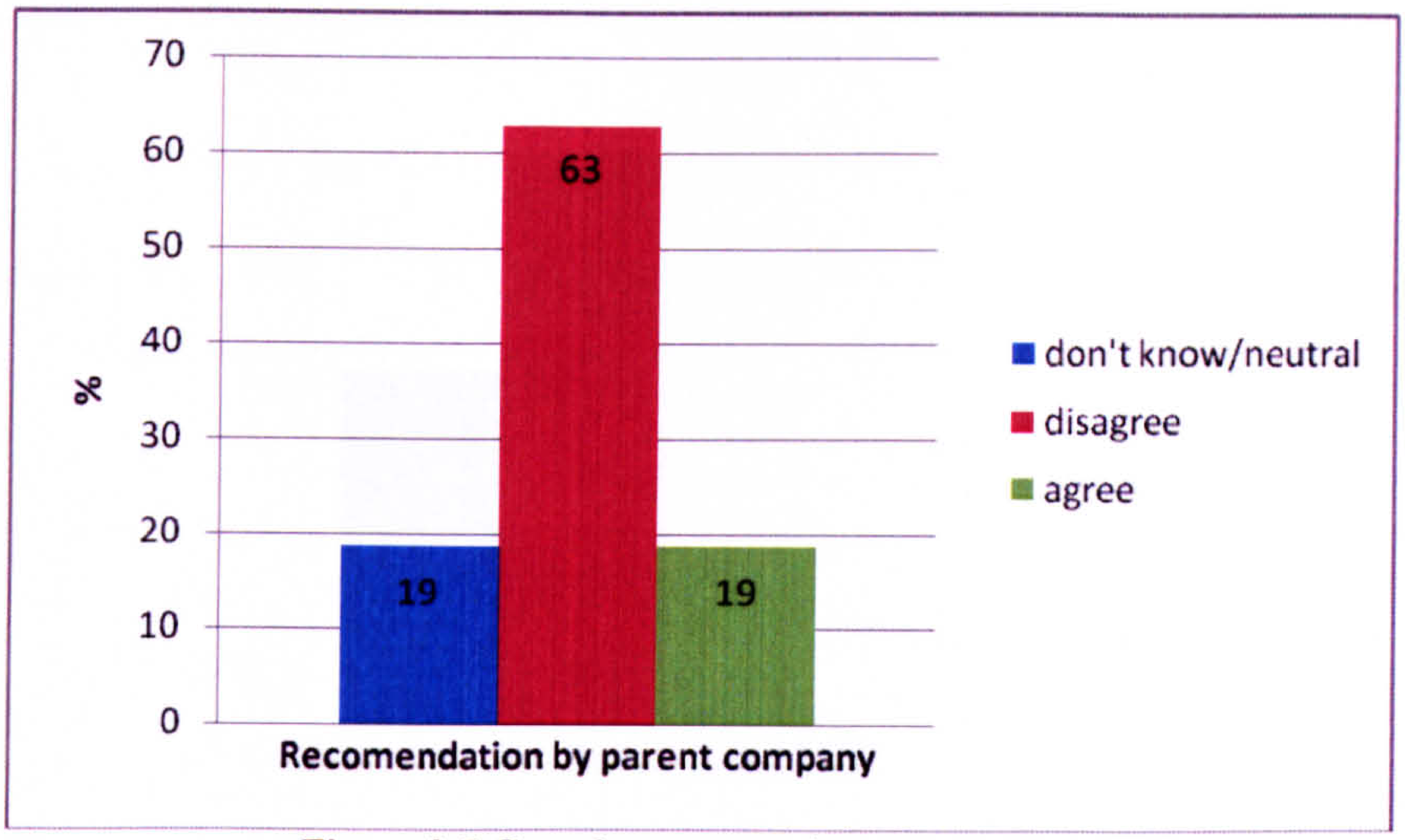

Figure 8-7 Coercive pressure/parent company

Parent companies of 38 (25%) of the surveyed business units use ABT. As noted in the previous section, 15 out of the 38 have imposed ABT in the respondents' business units. Only 7 of the remaining 23 parent companies were perceived as promoters of ABT use by the respondents. The rest of these companies were either perceived as not recommending ABT adoption (6) or their position with this regard was unknown/not clear for the respondent (10).

Table 8-6 Coercive pressure/parent company uses ABT

Use?	Frequency	%
No	114	75
Yes	38	25
Total	152	100

Figures 8-8 and 8-9 show that the same applies for the coercive pressure by the main suppliers and customers where a very small minority of the respondents agree with the existence of such pressure by suppliers (1%) and main customers (9%).

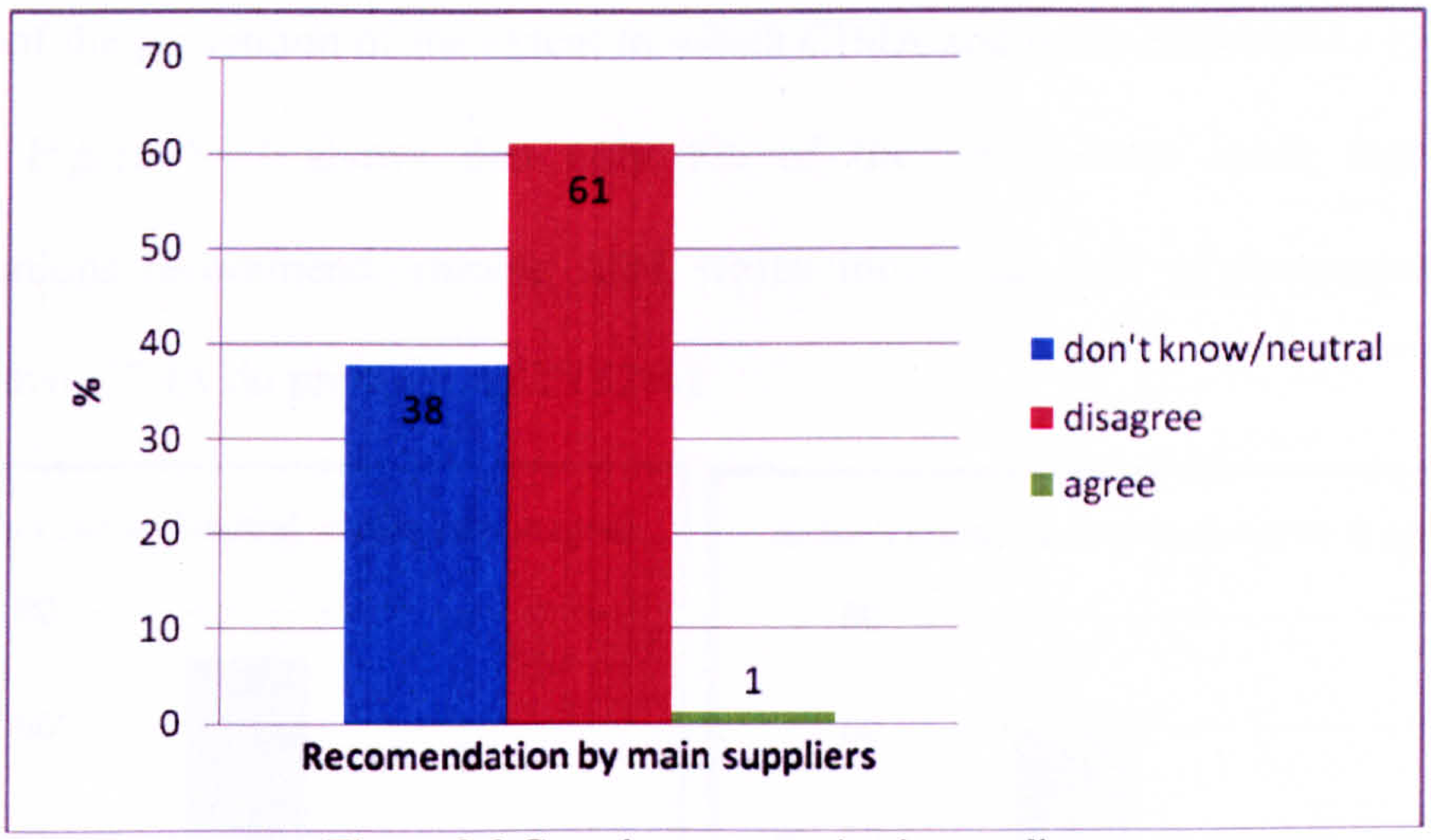

Figure 8-8 Coercive pressure/main suppliers

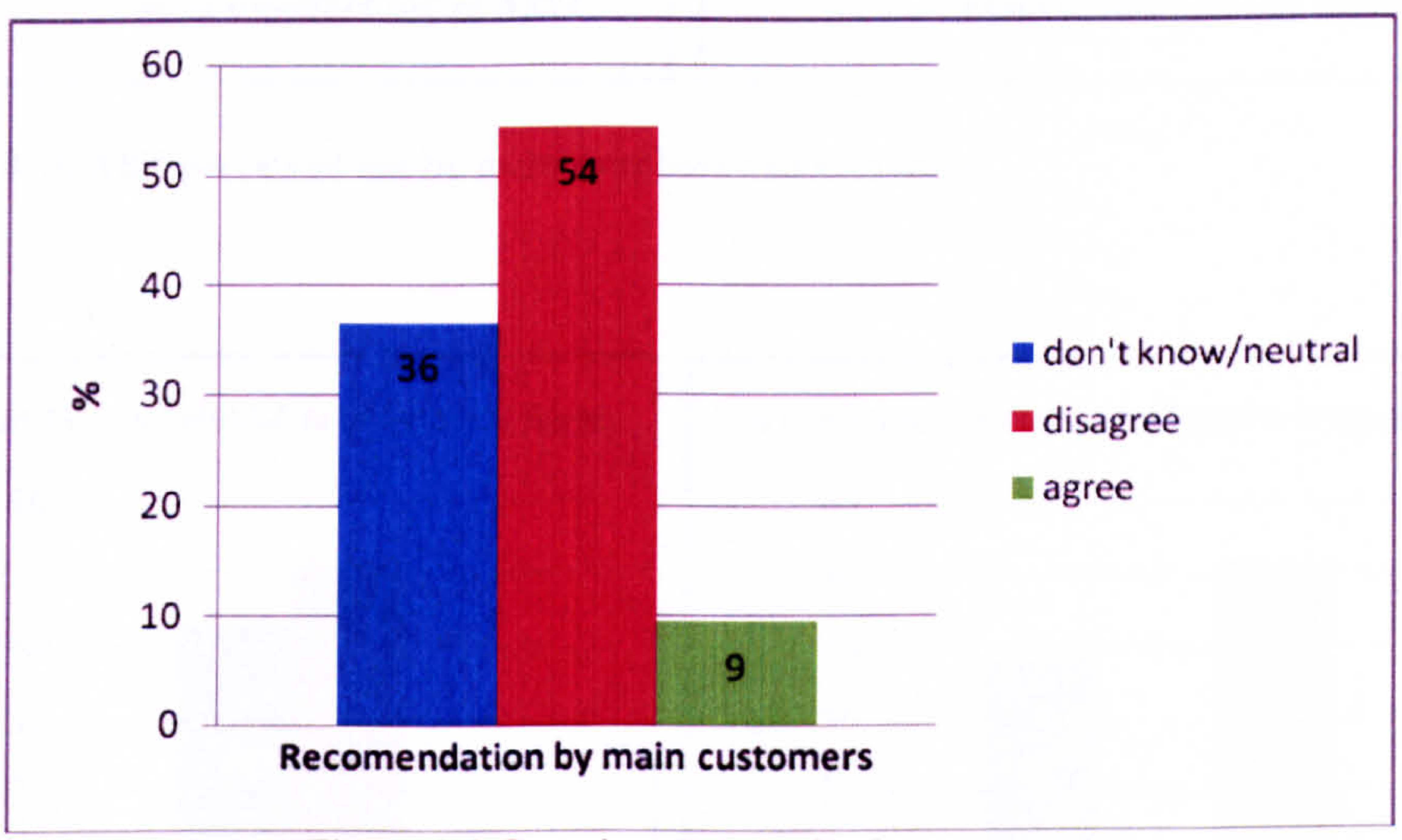

Figure 8-9 Coercive pressure/main customers

8.1.4.2 Normative pressures

Normative pressure was measured by four items (3,4,11,12) in question six. In terms of the extent of existing ABT usage by respondents' main suppliers and customers, Figure 8-10 shows that the majority of the respondents are don't know/neutral or do not agree that ABT is in use by their main suppliers (91%) and customers (82%). In terms of the perception of the extent to which CIMA and trade associations promote ABT, Figure 8-11 shows that only 5% of the respondents agree that trade associations recommend/promote ABT whilst more than half of the respondents agree that CIMA do promote ABT (52%).

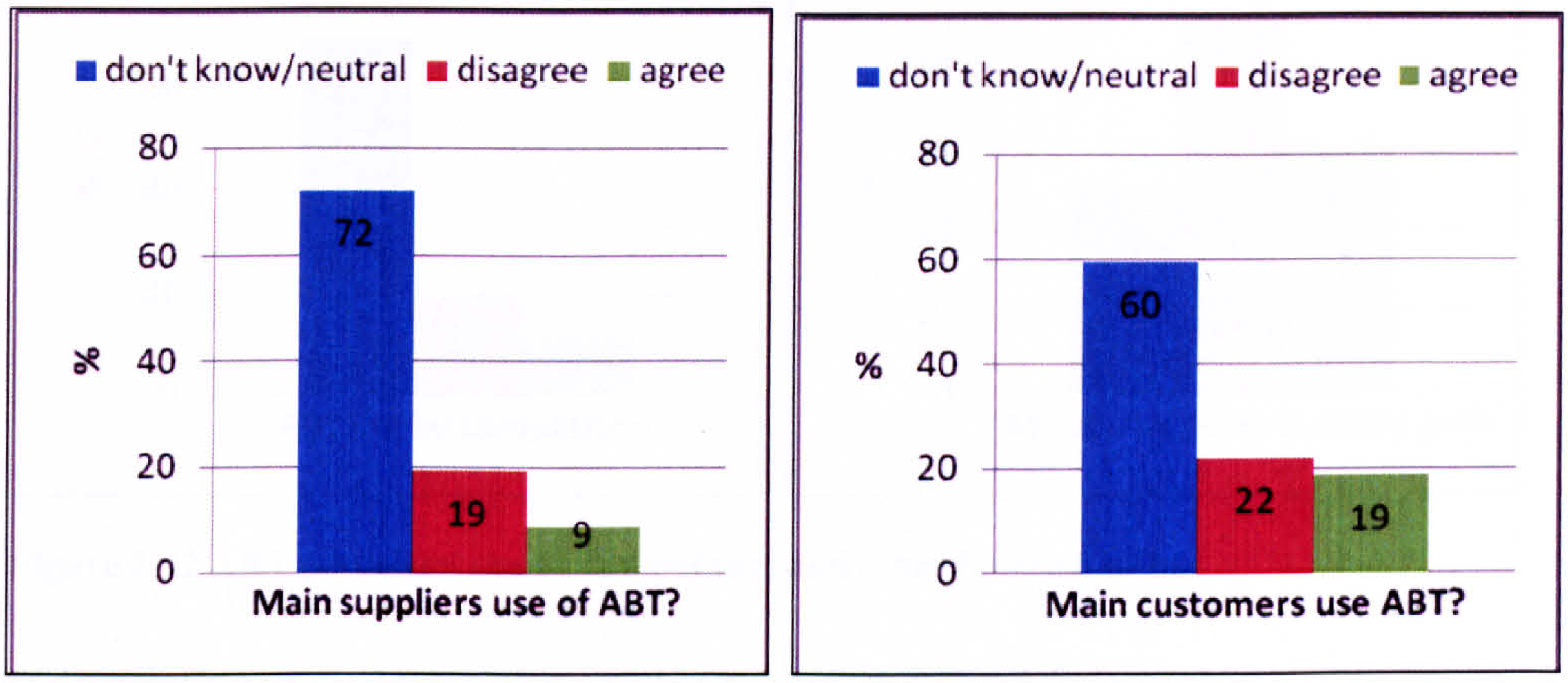

Figure 8-10 ABT perceived use by main suppliers and customers

Figure 8-11 ABT perceived promotion by trade association and CIMA

8.1.4.3 Mimetic pressure

Figure 8-12 shows the perceived extent of use of ABT by competitors (Q6-1) and other business units in the respondent's company (Q6-2). Only 11% (n=17) of respondents agree that ABT is in use by their competitors while this percentage increases to 29% (n=44) for the perceived use by other business units.

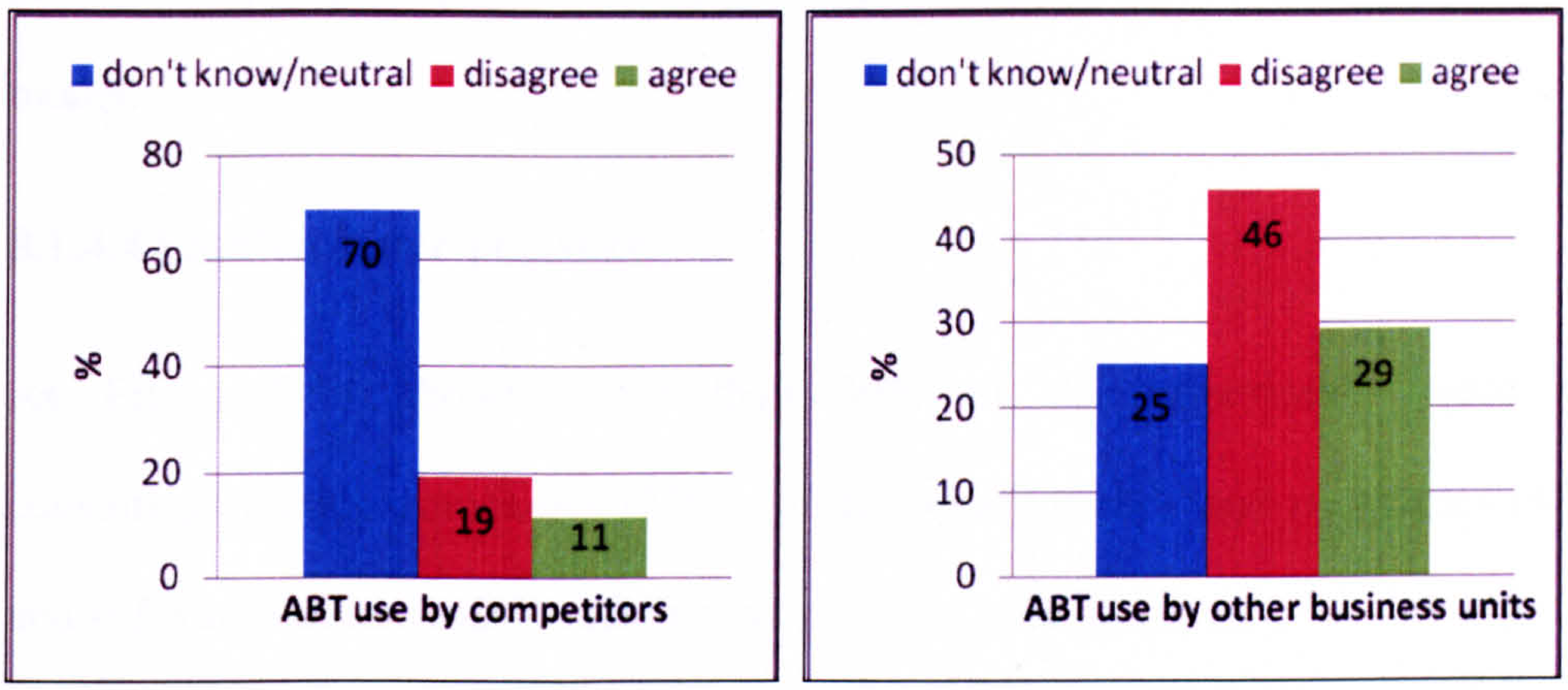

Figure 8-12 ABT perceived use by competitors and other business units

The perception of the extent to which competitors that have used ABT had benefited greatly (Q6-5), and had been perceived favourably by others in their industry (Q6-6) is presented in Figure 8-13. It can be seen that only a small minority of the respondents believe that competitors have benefited from ABT adoption (7%, n=10).

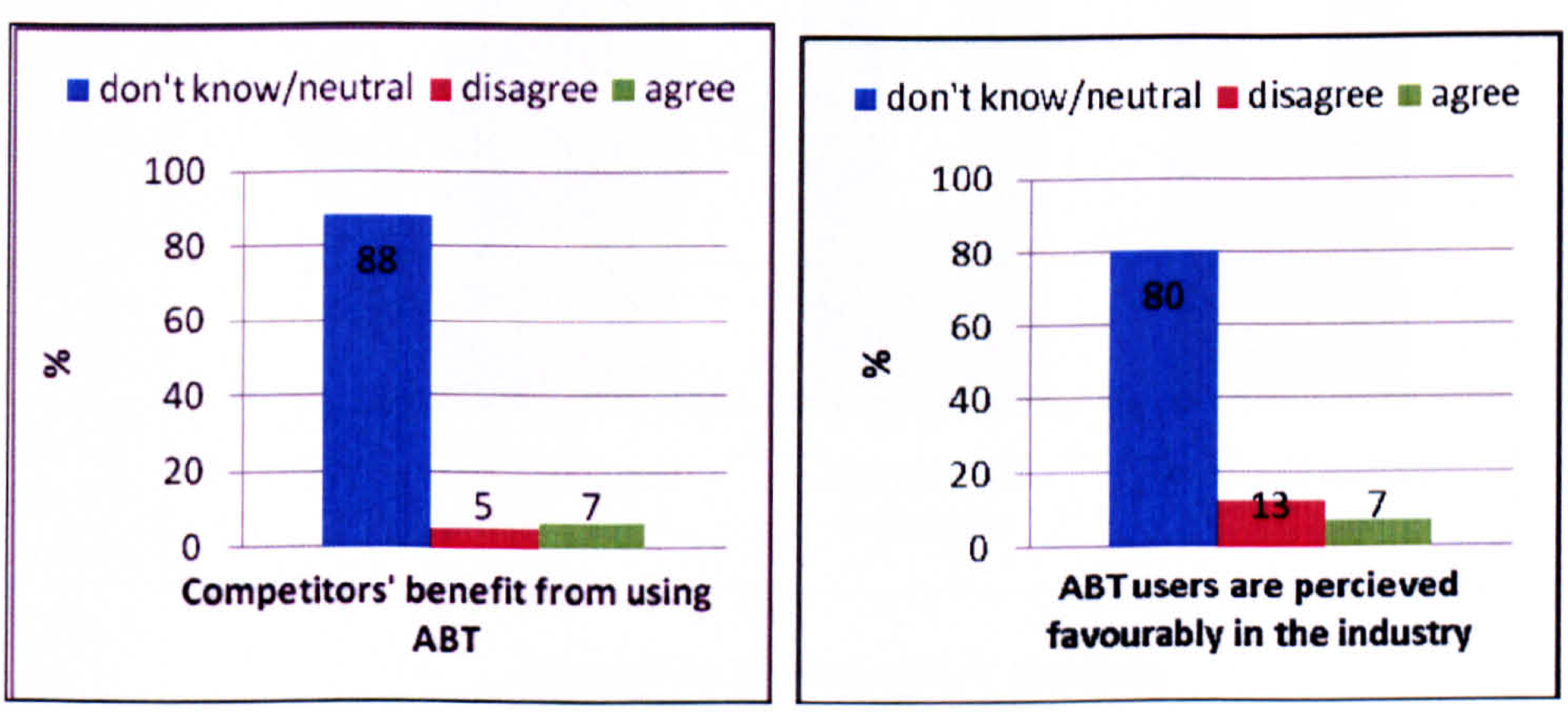

Figure 8-13 Competitors' benefit from using ABT

It might be assumed that mimetic pressures are weak because most respondents are either ignorant of or unconcerned by the ABT practices of competitors and other

SBUs. However, it will be shown that, where ABT is practiced by other SBUs in the same group of companies, this *does* influence local practice. In fact, mimetic pressure (copying the practice of other BUs) is a key variable in the final prediction model.

8.1.4.4 Fashion setter pressure

As Figure 8-14 shows, more than 30% of the respondents agree that consulting/auditing companies (37%), professional journals and magazines (49%) and software vendors (42%) recommend/promote ABT adoption.

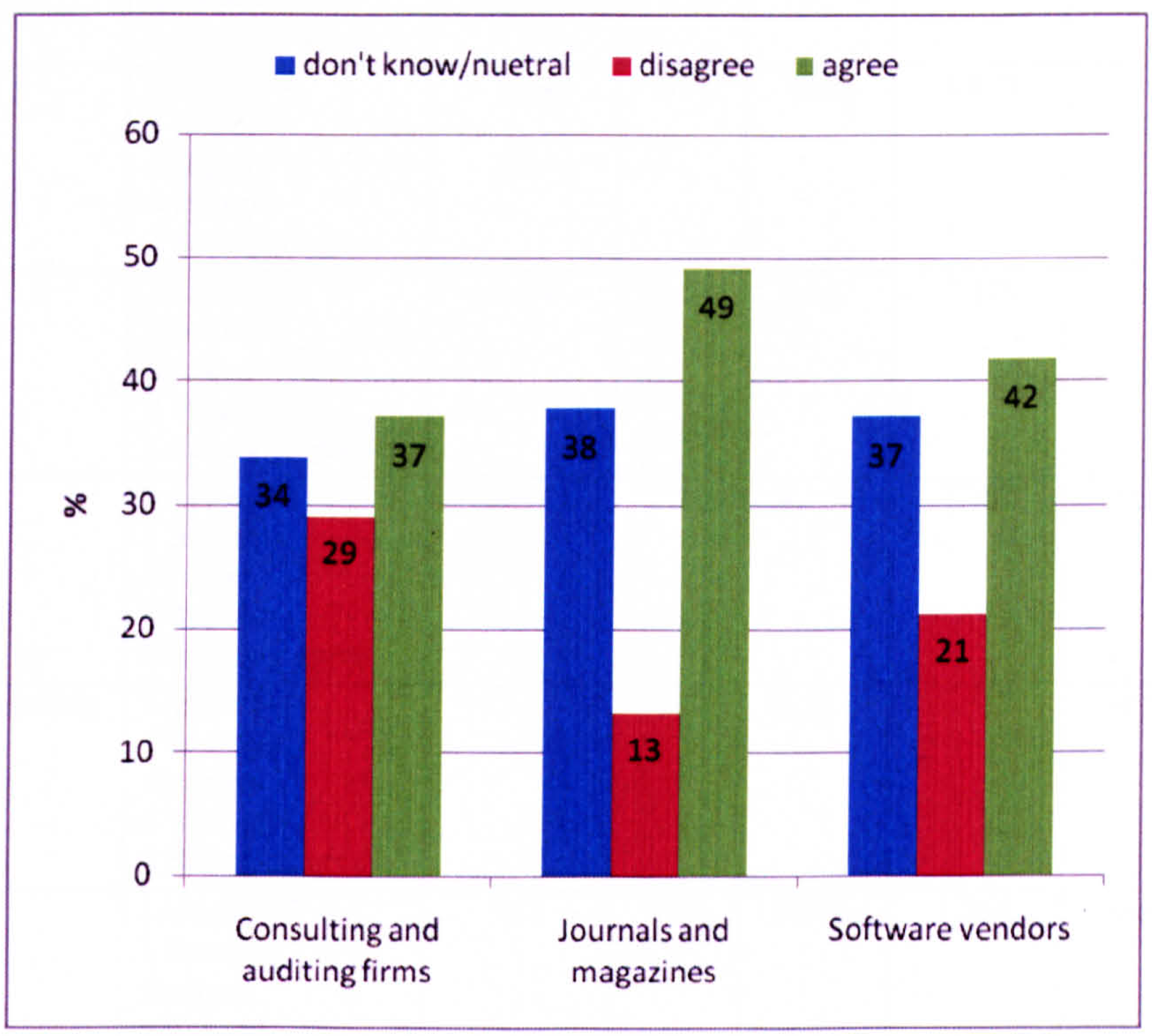

Figure 8-14 Fashion setters' pressure

Of course, respondents can agree that various agencies promote ABT without actually being influenced by such activities and this will be the conclusion drawn from further analysis.

8.1.5 Perceived ABT attributes

The perceived attributes of using ABT was measured by seven multiple-item scales. Table 8-7 contains the descriptive statistics for these variables. Respondents fall across almost the entire theoretical ranges available and therefore the data provides sufficient variance to support the testing of the research hypotheses.

Table 8-7 Descriptive statistics for using ABT perceived attributes

ABT attributes	Operationalization Scale	Theoretical range	Actual range	Mean	Std. Deviation	Skewness	Kurtosis
Relative Advantage Sum of 11 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	11-77	11-75	45.772	11.322	-0.377	0.395
Compatibility Sum of 2 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	2-14	2-14	7.688	3.072	-0.054	-0.785
Ease of Use Sum of 2 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	2-14	2-14	7.667	2.476	-0.063	-0.127
Image Sum of 2 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	2-14	2-14	8.100	2.787	-0.250	0.067
Result Demonstrability 1 item	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	1-7	1-7	4.331	1.337	-0.532	0.345
Trialability 1 item	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	1-7	1-7	4.814	1.365	-0.873	0.696
Cost Sum of 2 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	2-14	2-14	8.534	2.234	-0.149	0.492

8.1.6 Innovator's attributes

Innovator attributes were measured by multiple-item scales. Table 8-8 contains the descriptive statistics for these variables. The actual ranges observed are close to the theoretical ranges and therefore the data provides sufficient variance to support of the testing of the research hypotheses. Respondents were asked to select their strategic profile, from the three created by Snow and Hrebiniak (1980) that best described their SBU. The 59 SBUs classified as prospectors represent 38% of the respondents, the 36 analyzers 24% and the 57 defenders 38%. This is consistent with Miles and Snow (1978) who predicted that prospectors, defenders and analysers would be equally distributed in each industry.

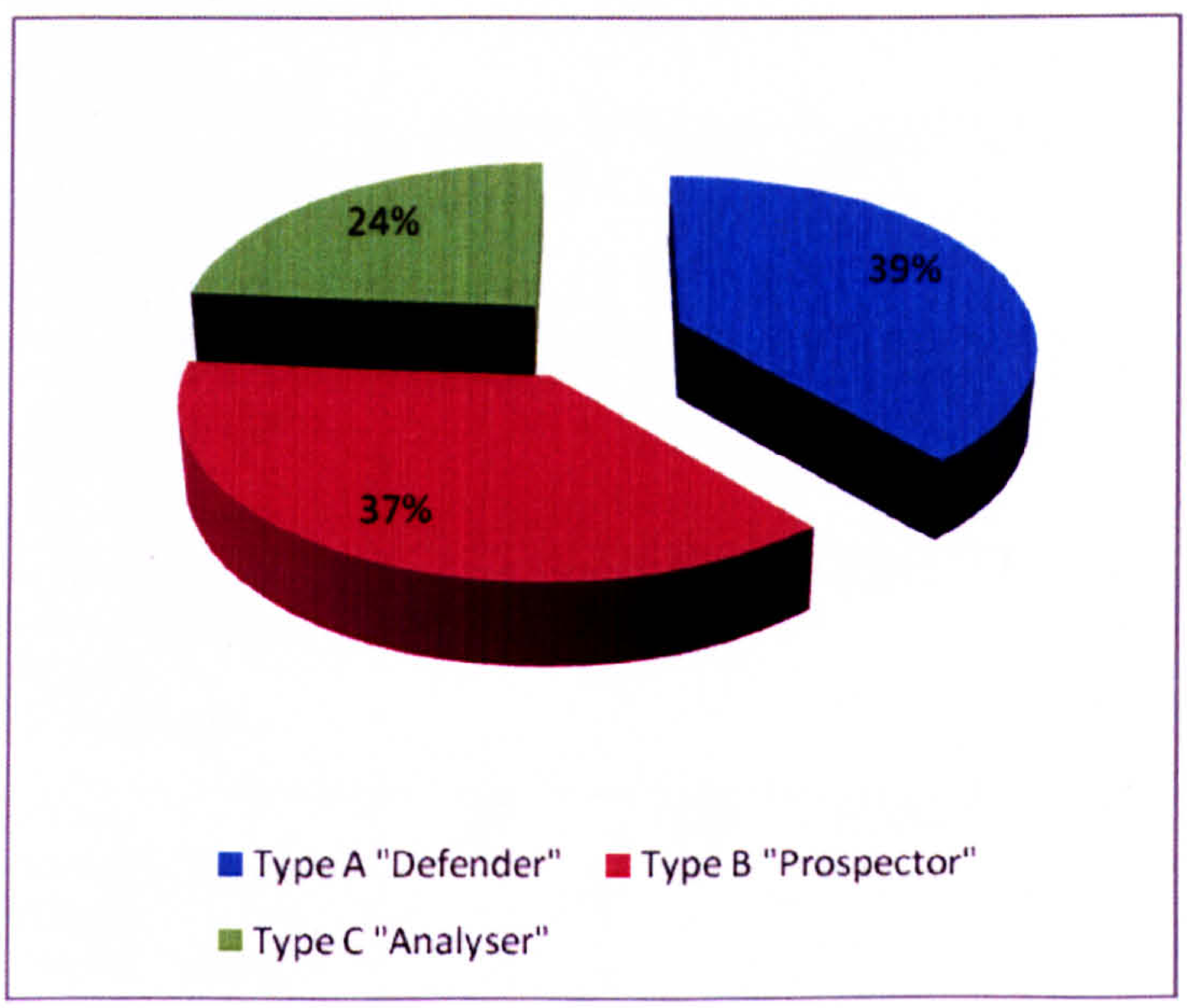

Figure 8-15 Business units' strategic profile

Table 8-8 Descriptive statistics for innovator attributes

Innovator's attributes	Operationalization Scale	Theoretical range	Actual range	Mean	Std. Deviation	Skewness	Kurtosis
Innovation Sum of 5 items	Lickert 1–7 1 Not valued 7 Valued to a very great extent	5-35	8-35	21.796	5.601	-0.270	-0.476
Outcome orientation Sum of 5 items	Lickert 1–7 1 Not valued 7 Valued to a very great extent	22	13-35	27.204	4.334	-0.711	0.609
Tight vs. loose control Sum of 8 items	Lickert 1–7 1 Not valued 7 Valued to a very great extent	39	17-56	34.586	8.197	-0.215	-0.501
Centralization Sum of 6 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	35	7-42	32.678	5.463	-1.182	3.725
Formalization Sum of 3 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	18	3-21	13.974	4.421	-0.505	-0.342
Vertical differentiation	Number of hierarchical levels	5	1-6	3.3	0.715	0.537	1.513
Information technology quality Sum of 5 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	30	5-35	23.941	7.246	-0.749	-0.077
Top management support Sum of 2 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	12	2-14	5.731	3.254	0.630	-0.475
Internal champion support Sum of 2 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	18	3-21	8.855	5.396	0.680	-0.561
Product complexity and diversity Sum of 4 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	24	4-28	16.270	4.748	-0.281	-0.162
Total Overhead	Overhead as a percentage of value added cost	70	10-80	33.763	13.411	0.737	0.536
Size	Natural Log of Sales size	0-max	5-4000 million	4.123	1.11	.289	.855

8.1.7 Environmental conditions

Table 8-9 contains the descriptive statistics for perceived environmental uncertainty and intensity of competition variables. The actual ranges observed are close to the theoretical ranges and therefore the data provides sufficient variance to support the testing of the research hypotheses.

Table 8-9 Descriptive statistics for environmental conditions

Environmental conditions	Operationalization Scale	Theoretical range	Actual range	Mean	Std. Deviation	Skewness	Kurtosis
PEU operational Sum of 4 items	Lickert 1–7 1 Highly predictable 4 Neutral 7 Highly unpredictable	7-28	5-24	12.197	3.963	0.745	0.311
PEU- supply side oriented Sum of 2 items	Lickert 1–7 1 Highly predictable 4 Neutral 7 Highly unpredictable	2-14	2-14	7.586	2.751	0.122	-0.800
PEU- Regulatory oriented Sum of 2 items	Lickert 1–7 1 Highly predictable 4 Neutral 7 Highly unpredictable	2-14	2-11	6.362	2.173	0.149	-1.007
Intensity of competition Sum of 5 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	5-35	13-33	23.704	3.882	-0.359	0.061

8.1.8 Need pull factors

The majority of the surveyed business units (68% n=104) did not face any compelling need that had an impact on their costing/cost management systems during the last two years. Table 8-11 shows the industry sectors that these business units belong to.

Table 8-10 Crosstab, business sector vs. compelling need

Industry	No	Yes	Total	% of total respondents from each industry
Manufacture of chemicals and chemical products	9	8	17	47%
Manufacture of food, beverages and tobacco products	15	7	22	32%
Manufacture of basic and fabricated metals	6	7	13	54%
Manufacture of medical, precision and optical instruments	5	6	11	55%
Manufacture of textile, wearing apparel; and leather products	5	3	8	38%
Manufacture of rubber and plastic products	6	3	9	33%
Miscellaneous	6	2	8	25%
Manufacture of wood and paper products.	10	2	12	17%
Manufacture of electrical machinery, radio, TV and communication equipments.	8	2	10	20%
Manufacture of machinery and equipment not elsewhere classified	12	2	14	14%
Aerospace, Aircraft and defence Manufacturing	3	1	4	25%
Manufacture of motor vehicles, trailers and other transport equipment.	6	1	7	14%
Publishing, printing and reproduction of recorded media	4	1	5	20%
Manufacture of other non-metallic mineral products	0	1	1	100%
Manufacture of office machinery and computers	2	1	3	33%
Manufacture of furniture; manufacturing not elsewhere classified	3	1	4	25%
Extraction/Manufacturing of coke, refined petroleum products and others.	4	0	4	0%
	104	48	152	

The degree of decision usefulness of cost information was measured by a four-item summated scale. Table 8-10 contains the descriptive statistics for this variable. Compared to the theoretical range, the actual ranges provide sufficient variance of the response to enable the testing of the hypotheses.

Table 8-11 Descriptive statistics for need pull factors

Need pull factors	Operationalization Scale	Theoretical range	Actual range	Mean	Std. Deviation	Skewness	Kurtosis
Degree of decision usefulness of cost information Sum of 4 items	Lickert 1–7 1 Strongly disagree 4 Neutral 7 Strongly agree	4-28	8-28	19.888	4.071	-0.547	0.022

8.2 Logistic regression analysis

The first step in the logistic regression analysis was to categorise the business units into non-adopters or adopters based on respondents' answers to question seven, stage model, and question one, ABT extent of usage. The answers to these two questions were cross-tabulated to identify two important groups: business units that adopt ABT and those that do not (See Table 8-12).

Table 8-12 ABT adopters and non-adopters

Stage of ABT implementation (Q7)	ABT extent of use (Q1)									
	1	2	3	4	5	6	7	Implementation process	Total	%
Not considered seriously yet	42	24	10	0	0	0	0	0	76	50 %
Interested seriously	0	1	2	3	0	0	0	3	9	5.9%
Approved	0	0	0	1	0	0	0	1	2	1.3%
Set-up	0	1	1	0	0	0	0	0	2	1.3%
Implemented	0	0	1	1	0	1	0	1	4	2.6%
Ramp-up	0	0	0	2	2	1	0	0	5	3.3%
Project based use	0	0	1	1	3	4	3	0	12	7.9%
Ad hoc use	0	0	3	8	12	6	2	0	31	20.4%
Considered but rejected	2	2	2	1	0	0	0	0	7	4.6%
Stopped after approval	1	0	0	0	0	0	0	0	1	0.7%
Failed ramp up	0	0	0	0	1	0	0	0	1	0.7%
Project based use ceased	0	1	0	0	0	0	0	0	1	0.7%
Ad hoc use ceased	0	0	0	0	1	0	0	0	1	0.7%
Total	45	29	20	17	19	12	5	5	152	100%

The aim was to establish groups of SBUs that were clearly non-adopters or clearly adopters. The following business units were not included in either group and were therefore excluded from the logistic regression analysis:

- Those claiming not to have seriously considered ABT but, nevertheless, had a weak use of ABT (34 BUs).
- Those with a serious interest in ABT (9 BUs).
- Those that have rejected, stopped or ceased ABT (11 BUs).

Arguably, these groups are neither clear non-adopters nor clear adopters. In addition, as recommended by Moore and Benbasat (1991), the 17 cases where ABT was imposed on the business unit were excluded as these BUs did not have a free choice to adopt or not adopt. Therefore, the 'non-adopters' group included all business units that have not considered ABT seriously yet and do not claim any level of use of ABT (42 BUs). The 'adopters' group included all business units that voluntarily used ABT (systematic and ad hoc use) at the time of the survey and business units that were progressing the implementation process after the approval of ABT implementation (39 BUs).

After grouping the cases, the three-stage analysis strategy explained in chapter six was employed. This analysis followed three steps:

1- Each independent variable was correlated individually with the dependent variable (adoption/no adoption)

2- Significant variables identified in step 1 provided the independent variables for a within-block multivariate logistic regression analysis.

3- Significant variables from the second step were regressed in the final model.

The first step of this analysis is important, as the variable selection process of building a logistic regression model "should begin with a careful univariable analysis of each variable"[54] (Hosmer and Lemeshow, 2000, p.92). Pearson Chi-square was used to test the association between categorical indicators and the dependent variable. To measure the strength of this association Cramer's V was calculated. For continuous variables "the most desirable univariable analysis involves fitting a univariable logistic regression model" which is equivalent to two-sample t-test analysis (Hosmer and Lemeshow, 2000, p.93). In the second stage of the analysis, the within block logistic regression, variables identified in the previous step as being significant predictors of ABT adoption were entered into further logistic regression analyses within their blocks. This within block analysis aimed to identify those variables within each group that are significant predictors of ABT adoption after controlling for the other significant variables within each block[55]. The following sections provide the results of the first two steps block by block.

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[54] The use of the term bivariate analysis and univariable analysis can be confusing. Hosmer and Lemeshow are referring to univariable logistic regression i.e. a logistic regression analysis including only one independent variable. Univariable logistic regression is asymptotically equivalent to the Pearson Chi-square test (Hosmer and Lemeshow, 2000: 93).

[55] Absence of perfect/high multicollinearity, which is a logistic regression analysis requirement, was checked and confirmed for each block of variables based on the tolerance values of the independent variables.

8.2.1 Block 1, Institutional push factors

As presented early in this chapter and in chapter six, the institutional pressures were measured as nominal variables, consisting of three categories: respondents that do not know or are neutral about the statement that measures the pressure, those that disagree and those that agree with these statements. The results of correlating institutional pressures indicators with the dependent variable (ABT adoption) are presented in Table 8-13.

Table 8-13 Bivariate analysis, institutional pressures

Institutional pressures	χ^2	df	Sig	Cramer's V
Coercive pressure/ parent company	**16.283**	**2**	**0.000**	**.451**
Coercive pressure/ suppliers	3.882	2	0.144	-
Coercive pressure / customers	4.264	2	0.119	-
Mimetic pressure/ competitors	2.723	2	0.256	-
Mimetic pressure/ other SBUs	**31.137**	**2**	**0.000**	**.624**
Mimetic pressure/competitors benefit from ABT.	1.347	2	0.510	-
Mimetic pressure/competitors image	.379	2	0.827	-
Normative pressure/ suppliers	5.936	2	0.051	-
Normative pressure/ customers	**12.832**	**2**	**0.002**	**.401**
Normative pressure/ trade association	1.371	2	0.504	-
Normative pressure/ CIMA	5.770	2	0.056	-
Fashion setters' pressure/ consultants	4.580	2	0.101	-
Fashion setters' pressure/ Journals and magazines	1.679	2	0.432	-
Fashion setters' pressure/ Software vendors	3.294	2	0.193	-

As can be seen, three indicators are significantly associated with ABT adoption: coercive pressure that comes from the recommendation of ABT by the parent company (χ^2 = 16.283, df = 2, p = 0.000), mimetic pressure that resulted from mimicking other business units, (χ^2 = 31.137, df = 2, p = 0.000) and normative pressure that stems from the perception that main customers use ABT (χ^2 = 12.832, df = 2, p = 0.002). According to de Vaus (2007, p.258), "in social sciences a correlation of 0.30 might be regarded as relatively strong". Therefore the significant correlation between ABT adoption with mimicking other BUs (Cramer's V= 0.624) can be classified as relatively very strong correlation and moderate to substantial for the other two indicators (Cramer's V= 0.451, 0.401). To have a closer look at these significant relationships, cross tables are used. Table 8-14 shows that almost 91% of those who agreed that their parent company actively recommend/promote ABT use have already adopted ABT. The majority of those who disagreed with the existence of this pressure (68.6%) did not adopt ABT.

Table 8-14 Cross-tab, ABT adoption vs. coercive pressure/parent

Adoption		Coercive pressure/parent recommend Q6.7			Total
		don't know neutral	disagree	agree	
No	Count	6	35	1	42
	%	33.3%	68.6%	9.1%	52.5%
Yes	Count	12	16	10	38
	%	66.7%	31.4%	90.9%	47.5%
Total	Count	18	51	11	80
	%	100.0%	100.0%	100.0%	100.0%

Table 8-15 shows that almost 96% of those who agreed that ABT is currently in use by other business units in their companies have adopted ABT. Moreover, 78% of those who do not agree with the existence of this pressure have not adopted ABT. The majority of those who are not aware of this pressure (64%) also did not adopt ABT.

Table 8-15 Cross-tab, ABT adoption vs. mimetic pressure/other BUs

Adoption		The extent to which ABT is in use in other business units Q6.2			Total
		don't know neutral	disagree	agree	
No	Count	16	25	1	42
	%	64.0%	78.1%	4.3%	52.5%
Yes	Count	9	7	22	38
	%	36.0%	21.9%	95.7%	47.5%
Total	Count	25	32	23	80
	%	100.0%	100.0%	100.0%	100.0%

Table 8-16 shows that almost 88% of those who agreed that ABT is currently in use by their main customers have adopted ABT. Moreover, 62% of those who do not agree with the existence of this pressure did not adopt ABT.

Table 8-16 Cross-tab, ABT adoption vs. normative pressure/ main customers

Adoption		Normative pressure by main customers Q6.4			Total
		don't know neutral	disagree	agree	
No	Count	30	10	2	42
	%	62.5%	62.5%	12.5%	52.5%
Yes	Count	18	6	14	38
	%	37.5%	37.5%	87.5%	47.5%
Total	Count	48	16	16	80
	%	100.0%	100.0%	100.0%	100.0%

These cross tables show why the mimetic pressure/ABT used by other BUs has the most powerful association. These three indicators were taken forward to the multivariate analysis in the second stage[56]. As presented in Table 8-17, a logistic regression model of one significant predictor ($p<0.05$) is the result of the within-block analysis for institutional pressures. Only mimicking other business units that adopted ABT continued to be significant after controlling for other institutional pressures.

Table 8-17 Logistic regression's model - Block 1

Institutional push pressures	**N**	**P value**	**OR**	**95% CI lower**	**95% CI upper**
Coercive pressure/ parent company	80	0.149	2.03	0.78	5.32
Mimetic pressure/ other SBUs	**80**	**0.000**	**8.50**	**3.59**	**12.14**
Normative pressure/ customers	80	0.787	0.91	0.45	1.83

This model correctly classifies 81.5% of the cases. This represents a significant improvement of 27.2% of prediction power from the intercept-only model (χ^2

[56] To simplify the interpretation of the resulting model, these items were recoded into two categories: respondents that do not know, are neutral or disagree with the statements that measure the pressure (coded 0); and those that agree with these statements (coded 1).

= 49.026, df = 1, p = 0.000). This model shows that the presence of mimetic pressure increases the odds of adopting ABT by 750%. Hosmer-Lemeshow goodness-of-fit test yielded a χ^2 (1) of .874 and was insignificant ($p > 0.05$), suggesting that the model fitted the data well. In other words the null hypothesis of a good model fit to data was tenable. Table 8-18 shows the overall significance of the model and its related goodness-of-fit and pseudo R^2 measures.

Table 8-18 Model specifications - Block 1

Tests (Significant Variables)		χ^2	**df**	**P**
Likelihood ratio test		49.026	1	.000
Hosmer and Lemeshow Test		.874	1	.350
-2 Log likelihood	77.817	**Overall correct classification**		
Cox & Snell R Square	0.413	Intercept-only model		Block1 model
Nagelkerke R Square	0.552	54.3%		81.5%

Overall the first two steps analyses lend support to the institutional perspective. As described in chapter 5, institutional theory identifies three forms of pressures to conform: coercive, mimetic and normative. This analysis reveals that, for each of these categories, there is a particular pressure that has a very significant correlation with the dependent variable. Coercive pressure by the parent company, mimetic pressure from other SBUs and normative pressure from customers are identified as key predictors. Combining these three predictors in one model resulted in a logistic model with one predictor: mimetic pressure. It is noted that, although the dominant variable is mimetic pressure from other SBUs, this variable is likely to be related to coercive pressure by the parent company. If the parent company applies coercive pressure to adopt ABT this may be magnified (or diminished) if other SBUs adopt ABT (or resist adoption). Therefore, at this level of the analysis, the results partially support hypothesis 1. Only mimetic pressure from other SBUs was fitted in a significant logistic model after controlling for other potential variables.

8.2.2 Block 2, Perceived attributes of ABT

Table 8-19 shows the result of univariable logistic analysis for the perceived attributes of using ABT. All the predictors are found to be significant predictors of ABT adoption (P<0.10).

Table 8-19 Univariable logistic regression, ABT attributes

Perceived ABT attributes	N	P value	Odds Ratio	95% CI lower	95% CI upper
Perceived relative advantage of ABT	81	0.000	3.638	1.872	7.068
Perceived image of ABT	81	0.000	3.860	1.864	7.995
Perceived compatibility of ABT	81	0.000	5.591	2.579	12.121
Perceived ease of ABT	81	0.000	3.876	1.936	7.760
Perceived demonstrabilty of ABT results	81	0.000	9.865	3.361	28.959
Perceived trialability of ABT	81	0.039	1.706	1.028	2.831
Perceived cost of ABT	81	0.001	0.349	0.189	0.645

To confirm this result a suitable correlation test was used. According to de Vaus (2007, p.262) when the dependent variable is dichotomous the level of measurement of the independent variable could be used to determine the choice of the correlation coefficient. The independent variables are measured as composite indexes which are normally considered to have ordinal level (Babbie, 2001); therefore the nonparametric Kendal's tau test was used. The results of this test are shown in Table 8-20, which confirm the findings of the logistic regression test and also show the direction of these relationships. Therefore all these predictors were included in the second stage of the analysis.

Table 8-20 Kendal's tau test, ABT attributes

ABT attribute	N	T	P
Perceived relative advantage of ABT	81	0.423	**0.000**
Perceived image of ABT	81	0.402	**0.000**
Perceived compatibility of ABT	81	0.489	**0.000**
Perceived ease of ABT	81	0.444	**0.000**
Perceived demonstrabilty of ABT results	81	0.546	**0.000**
Perceived trialability of ABT	81	0.150	**0.032**
Perceived cost of ABT	81	-0.385	**0.000**

As presented in Table 8-21, a logistic regression model of three significant independent variables ($p < 0.10$) (compatibility, ease of use and demonstrability) is the result of the within ABT attributes block analysis. This model correctly classifies 80.9% of the cases. This represents an improvement of 26.6% of prediction power from the intercept-only model ($\chi^2 = 62.958$, df = 3, p = 0.000). This model shows that for each one Standard Deviation (SD) increase in perceived compatibility, ease of use and demonstrability of ABT, the odds of adopting ABT increases by 262%, 138% and 364% respectively. Hosmer-Lemeshow goodness-of-fit test yielded a χ^2 (8) of 3.453 and was insignificant ($p > 0.05$), suggesting that the model fitted the data well. In other words the null hypothesis of a good model fit to data was tenable. Table 8-22 shows the overall significance of the model and its related goodness-of-fit and pseudo R^2 measures.

Table 8-21 Logistic regression model - Block 2

Independent variable	N	P value	OR	95% CI lower	95% CI upper
Perceived relative advantage of ABT	81	0.124	2.10	0.82	5.43
Perceived image of ABT	81	0.231	1.78	0.69	4.58
Perceived compatibility of ABT	**81**	**0.012**	**3.62**	**1.33**	**9.91**
Perceived ease of ABT	**81**	**0.060**	**2.38**	**0.96**	**5.87**
Perceived demonstrability of ABT results	**81**	**0.006**	**4.64**	**1.56**	**13.84**
Perceived cost of ABT	81	0.322	0.68	0.31	1.47

Table 8-22 Model specifications – Block 2

Tests (Significant Variables)		χ^2	df	P
Likelihood ratio test		62.958	3	.000
Hosmer and Lemeshow Test		3.453	8	.903
-2 Log likelihood	66.288	**Overall correct classification**		
Cox & Snell R Square	0.488	Intercept-only model		Block 2 model
Nagelkerke R Square	0.653	54.3%		80.9%

Based on the results of the first two steps of this analysis, it is concluded that the perceived attributes of ABT do play a vital role in ABT adoption/non-adoption. The multivariate analysis suggests that the perceived demonstrability of the results of using ABT is the most influential predictor. This could give an indication that, at this stage of ABT diffusion, decision makers place a high emphasis on the assurance that ABT techniques can deliver what they promise. Also, with the same line of reasoning, using ABT should, ideally, be perceived as compatible with existing cultures, processes and practices. Finally, the perception that using ABT is easy to learn and implement appears to play a role in facilitating ABT adoption. In summary, it can be concluded that although all the studied attributes are associated with ABT adoption in this sample, such adoption is more likely to happen when using ABT is perceived as easy, compatible and the results of such use has clear and demonstrable advantages and benefits. Therefore, at this level of the analysis, the results support hypothesis 6 with regard to three attributes: ease, compatibility and demonstrability.

8.2.3 Block 3, Innovator Attributes

Table 8-23 shows the result of the univariable logistic analysis of the association between ABT adoption and the attributes of the business units that were measured as indexes. Five variables out of fourteen were found to be significantly associated with ABT adoption ($p < 0.10$): having an outcome oriented culture, tight control, large size, top management support and champion support.

Table 8-23 Univariable logistic regression, innovator attributes

Innovator attributes	N	P value	Odds Ratio	95% CI lower	95% CI upper
Innovation dimension of BU culture	81	0.228	1.319	0.841	2.069
Outcome orientation dimension of BU culture	**81**	**0.002**	**2.338**	**1.350**	**4.047**
Tight vs. loose control	**81**	**0.031**	**1.689**	**1.050**	**2.716**
Centralization	81	0.641	1.111	0.713	1.731
Formalization	81	0.069	1.548	0.966	2.480
Vertical differentiation	81	0.843	1.04	0.690	1.57
Level of Overhead	81	0.946	1.015	0.655	1.574
Information technology quality	81	0.523	1.155	0.742	1.800
Size	**81**	**0.015**	**1.885**	**1.131**	**3.140**
Top management support	**81**	**0.000**	**8.331**	**3.557**	**19.515**
Champion support	**81**	**0.000**	**4.393**	**2.230**	**8.655**
Product lines diversity	81	0.853	1.042	0.672	1.617

This finding is confirmed by using Kendal's tau test as shown in Table 8-24.

Table 8-24 Kendal's tau test, innovator attributes

Innovator attribute	N	T	P
Innovation dimension of BU culture	81	0.121	0.198
Outcome orientation dimension of BU culture	81	0.326	**0.001**
Tight vs. loose control	81	0.193	**0.038**
Centralization	81	-0.005	0.958
Formalization	81	0.166	0.080
Vertical differentiation	81	0.023	0.827
Level of Overhead	81	-0.009	0.925
Information technology quality	81	0.078	0.404
Size	81	0.253	**0.006**
Top management support	81	0.579	**0.000**
Champion support	81	0.513	**0.000**
Product lines diversity	81	0.034	0.715

Chi-square was used for the categorical variable of business strategy and the result showed no association between ABT adoption and this variable ($\chi^2 = 1.240$, df = 2, p = 0.538). Therefore only five variables entered the logistic regression in the second stage of the analysis. As presented in Table 8-25, a logistic regression model of two significant independent variables ($p < 0.10$) (outcome orientation, top management support) is the result of the within innovator attributes block analysis. This model correctly classifies 87.2% of the cases. This represents an improvement of 32.9% from the intercept-only model ($\chi^2 = 66.214$, df = 4, p = 0.000). This model shows that for each one Standard Deviation (SD) increase in outcome orientation and top management support, the odds of adopting ABT increases by 100% and 457% respectively. Hosmer-Lemeshow goodness-of-fit test yielded a χ^2 (8) of 3.453 and was insignificant ($p > 0.05$), suggesting that the model fitted the data well. In other words the null hypothesis of a good model fit to data was tenable. Table 8-26 shows the overall significance of the model and its related goodness-of-fit and pseudo R^2 measures.

Table 8-25 Logistic regression's model - Block 3

Innovator attribute	N	P value	OR	95% CI lower	95% CI upper
Outcome orientation dimension of BU culture	**81**	**0.082**	**2.00**	**0.92**	**4.37**
Tight versus loose control dimension of BU culture	81	0.265	0.58	0.22	1.51
Size	81	0.221	1.52	0.78	2.98
Top management support	**81**	**0.002**	**5.57**	**1.92**	**16.15**
Champion support	81	0.274	1.60	0.69	3.73

Table 8-26 Model specifications – Block 3

Tests (Significant Variables)		χ^2	df	P
Likelihood ratio test		66.214	4	.000
Hosmer and Lemeshow Test		3.453	8	.903
-2 Log likelihood	63.032	**Overall correct classification**		
Cox & Snell R Square	0.506	Intercept-only model		Block3 model
Nagelkerke R Square	0.677	54.3%		87.2%

The results of the first two stages of analysis showed that ABT adoption is more likely when a business unit has an outcome oriented culture and its top management shows and shares its support for adoption. This result, at this level of the analysis, partially supports hypothesis 8, which links dimensions of organisational culture with ABT adoption, with relation to outcome orientation dimension. Also this result provides support for hypothesis 15 as it provides evidence of the impact of top management support as a predictor of ABT adoption. Hypotheses related to organisational structure (9, 10 and 11), business strategy (12), size (13), IT quality (14), internal champion support (16), level of overhead (17) and product complexity and diversity (18) were not supported by the analysis.

8.2.4 Block 4, Environment attributes

Table 8-27 contains the results of univariable logistic regression for the environmental factors. None of these factors were found to significantly predict ABT adoption. Therefore both perceived environment uncertainty and intensity of competition do not seem to affect ABT adoption choices in this sample. Therefore, the results do not support hypotheses 4 and 5. Consequently, environmental variables were not included in the following stages of the analysis.

Table 8-27 Univariable logistic regression, environmental conditions

Environmental conditions	N	P value	Odds Ratio	95% CI lower	95% CI upper
PEU/operational	81	0.937	0.982	0.633	1.523
PEU/supply	81	0.237	1.309	0.838	2.046
PEU/ regulatory	81	0.477	0.852	0.548	1.325
Competition intensity	81	0.308	1.262	0.807	1.973

8.2.5 Block 5, Need pull factors

As shown in Table 8-28, the importance of cost information is a significant predictor of ABT adoption ($p < 0.10$). While the existence of a compelling need to change was found to be insignificant ($\chi2$ (1) = 4.470 p = 0.134) and was excluded from the following stage of the analysis. These results support hypothesis 3 but not hypothesis 2.

Table 8-28 Association tests for need pull factors

Need pull factors	N	P value	Odds Ratio	95% CI lower	95% CI upper
Importance of cost information	**81**	**0.053**	**1.590**	**0.994**	**2.544**
	χ^2	df	Sig.	Cramer's V	
Compelling need	4.470	1	.134	-	

8.2.6 The final model

In the second step of this analysis, variables identified in the first step as being significant predictors of ABT adoption were entered into further logistic regression analyses within their blocks. Variables identified from each separate block as significant independent predictors of ABT adoption were then regressed in one holistic model[57] (see Table 8-29). This global analysis resulted in the final model that contains those variables that are significant predictors of ABT adoption.

Table 8-29 Final model initial predictors

Independent variable blocks	Significant predictors
Institutional push pressures	Mimetic pressure /Other business units
Need pull factors	Importance of cost information
ABT perceived attributes	Perceived compatibility of ABT Perceived ease of ABT Perceived demonstrability of ABT results
Innovator attributes	Outcome orientation dimension of BU culture Top management support
Environmental conditions	None

As shown in Table 8-30, a three-predictor logistic model was fitted to the data. This model correctly classifies 89.1% of the cases. This represents an improvement of 34.9% of prediction power from the intercept-only model (χ^2 = 79.46, df = 3, p = 0.000). This model shows that for each one Standard Deviation (SD) increase in Mimetic pressure/BU, Demonstrability, and Top Management Support, the odds of adopting ABT increases by 297%, 352% and 507% respectively. Hosmer-Lemeshow goodness-of-fit test yielded a χ^2 (8) of 7.099 and was insignificant (p > 0.05), suggesting that the model fitted the data well. In other words the null hypothesis of a good model fit to data was tenable. Table 8-31 shows the overall significance of the model and its related goodness-of-fit and pseudo R^2 measures.

[57] The importance of cost information factor was entered directly in the final stage as it is the only significant variable from block 5.

Table 8-30 Logistic regression – Final model

Predictor	β	S.E. β	Wald's χ^2	df	p	OR	95% CI lower	95% CI upper
Mimetic pressure/ other SBUs	1.378	0.54	6.55	1	0.010	3.97	1.38	11.40
Demonstrability perceived	1.508	0.58	6.78	1	0.009	4.52	1.45	14.05
Top Management Support	1.622	0.57	8.24	1	0.004	5.07	1.67	15.34
Constant	0.971	0.48	4.15	1	0.042	2.64		

Table 8-31 Final model specifications

Tests (Significant Variables)		χ^2	df	P
Likelihood ratio test		79.46	3	0.000
Hosmer and Lemeshow Test		7.099	8	0.526
-2 Log likelihood	47.383	**Overall correct classification**		
Cox & Snell R Square	0.58	Intercept-only model		Final model
Nagelkerke R Square	0.77	54.3%		89.1%

In summary, the result of testing the research hypothesis regarding the relationship between the likelihood that a business unit adopts ABT and the five blocks of predictors can be written in the following equation:

Predicted logit of (ABT adoption)	= 0.971 + 1.378 (Mimetic pressure) + 1.508 (Demonstrability) + 1.622 (Top management support)

The final equation includes one key variable from three blocks, institutional-push pressures (mimetic pressure from other SBUs), attributes of ABT (demonstrability) and innovator attributes (top management support). Two blocks of independent variables relating to need-pull factors and environmental conditions do not appear in the final prediction equation. Multivariate analysis indicates that variables from these blocks are not significant when other variables are controlled.

8.3 Summary of the findings

In this chapter descriptive and statistical techniques were used to analyse the data collected in this research in order to test eighteen general hypothesis developed in chapter five of this thesis. The relationship between forty factors related to this study hypothesis with ABT adoption was tested. As can be seen in Table 8-32, fifteen of these factors were found to be positively associated with ABT adoption, namely: coercive pressure/ parent company, mimetic pressure/ other SBUs, normative pressure/ customers, perceived relative advantage of ABT, perceived image of ABT, perceived compatibility of ABT, perceived ease of ABT, perceived demonstrability of ABT results, perceived trialability of ABT, outcome orientation dimension of BU culture, tight vs. loose control, size, top management support, champion support, importance of cost information. Only one factor was found to be negatively associated: perceived cost of using ABT.

Out of the sixteen associated factors, only seven factors found to be predictors of ABT adoption at block level after controlling for the impact of other factors that belong to the same block. These predictors are: mimetic pressure /SBUs, importance of cost information[58], perceived compatibility of ABT, perceived ease of ABT, perceived demonstrability of ABT results, outcome orientation dimension of BU culture, top management support.

[58] Importance of cost information was the only factor in the "Need-pull" block.

Table 8-32 The predictors tested in this study

	Factors tested	Stage (1)	Stage (2)	Stage (3)
Block 1				
1	Coercive pressure/ parent company	+	-	-
2	Coercive pressure/ suppliers	-	-	-
3	Coercive pressure / customers	-	-	-
4	Mimetic pressure/ competitors	-	-	-
5	Mimetic pressure/ other SBUs	+	+	+
6	Mimetic pressure/competitors benefit from ABT.	-	-	-
7	Mimetic pressure/competitors image	-	-	-
8	Normative pressure/ suppliers	-	-	-
9	Normative pressure/ customers	+	-	-
10	Normative pressure/ trade association	-	-	-
11	Normative pressure/ CIMA	-	-	-
12	Fashion setters' pressure/ consultants	-	-	-
13	Fashion setters' pressure/ Journals and magazines	-	-	-
14	Fashion setters' pressure/ Software vendors	-	-	-
Block 2				
15	Perceived relative advantage of ABT	+	-	-
16	Perceived image of ABT	+	-	-
17	Perceived compatibility of ABT	+	+	-
18	Perceived ease of ABT	+	+	-
19	Perceived demonstrability of ABT results	+	+	+
20	Perceived trialability of ABT	+	-	-
21	Perceived cost of ABT	(+)	-	-
Block 3				
22	Innovation dimension of BU culture	-	-	-
23	Outcome orientation dimension of BU culture	+	+	-
24	Tight vs. Loose control	+	-	-
25	Centralization	-	-	-
26	Formalization	-	-	-
27	Vertical differentiation	-	-	-
28	Level of Overhead	-	-	-
29	Information technology quality	-	-	-
30	Size	+	-	-
31	Top management support	+	+	+
32	Champion support	+	-	-
33	Product lines diversity	-	-	-
34	Strategy	-	-	-
Block 4				
35	PEU/operational	-	-	-
36	PEU/supply	-	-	-
37	PEU/ regulatory	-	-	-
38	Competition intensity	-	-	-
Block 5				
39	Importance of cost information	+	+	-
40	Compelling need	-	-	-

At the holistic level of the analysis, a logistic model of three predictors was found to significantly predict ABT adoption. These three factors belong to three different blocks of variables: institutional factors (mimicking other business units), innovator attributes (top management support) and ABT attributes (perceived demonstrability of ABT results).

The main findings of this study supported five hypotheses:

Hypothesis 1: The higher the coercive, mimetic, normative and fashion setters' pressures, the more likely it is that business units will adopt ABT.

There was evidence of coercive pressure from parent companies both through dictating and recommending that business units adopt ABT. There was evidence of mimetic pressure as business units were influenced by other units in the same group. And there was evidence of normative pressure from major customers. Correlations were strong between these factors and ABT adoption and the impacts could be clearly seen by simple observation of cross-tabulations.

Fourteen possible institutional variables were investigated to determine whether they were associated with ABT adoption and, as noted, strong correlations were observed for three variables (parents' coercion; mimetic copying of other SBUs and normative customer pressure). The other 11 variables were *not* significantly associated with ABT adoption. In several cases many respondents were simply ignorant (for example of the positions taken by suppliers and trade associations). In other cases respondents felt that there was a clear position (for example that CIMA encourages use of ABT) but there was no evidence that they were influenced. Only mimetic pressure from other SBUs was found to be a significant predictor of ABT at both block and holistic levels.

Hypothesis 3: The higher the level of the degree of decision usefulness of cost information, the more likely it is that business units will adopt ABT.

There was evidence of decision usefulness of cost information. Correlations were strong between this factor and ABT adoption. At block level, this factor was the only predictor from the "need-pull factors" block. However, at the holistic level, it was not a significant predictor of ABT.

Hypothesis 6: The higher the level of the perceived relative advantage, compatibility, ease, image, result demonstrability and trialability of using ABT, the more likely it is that business units will adopt ABT.

There was evidence of all ABT attributes in this study. These attributes were found to be strongly correlated with ABT adoption. At the block level, compatibility, ease and result demonstrability predict ABT adoption. At the holistic level, only result demonstrability was found to be a significant predictor of ABT adoption.

Hypothesis 8: The closer the organisational culture is to being innovative, outcome oriented and having tight control, the more likely it is that business units will adopt ABT.

There was evidence of organisational culture outcome oriented and tight control dimensions. Strong correlation between these two dimensions and ABT adoption was found. However, at block level organisational culture was found to predict ABT adoption only through the "outcome orientation" dimension.

Hypothesis 15: The higher the level of top management support of ABT adoption, the more likely it is that business units will adopt ABT.

There was evidence of top management support. Top management support was strongly correlated with ABT adoption and found to be a significant predictor of ABT adoption at both block and holistic levels.

In addition to rigorous testing of a range of hypotheses derived from the institutional, contingency and change management literatures, the study provides an up-to-date and detailed picture of the state of management accounting innovation in general and ABT use in particular in UK manufacturing industry.

It has been shown that UK manufacturers, typically, employ management accounting innovations with 9-10 innovations on average and 5-6 of these in extensive use. The most popular techniques were customer and competitor related innovations while the least popular were economic value based techniques.
Insofar as ABT is concerned, like other innovations, the usage depends on the precise definition of "use". The majority of surveyed business units (72%) had some experience of ABT (even if they had not seriously investigated possible implementation or still in the early stages of the implementation process). 50% of the surveyed BUs claimed serious interest in the implementation of ABT and these can be summarized into four main categories: seriously interested but not yet

approved, 6%; following the implementation process, 9%; ABT system in use, 28%; rejected, 7%. Of the ABT users, 8% had adopted project-based use while 20% were ad hoc users. The cross-tabulation of these findings (question 1) with the extent of use (question 7) is set out in Table 8-2. This reveals that only 11% of the surveyed BUs claim to use ABT extensively and those project-based users use ABT more extensively comparing to ad hoc users.

These findings are further discussed and used to draw the conclusions of this thesis in the following chapter.

CHAPTER 9 DISCUSSION AND CONCLUSION

In this chapter the work conducted in this study is firstly summarised and then the findings that are presented in chapter 8 are discussed and the conclusion is formed accordingly. Also, the main contributions and limitations of the current work are highlighted and, finally, indications for future research are provided.

9.1 Summary of the research

This study was motivated by the common criticism that UK manufacturing organisations have a relatively poor level of adoption of innovations and they, on average, lag behind competitors such as Germany, Australia, Japan and Switzerland with regards to the adoption of modern practices. This was combined with the call for more empirical studies that shed light on management accounting change that is occurring, by adding new techniques to the practice of management accounting. Therefore, the overall aim of this study was to explore the current status of the UK manufacturing sector in terms of adopting/using management accounting innovations. Moreover, in order to obtain more insight in this field, this study focused on one set of techniques, Activity Based Techniques, as an example of management accounting innovations. ABT were chosen as the focus of this study because since the emergence of the core technique of ABT, activity-based costing, ABC, this set of techniques were presented in management accounting literature as one of the most important management accounting innovations. Furthermore, the current status of the ABC literature played a role in choosing to focus on ABT. That is, the research on ABT is very thorough and reflects all the stages that management accounting innovation research went through since the relevance lost debate was initiated. However, this rich literature was criticised for being fragmented in general (Lukka and Granlund, 2002) and failing to develop the cumulative effects of pursuing streams of research (Atkinson, et al., 1997). More particularly, the research that was concerned with examining ABC adoption, in order to understand the "ABC Paradox", is highly unstable, inconsistent and inconclusive (Brown, et al., 2004; Drury and Tayles, 2005). ABT research therefore provided a challenge for the author in: providing a study that draws a picture of the current adoption status of management accounting innovations in the UK manufacturing sector; providing a role model study that overcomes the limitations of prior research and guides future research in the growing field of management accounting innovation research. To achieve this, a set of four research questions was developed:

Q1. To what extent are Management Accounting Innovations in use in the UK manufacturing sector?

Q2. What are the stages organisations go through in implementing management accounting techniques in general and what are they in relation to ABT?

Q3. To what extent are Activity Based Techniques adopted and used in the UK manufacturing sector?

Q4. What are the main predictors of the adoption of ABT in the UK manufacturing sector?

And the objectives of this study were set as follows:

1. Finding the extent to which MA change is occurring via innovations adoption in the UK manufacturing sector. This involved identifying a list

of management accounting innovations which are considered to be new in the contemporary management accounting literature.

2. Developing a generic and robust theoretical model for studying MAI adoption. This involved enhancing a multistage model of MAI adoption and implementation. Developing a heterogeneous theoretical model for MAI adoption and implementation which represents different theoretical perspectives from the innovation literature and considers the current generic models available in the literature.

3. Empirically testing the above model in the context of ABT adoption. This objective involved the following sub-objectives:

    1- identifying and addressing earlier ABC adoption research limitations by consulting organisational innovation theory and literature;

    2- developing and adopting an explicit and comprehensive definition of ABT;

    3- developing a research strategy to examine the ABC paradox;

    4- improving the measurement and testing procedures used in prior research.

To attain these objectives it was important to explicitly position this study within the boundaries of a suitable frame of reference: innovation research. The remarks and directions provided by innovation research scholars that lead to fruitful innovation research were explored and adopted in the current study and prior ABT related research was evaluated based on these guidelines. Consequently, the main limitations of prior ABT innovation research were identified from an innovation research perspective (see chapters 2 and 3). These main limitations were: lack of explicit definition of ABT, minimal consideration of ABT attributes, inconsistency and ambiguity concerning the innovation stage and reliance on under-specified theoretical models (single theoretical perspectives). These limitations contributed to the inconsistency and, at times, contradictory research results of previous ABT research. Overcoming these limitations started by exploring ABT's ambiguity and identifying its components as a management accounting innovation. Thus a comprehensive definition of Activity Based Techniques (ABT) was developed and adopted as follows: ABT is: *Any management accounting technique that uses business unit activities as its base. Such techniques include: Activity Analysis (AA), Activity Cost Analysis (ACA), Activity Based Costing (ABC), Time Driven ABC, Activity Based Management (ABM) and Activity Based Budgeting (ABB).* Also, ABT attributes were clarified as being mainly administrative with technical elements. They are likely to be radical, central, flexible, highly uncertain and pervasive. The aim of this study was to arrive at a heterogonous and comprehensive theoretical framework. The framework was a factor-stage framework that consists of a comprehensive factor model and a generic stage model of management accounting innovation adoption and implementation. The factor model was developed based on three different theoretical perspectives (institutional theory, management fashion and efficient-choice perspectives) and guided by three generic and comprehensive factor models, identified from the innovation literature: Kwon and Zmud (1987), Leseure, et al., (2004) and Askarany (2005). The generic stage model of MAI adoption and implementation was developed, based on the available models in the innovation literature and integrating the three theoretical perspectives.

The original factor model consisted of six blocks of factors: institutional push factors, need-pull factors, innovator attributes, environment attributes, innovation perceived attributes and implementation process attributes. The multistage model consisted of three main phases and each of these phases encompasses a number of stages: initiation (awareness, interest, and adoption decision), implementation (set-up and implementation) and integration (ramp-up, routinization, infusion). The possibility that the innovation process could stop at any time during the above phases or might not start at all was integrated in this model. The final model was customised to study ABT adoption and to explore the "ABC Paradox".

This customisation led to focusing on the adoption decision of ABT, as previous UK based research suggests that the ABC paradox in the UK results from the weak adoption at the first place. Therefore, the final theoretical model focused on ABT adoption and factors related to the implementation process were not tested in the current study. The relationship between ABT adoption and the five blocks of factors were explored and eighteen hypotheses were tested. Data was collected mainly by mail survey questionnaire from a sample of business units from the population of medium and large manufacturing companies in the UK that have a minimum of one CIMA member with a minimum of 5 years membership. Questionnaire design and distribution was based on Dillman's "Tailored Design Method". The survey was preceded by five semi-structured one-to-one interviews with director level staff at different manufacturing strategic business units in the UK. These interviews allowed themes from previous quantitative ABC adoption research to be explored, practitioners' understanding of ABT to be investigated and possible explanations of the ABC paradox to be considered. Ex post e-mail interviews were conducted in order to check the reliability of the survey results and to seek further explanation for some of the responses. Data from 152 manufacturing business units (11% response rate) were analysed in chapter 8. The following sections discuss the results of this analysis and provide the conclusion of this thesis.

9.2 Discussion and conclusion

This research had four research questions to answer. The following paragraphs address these questions, based on the relevant findings of the data analysis presented in chapter 8 and seek to provide relevant conclusions.

9.2.1 Extent of use of Management Accounting Innovations

The first research question was concerned with the extent to which Management Accounting Innovations are in use throughout the UK manufacturing sector. The analysis provided in chapter 8 found that all the fifteen MAIs included in the questionnaire were in use at the time of the survey. Usage rates range between 45% for economic value to customers (EVC) to 82% for customer profitability analysis (CPAN). Three techniques that provide information for decision making involving customers and competitors (competitor performance appraisal, competitive position monitoring and customer profitability analysis) were found to be the most widely used among the fifteen innovations. In terms of the average number of MAIs used, it was found that business units in the sample use nine to ten MAIs from the list of fifteen innovations, although, when considering the extent of the use, the number of innovations in extensive use drops to 5-6 innovations. Most respondents, around 56%, use 1 to 4 innovations extensively, 14.5% use 5 to 9 innovations extensively, and less than 1.5% of the companies use 10-12 innovations extensively. About 28% of the surveyed business units do not use any of the 15 innovations extensively. These results firstly confirm Sulaiman and Mitchell's (2005) suggestion that management accounting change could occur through the addition of new management accounting techniques. Secondly, the results provide empirical evidence that supports Ax and Bjørnenak's (2007) general observation that MAIs are influencing management accounting practice. It can be concluded that MAIs are widely in use in the UK manufacturing sector and at the same time, it can be noticed that companies seem to be selective in the choice of MAIs. The intensity of the usage might reflect the innovator's commitment and perceived benefits from using these innovations.

9.2.2 Activity Based Techniques' routes to implementation, rates of adoption and extent of use

The second research question aimed to explore the stages of the adoption and implementation of management accounting innovations. This led to a stage model developed from the innovation literature. In the light of the second research question, the third research question was aimed at the identification of the extent of adoption and the use of Activity Based Techniques in the UK manufacturing sector. This involved empirically testing the stage model customised for ABT in the light of the findings of the exploratory interviews which were conducted in the early stage of this research. This study is the first empirical study in the management accounting field that empirically demonstrates that management accounting innovations could be employed by either following a systematic unitary sequence (interest, approval, set up, implementation, ramp up, use) or on an ad hoc basis. It was found that only 28% of users in the survey sample followed all or most of the stages of the model while 72% did not. Therefore, it can be concluded that ad hoc use of ABT is the most popular form of ABT usage in the UK manufacturing sector. However, such a conclusion should take into consideration that this result is based on a wide definition of ABT which includes any practice that has activity logic as its core. It can be argued that certain levels of the complexity of ABT systems would need a systematic implementation approach. However when the use of an ABT system is limited in its depth and breadth, an ad hoc implementation method could be thought appropriate. In addition to confirming the existence of the two possible routes to ABT adoption, systematic versus ad hoc, the research also showed that around 72% of the business units in the sample had experience with ABT. To be specific the surveyed business units are either using ABT (28%), still in the process of implementation (14%), have given up ABT during the implementation process (6%), have ceased the use of ABT after using it for a while (1.4%) or they are using it at a weak level although its formal adoption had not been given any serious consideration (22%). This rate of 72% drops to approximately 37% for BUs that have adopted ABT (i.e. ABT was either approved and still in the implementation process or in use). It drops to 28% as a usage rate (both systematic and ad hoc use) and to 11% if only extensive usage of ABT is considered. Therefore, it can be concluded that, although activity based techniques are not extensively used, activity logic is widely experienced by the majority of UK manufacturing business units. Moreover, although the overall adoption rate in this study was considerably higher than in prior studies conducted in the UK, with 37% of business units reporting that they adopted ABT, business units that reported relatively high intensity of the use of ABT were only 11%. The higher adoption and usage rates found in this study might lend support to the continuing relevance of ABT, which has been questioned because of low adoption rates found in a number of previous studies. These findings provide evidence of the impact of the definition of ABT and the stage of implementation on reported adoption rates. Considering ABT as a logic, as defined in this study, revealed how widely ABT is experienced by even those that have not yet seriously considered implementing it. The higher adoption rates found here compared to prior studies are a direct result of using a wider definition of ABT and using a well developed multistage adoption model that has the ability to detect the ad hoc use of ABT. Interestingly, the results of this study encapsulate most of the previous findings reported by studies conducted in the UK (8%-28%) and provide a possible rationale for such wide variation. Finally it is important to emphasize that this research differs from previous research conducted in the UK in three ways.

Firstly, focusing on the adoption of any activity-based techniques rather than only ABC, in other words focusing on the adoption of activity-based logic in any sub system of management accounting. Secondly, differentiating systematic or project based adoption from ad hoc adoption, a distinction noted during the interviews that preceded the survey. Thirdly, this study has used responses from two questions in addition to follow-up interviews to provide more reliability to any claim of ABT adoption. The findings of this research regarding ABT adoption can be considered the most recent, accurate and reliable findings in the UK manufacturing sector.

9.2.3 Predictors of ABT Adoption

The last research question has an explanatory nature. It aims to identify the main predictors and combinations of predictors for the adoption of ABT in the UK manufacturing sector. After excluding the cases where the use of ABT was imposed, the predictive power of forty factors was examined at three levels: factor, block and holistic levels using binary logistic regression (see Table 9-1). Chi Squared and univariable logistic analysis showed that sixteen of the forty factors are associated with ABT adoption and predict the likelihood of this adoption. These factors are: institutional pressures (coercive pressure from parent company, mimetic pressure from other SBUs and normative pressure from customers), perceived attributes of using ABT (relative advantage, image, compatibility, ease, demonstrability, trialability and cost), attributes of the innovator (outcome orientation dimension of BU culture, tight vs. loose control, size, top management support, champion support) and need pull (importance of cost information).

Table 9-1 Predictors tested in the study

	Factors	Factor level	Block level	Holistic level
Block 1				
1	Coercive pressure/ parent company	+	-	-
2	Coercive pressure/ suppliers	-	-	-
3	Coercive pressure / customers	-	-	-
4	Mimetic pressure/ competitors	-	-	-
5	**Mimetic pressure/ other SBUs**	+	+	+
6	Mimetic pressure/competitors benefit from ABT.	-	-	-
7	Mimetic pressure/competitors image	-	-	-
8	Normative pressure/ suppliers	-	-	-
9	**Normative pressure/ customers**	+	-	-
10	Normative pressure/ trade association	-	-	-
11	Normative pressure/ CIMA	-	-	-
12	Fashion setters' pressure/ consultants	-	-	-
13	Fashion setters' pressure/ Journals and magazines	-	-	-
14	Fashion setters' pressure/ Software vendors	-	-	-
Block 2				
15	**Perceived relative advantage of ABT**	+	-	-
16	**Perceived image of ABT**	+	-	-
17	**Perceived compatibility of ABT**	+	+	-
18	**Perceived ease of ABT**	+	+	-
19	**Perceived demonstrabilty of ABT results**	+	+	+
20	**Perceived trialability of ABT**	+	-	-
21	**Perceived cost of ABT**	(+)	-	-
Block 3				
22	Innovation dimension of BU culture	-	-	-
23	***Outcome orientation dimension of BU culture***	+	+	-
24	**Tight vs. loose control**	+	-	-
25	Centralization	-	-	-
26	Formalization	-	-	-
27	Vertical differentiation	-	-	-
28	Level of Overhead	-	-	-
29	Information technology quality	-	-	-
30	**Size**	+	-	-
31	**Top management support**	+	+	+
32	**Champion support**	+	-	-
33	Product lines diversity	-	-	-
34	Strategy	-	-	-
Block 4				
35	PEU/operational	-	-	-
36	PEU/supply	-	-	-
37	PEU/ regulatory	-	-	-
38	Competition intensity	-	-	-
Block 5				
39	**Importance of cost information**	+	+	-
40	Compelling need	-	-	-

The second stage of the analysis, block level, resulted in seven predictive factors when other within-block factors were controlled. These were drawn from the four blocks as follows: institutional pressures (mimetic pressure from other business units), need pull factors (importance of cost information); ABT perceived attributes (perceived compatibility of ABT, perceived ease of ABT, perceived demonstrability of ABT results); innovator attributes (outcome orientation dimension of BU culture, top management support). Finally, the holistic analysis resulted in a logistic model of just three predictors: mimetic pressure from other business units, perceived compatibility of ABT and top management support). These results are further discussed in the following sections.

9.2.4 Institutional and management fashion perspectives

These factors include coercive, mimetic, normative and fashion setters' pressures. To the knowledge of the author, this is the first study in management accounting innovation research that considers these two perspectives in this depth.

9.2.4.1 The impact of coercive pressures

It was found that almost 40% of ABT users (17 out of 43) have used ABT as a direct result of imposition by either regulation or their parent company. A very significant minority of ABT adopters do not *choose* to use ABT, they are *compelled* to adopt activity-based methods. In all the 15 cases where parent companies compelled ABT use, the parents were already using ABT.

In addition, the perceived recommendation (as opposed to imposition) by the parent company was found to be the only coercive pressure that is associated with ABT adoption (coercive pressures from the main suppliers and customers were found to be absent or extremely weak). The majority of business units that perceive their parent companies to be promoters of ABT have adopted ABT.

Overall, out of the 56 ABT adopters there were 15 cases where ABT was imposed by parent companies and 10 cases where parent companies were perceived as promoters of ABT use. Therefore, almost 45% of ABT adopters were influenced by their parent companies' imposition and coercive pressures.

However, parent company coercive pressure was not found as a significant predictor of ABT after controlling for other institutional pressures. This surprised the researcher because the association between parent company coercion and adoption is certainly strong. It seems likely that, in groups where the parent applies coercive pressure, this is felt indirectly as business units compare their practices with other units in the group and experience mimetic pressure to conform to broader group practices.

Therefore, it is concluded that pressures from parent companies on their strategic business units in the form of mandating or recommending the use of ABT have a clear impact on ABT adoption. The imposition of ABT by the parent company is sufficient to make a business unit adopt/use ABT and strong parent support for ABT seems to lead to a group culture that makes ABT difficult to resist. This finding is unique to this study. To the knowledge of the author, this is the first study that reveals that ABT could be adopted and used as a result of imposition. Unlike Malmi's (1999) study, this evidence supports Abrahamson's (1991) typology in terms of providing empirical evidence of forced-selection as a perspective that could explain ABT adoption/use.

9.2.4.2 The impact of mimetic pressures

Mimetic pressures from competitors and other business units were examined in this study. Interestingly, it was found that the majority of the respondents did not know whether ABT was used by competitors and consequently, the majority were not aware of any benefits of such adoption. Thus, business units are not affected by mimetic pressure from competitors simply because they are not aware of competitors position regarding ABT adoption and use. The bivariate analysis showed no significant association between mimetic pressures from competitors and ABT adoption. However, it was found that pressure from the perception that other business units are using ABT is significantly associated with ABT adoption. The majority of business units that perceived other business units as non ABT users or were not aware of their position regarding ABT adoption did not adopt ABT. On the other hand, the majority of those business units that perceived other business units as ABT users adopted ABT. This strong association qualified mimetic pressure to be a significant predictor of ABT adoption even after controlling for other associated institutional factors.

Apparently information about competitors' management accounting systems is either not available or considered not very significant by the respondents of this survey who are mainly financial controllers. This attitude weakens the potential impact of competitors on the adoption of management accounting innovations. On the other hand, information about the adoption of ABT in other business units is available and influences the decision to adopt a particular management accounting innovation. Therefore, it can be concluded that mimetic pressure from within the business is far more effective than the pressure that comes from the wider circle of competitors. This could be due to the availability of the information and, as argued above, probably reflects the coercive pressure from parents' companies. Parent coercive pressure could be deduced as important, working together with the mimetic pressure that other business units exert.

9.2.4.3 The impact of normative pressures

Normative pressures from main suppliers, customers, CIMA and trade associations were examined. The majority of the respondents were either not aware or do not agree that ABT is in use by their main suppliers and customers. A small minority of them believe that ABT is recommended by trade associations while just more than half of respondents agree that CIMA does promote ABT. Only the pressure from main customers was found to be significantly associated with ABT adoption. The majority of those that perceived their main customers as ABT users were found to be adopting ABT themselves. However, controlling for all significant institutional pressures resulted in the exclusion of normative pressures by main customers as a potential predictor of ABT adoption. It can be concluded that normative pressures by the professional network has a very weak impact on ABT adoption.

9.2.4.4 The impact of fashion setters' pressures

Fashion setters' pressures were found to have no significant association with ABT adoption. These pressures represent pressures by consultancy companies, professional journals and magazines and software vendors. This finding is supported by the observation that the researcher recorded during the first stage of this research, the ex ante interviews, where the absence or weak influence of software vendors and management consultants in terms of pushing ABT was evident in the five companies that were visited. Moreover, this finding is also supported by the findings of a recent UK study. In that study, eighty-nine consultancy companies' web sites were scrutinised with the purpose of defining them as ABT promoters or non-promoters (Giwa, 2009). Three criteria were used to determine if ABT was promoted by a company: advertising ABT on its websites, offering ABT software, and/or providing ABT training and materials. The websites of 89 companies were searched and it was found that ABT was not promoted by the majority (91%) (Giwa, 2009). This result could be an indication of the diminishing influence of fashion setters on ABT adoption and/or the recognition that ABT is not a fashionable managerial tool any more. This conclusion lends support to Malmi's (1999) conclusion regarding ABC diffusion in Finland where he found no influence on ABC diffusion by fashion setters during the late stages of diffusion.

Overall, institutional but not fashion setters' pressures seem to play a role in ABT adoption. On the one hand, ABT adoption is likely as a result of being mandated by parent company or regulation and when other business units are perceived as ABT users. On the other hand, it seems that fashion setters in the UK have little impact on decisions to adopt ABT. This means weak supply and promotion of ABT and consequently low fashion setters pressure and lower adoption rates.

9.2.5 The efficient-choice perspective

In this study, efficient-choice related predictors were classified in four blocks: need-pull factors, environment attributes, innovator attributes and perceived attributes of using the innovation. The following paragraphs present the main conclusions related to these blocks of factors.

9.2.5.1 The impact of need-pull factors

Two potential predictors of ABT adoption were considered in this block: a compelling business need and the importance of cost information. About one third of the surveyed business units have faced a compelling business need that had a significant impact on their costing/cost management systems, however, analysis showed that there is no significant association between this factor and ABT adoption i.e. most of those who faced such needs did not adopt ABT. Therefore, it might be concluded that ABT was not considered as a possible tool that could help in responding to the compelling business need faced by business units. A possible explanation is that ABT, as concluded in the previous sections, seems to be less attractive as a tool that consultancies and other fashion setters might recommend to fulfil their clients' needs. Probably other management accounting innovations are offered in such circumstances. However, it was found that the importance of cost information is associated with and a significant predictor of ABT adoption. This is similar to Krumwiede's (1998) conclusion, it seems that ABT is more likely to be considered when cost data are considered an essential factor in the decision making process.

9.2.5.2 The impact of innovator attributes

The impact of twelve predictors related to innovator attributes on ABT adoption was examined. These predictors covered business units' culture, structure, strategy, level of overhead, product lines diversity, IT quality, size, support provided by top management and internal champion. It was found that five innovator attributes are associated with ABT adoption: organisational culture dimensions (outcome orientation, tight vs. loose control), size, and organisational support (top management support, internal champion support). Therefore, when the business unit is larger, more outcome oriented, has tighter control of its processes and there is a supportive environment the more likely it is to adopt ABT. Interestingly, this confirms Brown, et al.'s (2004) conclusion that factors traditionally used to rationalise ABT adoption (level of overhead, product lines diversity) are not able to predict ABT adoption. Also, contrary to expectation, structure and strategy were not associated with ABT adoption[59]. This result differs from Gosselin's (1997) and Schoute's (2004) findings: a significant positive association between vertical differentiation and the adoption of ABC and no significant relationship with either centralization or formalization. One possible reason for that is that Gosselin (1997) tested the impact of these two factors on specific activity based techniques, (AA, ACA, ABC) whilst this study focused on activity logic rather than a specific technique. Another possible explanation is that Gosselin (1997) and Schoute (2004) did not identify the stage of their focus clearly. Regressing the five attributes into one model left only two significant predictors: outcome orientation dimension of BU culture and top management support. Therefore, it is concluded that the more the business unit is competitive, emphasizes action and results, has high expectations for

[59] Culture, structure and strategy were found to be associated with ABT use rather than adoption when the first stage of the analysis was repeated using ABT use as the dependent variable.

performance and has a supportive management for adopting ABT, the more likely it is that ABT would be adopted.

9.2.5.3 The impact of innovation's attributes

Examining the impact of the perceived attributes of using ABT is unique to this study. At the bivariate level, the seven attributes examined were found to be significantly associated with ABT adoption. This suggests that when in use, ABT is perceived as trialable, superior to current practices, easy, not costly, with demonstrable result, compatible with current practice and culture and improves the image of the adopter, and therefore it is more likely that ABT will be adopted. This supports Rogers' (1995, 2003) general finding that perceived innovation attributes have the most significant influence on innovation adoption. Also this finding gives, for the first time, empirical evidence that supports Anderson's (1995, p.39) observation that attributes of ABT "were from the beginning critical elements in the search for new cost system approaches". When the seven attributes were regressed together in one logistic model, three attributes were found to be able to predict ABT adoption: compatibility, ease and demonstrability. This indicates that adopting ABT is more likely to occur when using ABT is perceived to be compatible with the business unit culture, existing process and practices, easy to learn about and implement, and has clear and demonstrable advantages and benefits.

9.2.5.4 The impact of environmental conditions

Two environmental conditions were examined, perceived environmental uncertainty PEU and intensity of competition. This study confirmed the multidimensional nature of the PEU construct found in prior research by Al-Dahiyat (2003) with three dimensions: operational, supply and regulatory. None of these dimensions were found to be associated with ABT adoption. This result confirms Schoute's (2004) finding. Similarly, intensity of competition did not correlate with ABT adoption, the opposite result to traditional expectations (e.g. Kaplan and Cooper, 1998). Therefore, the argument can be made that when environmental conditions favour acquisition of new management accounting systems, activity based techniques are not always considered as the appropriate tools to deal with these conditions. This may be deduced to be effected by the previously concluded weak fashion setters' pressure.

Overall, from the efficient-choice perspective, this study provides no evidence that traditional contingent variables like PEU, competition and size can predict the adoption of ABT. Neither does the existence of a compelling business need or a BU strategy predict ABT adoption. Instead the predictive variables are related to the attributes of the innovator, the perceived attributes of ABT and the perceived need for more accurate cost information. Factors such as business culture, management support and the demonstrability of ABT are much more likely to predict ABT adoption than traditional contingency variables.

9.2.6 The final prediction model

In the previous paragraphs the conclusions from the different theoretical perspectives were presented. Each perspective provided a set of predictors of ABT adoption; however, in the within-block analysis, the impact of the predictors from other blocks was ignored. The final stage of the logistic regression analysis employed in this study aimed to bring the different perspectives together and provide a model that holistically considers the significant predictors of ABT adoption from the different perspectives. The result of this analysis was following equation:

Predicted logit of (ABT adoption)	= 0.971 + 1.378 (Mimetic pressure) + 1.508 (Demonstrability) + 1.622 (Top management support)

This model suggests that, simply, ABT is more likely to be adopted if other business units in the same organisation are perceived to be using it. Also, it suggests that the more the benefits of using of ABT is demonstrable the more likely ABT will be adopted. Finally, it shows that support of the top management in the organisation is also a key predictor of ABT adoption.

9.3 The overall picture

Overall, this study showed that management accounting innovations are relevant and an important means for change. This study was more sophisticated than many other studies in two major ways. First, the definition of ABT was widened but, at the same time, a series of questions were asked in order to establish the extent of use of ABT. Second, drivers of ABT were drawn from a wide range of literature so that the theoretical model was unlikely to be under-specified. The sophistication of the study led to two key conclusions that help to explain discrepancies in previous research results.

First, this study provided an explanation of the ABT paradox: apparently low rates of ABT adoption despite the proclaimed benefits that the technique brings. If a wide definition of ABT is employed then the majority of UK manufacturing companies *have* been influenced by ABT ideas. Only with a tight definition of ABT, together with a stringent view of "adoption", does the paradox appear. In this study only 11% of the sample would then be categorised as ABT adopters if adoption was defined as an extensive use of ABT. Previous studies have indicated a very wide range for the percentage of companies adopting ABT and this study provides an explanation for this diversity. Previous studies may not be as inconsistent as they appear when the definition of ABT (and scope for misunderstanding) is taken into account.

Second, this study reveals that ABT adoption is not driven by the factors that ABC literature traditionally use as a justification for using ABC i.e. level of overhead, diversified products and intense competition. Instead, this study emphasises the influence or lack of influence of key institutions and individuals. The power of institutional pressure is strikingly demonstrated by the large minority of business units that adopted ABT because they were compelled to do so by either regulatory pressure or corporate edict.

Having excluded those business units that were *compelled* to adopt ABT, multivariate analysis based on logistic regression then revealed that, although 16 factors were associated with ABT adoption, eventually this reduced to just three key predictors: mimetic pressure from other business units, demonstrability of the results of using ABT and top management support. A very comprehensive initial theoretical model thus led to the conclusion that ABT adoption can be predicted by only a few variables. If a large number of variables are not controlled (as in many previous research studies) then other variables can appear to be significant predictors and results are not as reliable as those presented here.

In this study key predictors of ABT adoption were drawn from three factor blocks: institutional pressures, attributes of ABT and attributes of the innovating company. Surprisingly, no predictor variables were drawn from the block of "need-pull" factors. The final model indicates that adoption of ABT can be predicted by forced-selection, mimetic behaviour, the ease with which ABT results can be demonstrated and management commitment. That is, ABT will probably be adopted if mandated by regulation or the parent company; if it has been adopted by other business units; if its results are easy to see and if it has the support of key individuals in the organisation. These results are consistent with institutional theory where it is suggested that organisations respond to coercive, mimetic and normative pressures and with organisational change theory where managerial support is a well known facilitator of change. The results provide little support for the influence of contingent variables such as perceived environmental uncertainty, strategy, structure, size and competition. Thus purely contingency-based studies of management accounting innovation may be severely under-specified. Although the final model is very parsimonious and can be illustrated as in Figure 9-1 the analysis leading up to the final model draws attention to other variables that can help to build understanding of the conditions likely to lead to ABT adoption.

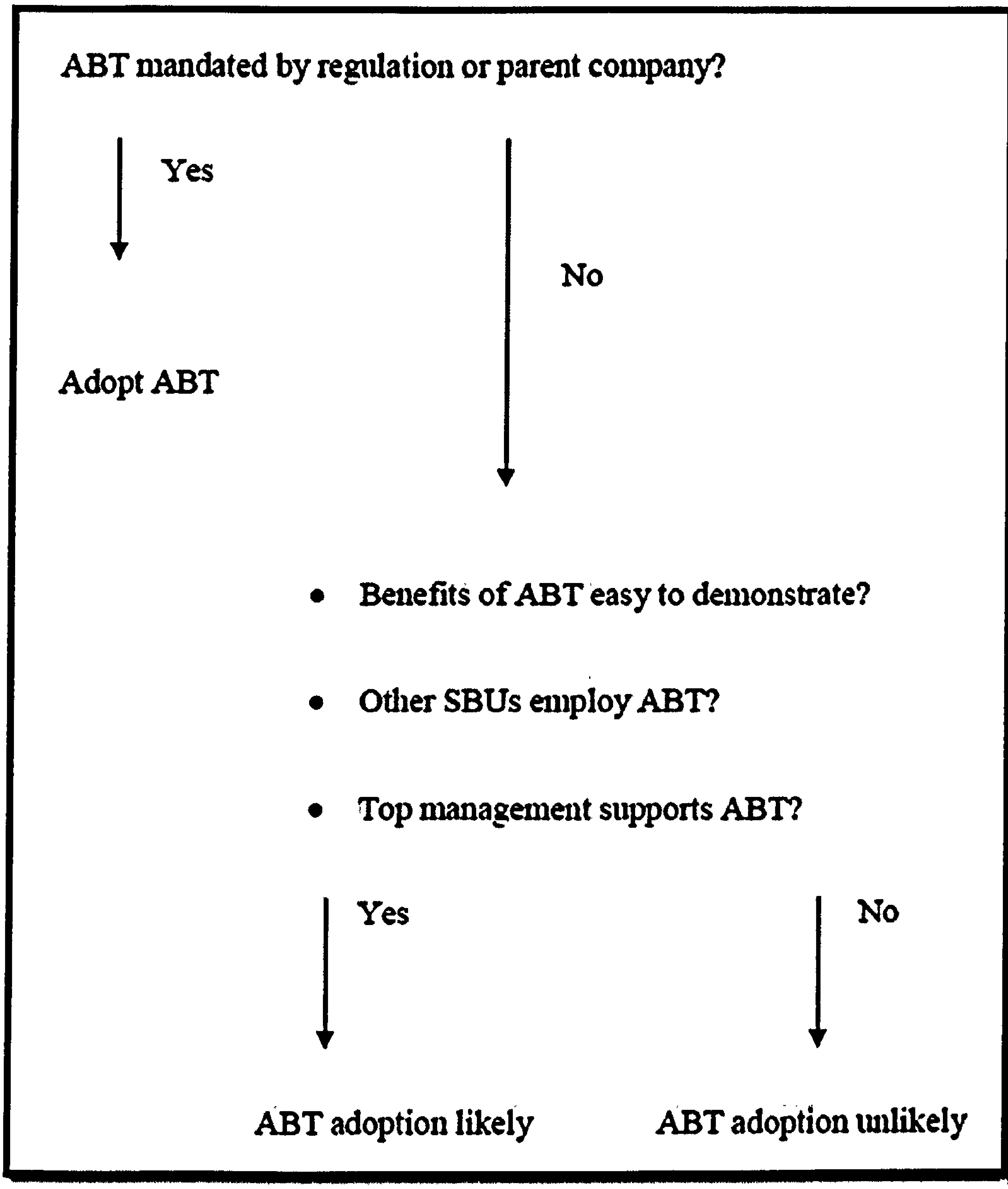

Figure 9-1 The final model

It was noted, in the earlier stages of analysis, coercive pressure from the parent company was significant. However, the influence of this factor might be felt indirectly as other SBUs in the group take up ABC, eventually, no SBU would want to be left behind. While some normative pressure to adopt ABT might be felt from customers there is little evidence of any other institutional pressure. The perceived nature of ABT techniques is important in the adoption decision. In particular, a perception that the technique is easy to use and compatible with other methods would be helpful. To a lesser extent so would a favourable perception of the technique's image, advantages, trialability and cost. All of these features of ABT seem to be summed up in the predictive variable: demonstrability of ABT results. The final prediction model included top management support but, in addition, the support of an ABT champion was related to ABT adoption at both the factor and block levels. This provides convincing evidence of the importance of key individuals in the decision to adopt ABT. Outcome orientation dimension of culture was found significant at the block level; however, it was not included in the final prediction equation. Similarly, none of the contingent variables were included in the final prediction model; in this group, none survived to the block level and, indeed, only one individual factor, the importance of cost information, was found to be correlated with ABT adoption. Finally, this study noted the diminishing/disappearing influence of fashion setting organisations. At the current stage of ABT diffusion, ABT is no longer viewed and presented as a fashion; instead it is deduced that ABT is now presented as just one tool from the range of possibilities available.

9.4 Limitations and further directions for future research

Although this study overcomes many previous research limitations, there are still, as with any research, a number of limitations that should be highlighted. Moreover, these limitations present opportunities for future research. These limitations are related to the methodological and theoretical design as well as data analysis procedures. First, the findings of this study exclusively pertain to a specific population. This study was conducted on medium and large manufacturing organisations operating in the UK that have at least one CIMA member with at least 5 years membership. Thus, the results of this study in small manufacturing organisations or to other organisations operating in non-manufacturing industries would provide valuable research. Also because the sample was drawn from the UK, the generalisability of the findings of this study over other national settings may not be valid. Future research is needed to reveal whether the results are generalisable for small manufacturing or non-manufacturing organisations and to replicate this study in other countries. Undertaking similar studies in other countries would allow investigation of the impact of national culture on MAIs adoption. Also, it is important to emphasise that, although the use of CIMA database was best for a number of reasons it obviously has the limitation that the survey should not strictly be generalisable beyond the views of management accountants.

Second, data collection by questionnaire has limitations. Firstly, it is not flexible; once the administration phase is under way, it is impossible to backtrack. In addition, collecting data by questionnaire exposes the researcher to the bias of the person making the statements (Thietart, et al., 2001). Moreover, an important limitation of this research method is the lack of direct contact with the phenomenon being researched and the respondent (Innes and Mitchell, 1997). In order to minimise these limitations, face to face interviews were undertaken to refine the questionnaire and e-mail and phone interviews were carried out to check the reliability of the survey results and seek further explanation of some of the responses. In addition, the design of this study's survey was mainly based on the tailored design recommended by Dillman, (2000) in his book "Mail and Internet Surveys, The Tailored Design Method" which resulted in a well developed and extensively revised and pre-tested respondent-friendly questionnaire. Despite these precautions questionnaires suffer from inflexibility and respondent bias. In particular, in this study, all the respondents were CIMA members who may have been biased towards reporting ABT adoption. This might have been addressed by taking opinions from other members of the SBU but this would have been difficult to administrate and would have added to the cost of the study.

Third, although this study is one of first in the management accounting innovation literature to incorporate a wide range of predictors from different theoretical perspectives, the threat of model under-specification/misspecification is still a concern. Innovation is a very complex phenomenon and a single perspective research could hardly provide conclusive explanations. Each one of the three theoretical perspectives adopted in this study has provided an explanation for ABT adoption. However, even a model based on three theoretical perspectives might be deficient. Therefore, other perspectives should be considered for future research. As the results of this study suggest the importance of micro-level related factors, one potential perspective that could be considered in future research is the innovation mindfulness perspective. This perspective is concerned with innovation processes particularly in the context of innovations subject to bandwagon dynamics (Fiol and O'Connor 2003). Fiol and O'Connor (2003) suggested this perspective as a complement and extension of macro-level theories of bandwagon behaviors "by identifying the micro-level characteristics of the decision context and of decision makers that influence why a given firm will resist following bandwagon behaviors. If decision makers mindfully assess both the external environment and their internal capabilities they are likely to join a bandwagon only if it is advantageous to their specific circumstances" (Fiol and O'Connor 2003, p.66). When ABT adoption was considered, it seems that at the early stages of ABT diffusion, when ABT was considered as a fashion, the pressure of fashion setters was resisted by UK organisations. This resistance, which was reflected in low levels of adoption compared to the USA, could therefore be argued to be a result of UK organisations adopting innovations mindfully based on reasoning grounded in their own conditions.

Fourth, this study has focused on ABT adoption rather than the use of ABT. Although the group of ABT adopters includes ABT users, the results of the current analysis might be different if ABT use was the main focus. However, the small number of ABT users in the sample made such a focus very difficult when using statistical methods like logistic regression. Another approach would be to use other methods that can handle small groups. Qualitative Comparative Analysis (QCA) is a non-statistical approach that might be appropriate in the case of small samples (Ragin, 1987, 1999). QCA is a configurational approach developed in the field of comparative sociology through the work of Charles Ragin (Ragin, 1987, 1999). It aims to understand complex phenomenon by using the logic of Boolean algebra to determine the most parsimonious set of inter-related conditions that explain the outcomes observed among a given set of study cases (Ragin, 1987, 1999). In particular, the method identifies necessary and/or collectively sufficient conditions to produce an outcome (Ragin, 1987, 1999). This approach was recently successfully implemented in management accounting research to define the determinants and the configurations of the determinants of the use of standard costing in the Syrian public sector (Ibrahim, 2007). The method can be used not only to explore the necessary and/or collectively sufficient conditions that lead to using ABT but also to identify the conditions that lead to systematic or ad hoc use.

Despite the above limitations, this study is amongst the first to focus on management accounting innovations as a means of change. Three chapters of this thesis have provided an overview of innovation research in general and in relation to management accounting. Also, this study, for the first time, has presented ABT as an innovation and specified its definition, elements and attributes. Moreover, this study has developed a generic theoretical framework that consists of a well established stage model and a comprehensive set of predictors that represent the three main theoretical perspectives to study innovation process. Also, this study has highlighted a methodological strategy for studying management accounting innovations that overcomes the low response rates of survey studies that use long questionnaires. By implementing Dillman's "Tailored Design Method", the researcher first collects data about the diffusion of the innovation and the different factors that affect this diffusion using a relatively long questionnaire. Later the researcher can seek more details about the innovation itself. Furthermore, different measures were developed or verified in this research. Measures for institutional pressures and management accounting innovations' attributes were developed in this study and the measure of PEU was verified. Finally, this study has provided an elegant and parsimonious model that predicts ABT adoption using only three predictors from forty predictors in the theoretical model.

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Appendixes

Appendix 1: The invitation of the semi-structured interviews

University of BRISTOL

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29 January 2007

Dear

Re: Adoption and implementation of new management accounting techniques

This research project, a major part of the PhD dissertation of one of my students, aims to determine the factors that influence adoption of new management accounting techniques. The specific focus is on the adoption and implementation of Activity Based Techniques.

The importance of this research topic has been recognised by the Chartered Institute of Management Accountants, and by recent reports published by the National Statistics Office and the Confederation of British Industry.

Your organization has been identified as one of that could be very helpful in the first stage of this project. We wish to interview senior finance officers so as to develop a multi-stage model of ABT adoption and implementation and identify the most influential factors at each stage of adoption. Your organization represents the first stage of any adoption process: "No consideration for adoption".

The development of a reliable survey questionnaire for the second stage of the project is crucial so your participation is extremely important. All information provided will be used for academic purposes only and will be treated as "strictly confidential". Your name or that of your organisation will not be released under any circumstances, and the results will only be reported in aggregate form within summarised tabulations.

We would be very grateful if you could help. The interview will initially require up to one and a half hours of your time and we would arrange to visit you at your convenience.

I would like to thank you for your help and cooperation and, if you have any questions, please do not hesitate to contact me.

Yours Sincerely,

David Dugdale

Professor of Management Accounting
University of Bristol

Appendix 2: The questions of the semi-structured interviews

Semi-Structured Interview Schedule

(Assessment, Rejection, Approval)

1. ***Company:***

(a) Brief company history

(f) Accounting function - No. staff (financial accounting)
- No. staff (managerial accounting)
- Place in organisation (central service?)

2. ***Participant:***

(a) Brief job description.
(b) Previous work experience.
(c) Qualifications.

3. ***Stage of implementation:***

Stage	*Description*
Not considered	ABC has not been seriously considered. We use either single or departmental/multiple plant-wide allocation methods only.
Initiation/evaluating	ABC is being evaluated and implementation is possible, but implementation has not yet been approved.
Evaluated then rejected	ABC has been evaluated (but not implemented) and was later rejected as a cost assignment/ management method.
Evaluated and approved for implementation	approval has been granted to implement ABC and devote/spend the necessary resources, but analysis (see next stage) 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.
Gaining acceptance	analysis is complete and ABC model has project/implementation team support, but ABC information is not yet used outside of the project/implementation team for decision-making.
Implemented then abandoned	ABC was implemented and analysis performed but it is not being pursued at this time.
Restricted Use	used by accountants for internal accounting purposes, but has not been accepted by non-accounting upper management or departments for decision-making. It is still considered a project model only with infrequent updates.
Used somewhat	Occasionally used by nonaccounting upper management or departments for decision-making. General consensus among non-accounting departments is that the model provides more realistic costs. However, it is still considered a project model only, with infrequent updates.
Used extensively	commonly used by nonaccounting upper management or departments for decision making and considered a normal part of the information system. Clear benefits can be identified, such as: non-value adding activities identified, process performance improved, products priced better and strategic/operating decisions improved.

4. ***How the technique has been assessed?***

- When did you start? What is timetable timescale?

- What was your approach?

- Do you have an assessment team? If so, how is it structured? (Assessment Team cohesion, heterogeneity, size, training) (Consultants, In-house accountants, Production personnel, IT/IS personnel, Marketing personnel)

- Did you use any software products? Which did you use?
  Spreadsheet or database package
  In-house developed software
  Specialized stand alone ABC package. (e.g. Acorn, ALG, SAS, Lead)
  ABC module built in the firm's Enterprise Resource Planning (ERP) systems (e.g. SAP R/3, Baan, Oracle).

  - How Sophisticated is the ABC system you have assessed/trying to implement?

  - PROBE :What is the number of activity pools (the size of activity dictionary) defined?

  - How many first stage cost drivers are defined?

  - How many second stage cost drivers are defined?

  - How many hierarchy levels have been identified in the ABT model?
    OR,

- Managers directly estimate the resource demands imposed by each transaction, product, or customer rather than assign resource costs first to activities and then to products or customers.
- For each group of resources, estimates of only two parameters are required:

a) the cost per time unit of supplying resource capacity and
b) the unit times of consumption of resource capacity by products, services, and customers.

At the same time, the new approach provides more accurate cost-driver rates by allowing unit times to be estimated even for complex, specialized transactions.

- What is/was the level of commitment from senior management?

- What is the level of understanding of ABC amongst senior management? Did you do any facilitation/training to advance commitment?

- What are the criteria that you will use to judge using ABC?

5. ***Why ABC system:***

Why was a decision taken to consider/assess the technique?

- What were your objectives from introducing ABC? (The expected benefits of ABC?) (The planned use of ABC: Costing, budgeting or managerial purpose?)

Breadth of ABC use:

What are the functions/departments that routinely use the ABC information for decision making?

- Design engineering
- Manufacturing engineering
- Production management
- Plant manager
- Top management
- Marketing
- Corporate finance

Depth of ABC use:

What are the purposes that ABC information is consistently used for?

- Product costing
- Cost Management and Reduction
- Pricing decisions (Product Pricing)
- Product mix decisions
- Determine customer profitability
- Budgeting
- As an off-line analytic tool
- Outsourcing decisions
- Performance measurement
- Stock Valuation
- Product Output Decisions
- New Product Design
- Customer Profitability Analysis
- Cost Modelling

Level of integration of ABC into firm strategic and performance evaluation systems

- Is ABC tied to the competitive strategies of the business unit?
- Is ABC linked to the evaluations of non-accounting personnel?
- Is ABC linked to compensation of non-accounting personnel?

Frequency of usage:

- A pilot study
- Used occasionally only on a one-off basis
- Used in parallel with other system (continues use)
- Used as the main basis costing system (pure continues use)

- What was the impetus for the study / project? (What factors caused you to begin the considering and assessing of ABC system?)

PROBE - Awareness of literature
- Parent Company
- Responsible parties (accountants or management) Champion? Who?
- Change in the organisation structure?
- Strategy
- Competition - intense?
- View of your company's market position - competitive strengths
- and weaknesses

PROBE - Cost position e.g. low cost producer
- Objectives within the market strategy

- External communication (CIMA, competitors) (How many companies you know in your industry use ABC? Were they successful?)

- Production process characteristics (Product diversity, Product line complexity, Dominance of overhead)

PROBE: Current Products

Current type or range?
Changes over time?
New product development?

Cost structure Rounded	%
Direct Material	
Direct Labour	
Production overhead	
Non-production overhead	
	100%

- Other innovations (Managerial, accounting, IS, manufacturing) (TQM, JIT, TC, BSC, TOC, IAS, ERP, MRP, CAD....)

- Problems with previous costing system (Please describe your previous costing system [strengths, weaknesses])

- Innovation characteristics (When first ABC was suggested, ***at that time*** did you think that ***using*** an ABC system:

Relative advantage

- Can get the job done quicker, easier, improve the quality of service, increase overall effectiveness, achieve greater control over work processes (More accurate, helps in avoiding the weaknesses of the current system?)

Trialability

- It is possible and easy to trying using ABC and assessing it

Compatibility

- Is compatible with your practice, firm strategy and culture with existing processes?

Complexity for users

- Is easy to implement
- Can be learned quickly and easily

Image

- Will Enhances the profile and reputation of the company

Visibility

- Outcomes are easily reported/communicated
- Has clear and demonstrable Advantages/benefits)

6. ***Why you rejected the technique? OR Why you approved the technique?***

7. ***<u>How is it intended to implement the technique?</u>***

PROJECT STRUCTURE
1. When did you start? What is timetable/timescale?
2. What is your approach?
3. What was your methodology - pilot site, 'big bang'?
4. If you used a pilot site, how did you select it?
5. Do you have a project team? If so, how is it structured?
    - Implementation team cohesion
    - Implementation team heterogeneity
    - Implementation team size
    - Implementation team training
    - ABC training investments

6. Is there a steering group?
7. Who is on the steering group?
8. What is the level of commitment from senior management?
9. Did you use consultants?
10. Did you use any software products? Which did you use?

- What were the main problems/difficulties in assessing it? (IT)
- What problems if any have still to be resolved?
- Are there any pitfalls to be avoided for someone starting out?
- Is there anything that you would do differently?

Appendix 3: The pre-notice letter

CIMA

Dear CIMA member,

This month, you will receive a request to complete a postal questionnaire for a research project conducted by Bristol University, and sponsored by CIMA. It concerns the diffusion of management accounting innovations in UK companies and the factors that affect this diffusion.

As successful innovation in management accounting is vital both to keep industry competitive and to maintain the vitality of the management accounting profession, we are asking for your valuable contribution by completing the questionnaire that you will receive shortly.

It is only with the generous help of our members that such research can be successful for CIMA.

Yours sincerely,

CIMA Research and Development

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26 Chapter Street London SW1P 4NP United Kingdom T +44 (0)20 7663 5441 F +44 (0)20 7663 5442 W www.cimaglobal.com

Appendix 4: The cover letter

University of BRISTOL

CIMA

2/10/2007

Dear Mr David Dugdale,

You should have recently received a letter from CIMA inviting you to participate in this research project which aims to determine the factors that influence adoption and implementation of new management accounting innovations in UK manufacturing companies. This will provide insights into changing cost management systems and the influence of business environment, strategy and culture on their implementation and success. The importance of this research topic is recognized by CIMA and in recent reports published by the National Statistics Office and the Confederation of British Industry.

Your name and your organisation is one of a sample chosen to participate in this study. It was selected randomly from the entire population of UK manufacturing companies published by CIMA. The success of this study is dependent on obtaining a high response rate so that its results will be truly representative of practice in UK manufacturing industry. Thus your participation is extremely important. We assure you that all information will be used for academic purposes only and will be treated as "strictly confidential". If you desire, we will send you a report of our findings.

Thanking you for your help and cooperation, and looking forward to receiving your response in the enclosed pre-paid stamped addressed envelope. In the mean time, if you have any questions, please do not hesitate to contact either of us on one of the numbers/e-mails listed below.

Yours Sincerely,

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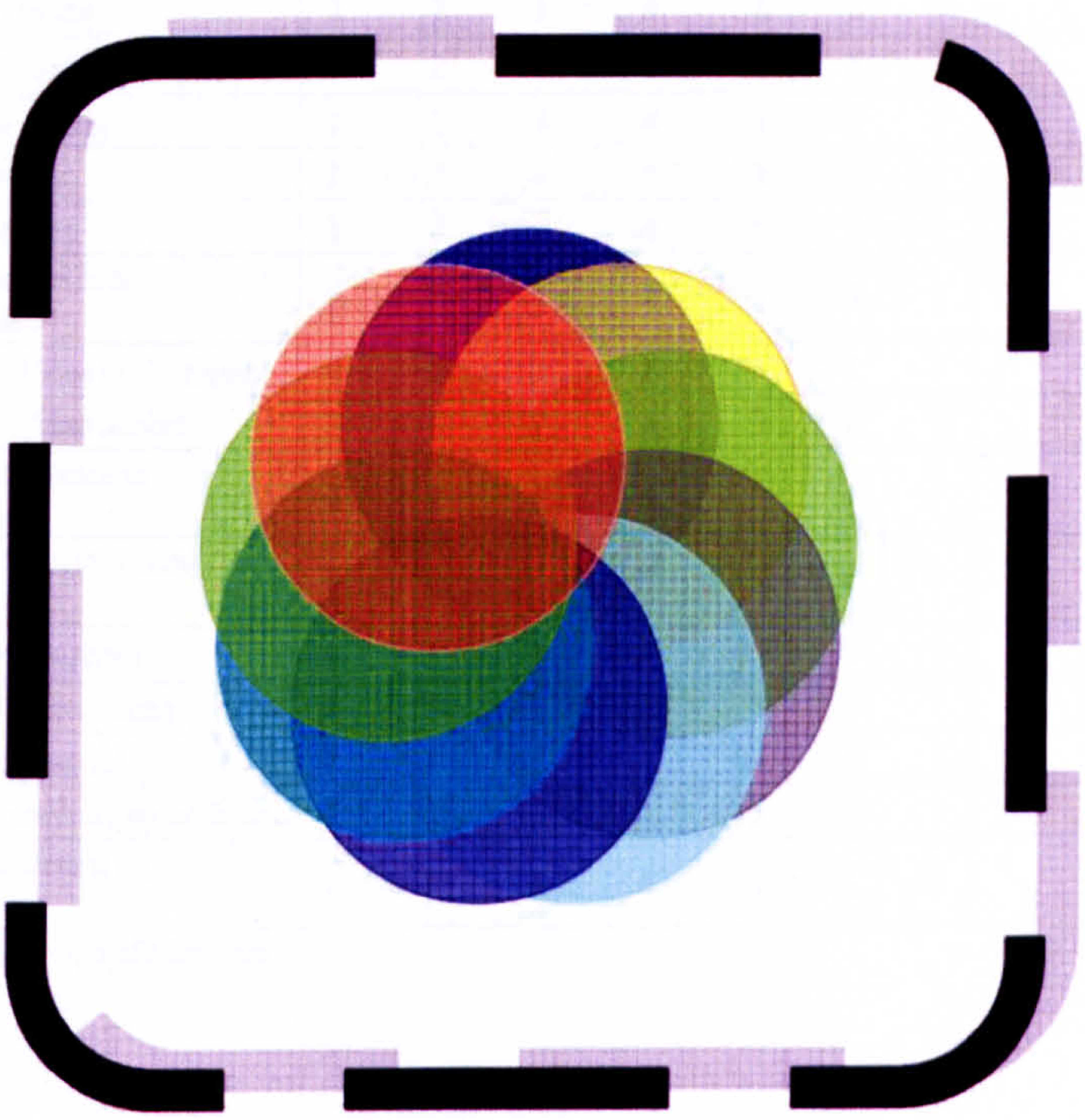
Appendix 5: The questionnaire

University of
BRISTOL

Management Accounting Innovations Survey



Sponsored by

CIMA

Your replies will be treated in the strictest confidence and individual responses will not be released to any third party without your permission.
Your responses will be treated according to the Data Protection Act 1998 and CIMA Confidentiality Agreement and Data Protection Information.

Section A: Management accounting innovations[1]:

1. ***Using the following scale, please indicate to what extent your business unit uses the following management accounting techniques. If the technique is still in the process of being implemented, please tick in the last column.***

Not at all						*To a great extent*
1	2	3	4	5	6	7

Management Accounting Innovations	In use							Implementation process
Strategic costing	1	2	3	4	5	6	7	
Activity Based Techniques	1	2	3	4	5	6	7	
Life cycle costing	1	2	3	4	5	6	7	
Target costing	1	2	3	4	5	6	7	
Quality costing	1	2	3	4	5	6	7	
Environmental cost management	1	2	3	4	5	6	7	
Economic Value to Customer	1	2	3	4	5	6	7	
Economic Value Added	1	2	3	4	5	6	7	
Competitive position monitoring	1	2	3	4	5	6	7	
Competitor performance appraisal	1	2	3	4	5	6	7	
Value chain analysis	1	2	3	4	5	6	7	
Throughput accounting	1	2	3	4	5	6	7	
Balanced scorecard	1	2	3	4	5	6	7	
Customer profitability analysis	1	2	3	4	5	6	7	
Cash Flow Return on Investment	1	2	3	4	5	6	7	
Others, please specify/describe								

2. ***During** the last two years, has your business unit faced a compelling need leading to a significant change in your costing/cost management system? (e.g. financial crisis, threat of closure, changed competitive environment, significant strategic change etc.).*

Yes ☐ No ☐

[1] Definitions of management accounting techniques are provided separately.

CIMA

University of BRISTOL

Questions 3-9 are general questions <u>all respondents should answer them</u>. These questions help us to gauge the prevalence of Activity Based Techniques in your general business environment. Please either tick the appropriate box or circle the appropriate number.

3. *Is there any regulation (by the government or any other regulatory authority) that imposes ABT in your industry?* Yes ☐ No ☐

4. *Does your parent company use activity based techniques?* Yes ☐ No ☐ N/A ☐

5. *Has your parent company imposed ABT in your business unit?* Yes ☐ No ☐ N/A ☐

6. *Please indicate the extent to which you agree/disagree with the following statements:*

Strongly disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Strongly agree
1	2	3	4	5	6	7

	Strongly disagree			Neutral			Strongly agree	
ABT is currently in use by:								
1. Our main competitors.	1	2	3	4	5	6	7	don't know
2. Other business units in our company.	1	2	3	4	5	6	7	don't know
3. Our main suppliers	1	2	3	4	5	6	7	don't know
4. Our main customers	1	2	3	4	5	6	7	don't know
Our main competitors who have adopted ABT:								
5. Have benefited from it.	1	2	3	4	5	6	7	don't know
6. Are perceived favourably by others in the industry.	1	2	3	4	5	6	7	don't know
ABT adoption is recommended/promoted by:								
7. Our parent company.	1	2	3	4	5	6	7	don't know
8. Our main suppliers.	1	2	3	4	5	6	7	don't know
9. Our main customers.	1	2	3	4	5	6	7	don't know
11. Trade associations.	1	2	3	4	5	6	7	don't know
12. CIMA.	1	2	3	4	5	6	7	don't know
13. Consulting/auditing companies.	1	2	3	4	5	6	7	don't know
14. Professional journals and magazines.	1	2	3	4	5	6	7	don't know
15. Software vendors.	1	2	3	4	5	6	7	don't know
Regarding the current level of knowledge of ABT:								
16. Accounting staff have good knowledge of ABT.	1	2	3	4	5	6	7	don't know
17. Managers have good knowledge of ABT.	1	2	3	4	5	6	7	don't know

CIMA

University of BRISTOL

7. ***The following statements describe a sequence of possibly overlapping stages that may be followed in implementing Activity Based Technique. This process could stop at any of these stages. Please tick next to the statement that best applies to your business unit in column A (still in the process/using) OR column B (where the process stopped).***

(Please tick one box only)

Stage	Stage description	**A** The current stage of ABT implementation	**B** ABT implementation process stopped during/by the end of this stage.
	Activity Based Techniques have not been **seriously** considered yet.	☐	
1	***Interested:*** We are **seriously** considering ABT. Discussions/investigations are taking place regarding possible introduction.	☐	Considered but rejected ☐
2	***Approved:*** Approval has been granted to implement ABT and the necessary resources assigned.	☐	Stopped after approval ☐
3	***Set-up:*** Currently planning for ABT implementation, determining project scope and objectives, collecting data, anticipating possible problems and considering necessary changes in the adopted technique and/or in the organizational structure.	☐	Set up stopped/failed ☐
4	***Implemented:*** Implementation process is completed and ABT model/project has been piloted. The adoption decision was reviewed and confirmed. The ABT model is available for use.	☐	Implementation abandoned ☐
5	***Ramp up***: We started to use the ABT model. The acceptance of the new practice is being built gradually in the organization, and unexpected problems are being dealt with. A common understanding of ABT is emerging.	☐	Ramp up stopped/failed ☐
6	***Using:*** ABT used after following most or all of the above stages.	☐	Use ceased ☐
	ABT used without following most or all of the above stages.	☐	Use ceased ☐

8. *When did your business unit:* *(please answer if relevant)*

	MM		YYYY			
A) First consider ABT initiation?						
B) Formally approve ABT implementation?						
C) Use ABT?						
D) Stop ABT implementation/use (rejected, abandoned or ceased)?						

9. ***If you have not yet implemented ABT:*** *please indicate the extent to which you disagree/agree with the following statements.*

If you have implemented or are in the process of implementing ABT: *please indicate your attitude/perception to* ***ABT use when it was first considered.***

	Strongly Disagree			Neutral			Strongly agree	
Using ABT :								
1. costing is better than current practice.	1	2	3	4	5	6	7	N/A
2. cost management is better than current practice.	1	2	3	4	5	6	7	N/A
3. budgeting is better than current practice.	1	2	3	4	5	6	7	N/A
4. pricing is better than current practice.	1	2	3	4	5	6	7	N/A
5. performance measurement is better than current practice.	1	2	3	4	5	6	7	N/A
6. is compatible with our business unit existing processes/practices .	1	2	3	4	5	6	7	N/A
7. is compatible with our business unit's culture.	1	2	3	4	5	6	7	N/A
8. enhances the profile and reputation of the business unit	1	2	3	4	5	6	7	N/A
9. is a sign of a modern dynamic company.	1	2	3	4	5	6	7	N/A
10. improves outsourcing decisions	1	2	3	4	5	6	7	N/A
11. improves forecasting	1	2	3	4	5	6	7	N/A
12. improves capacity management and capital investment decisions	1	2	3	4	5	6	7	N/A
13. better complements our value-based management tools, such as EVA	1	2	3	4	5	6	7	N/A
14. better complements our Just in Time production systems	1	2	3	4	5	6	7	N/A
15. better complements our Total Quality Management approach	1	2	3	4	5	6	7	N/A
16. is conceptually easy to learn and understand.	1	2	3	4	5	6	7	N/A
17. is easy to implement.	1	2	3	4	5	6	7	N/A
18. has clear and demonstratable advantages/benefits.	1	2	3	4	5	6	7	N/A
19. could be tried/piloted before deciding to adopt.	1	2	3	4	5	6	7	N/A
20. is expensive to implement.	1	2	3	4	5	6	7	N/A
21. is expensive to maintain	1	2	3	4	5	6	7	N/A
Top management:								
22. is interested in the implementation of an ABT system	1	2	3	4	5	6	7	
23. considers ABT important to the organisation	1	2	3	4	5	6	7	
24. effectively communicates its support for ABT	1	2	3	4	5	6	7	
There is an individual who enthusiastically championed:								
25. the consideration of ABT.	1	2	3	4	5	6	7	
26. the adoption of ABT.	1	2	3	4	5	6	7	
27. the active use of ABT.	1	2	3	4	5	6	7	

Section B: About your business unit:

The following general questions help us to categorise your business unit.

10. ***Please specify the approximate number of employees (full-time equivalents) currently employed in your business unit.*** .... employees

11. ***Please specify the approximate annual sales turnover for your business unit for the last financial year.*** £ .... million

12. ***In what type of business/industry is your business unit engaged?*** *(please be specific: e.g. steel manufacturing)*

....

13. *The following statements describe three organisational types commonly observed in practice (none of these types is inherently "good" or "bad"). Please select one (A, B or C) that you believe most closely describes your business unit compared to others in your industry (the three types specified are generic and may not exactly represent your business unit). Please consider your business unit as a whole.*

☐ **Type A:**

This type of organisation attempts to locate and maintain a secure niche in a relatively stable product or service area. The organisation tends to offer a more limited range of products or services than its competitors, and it tries to protect its domain by offering higher quality, superior service, lower prices, and so forth. Often this type of organisation is not at the forefront of developments in the industry, but concentrates instead on doing the best job possible in its market.

☐ **Type B:**

This type of organisation typically operates within a broad product-market domain that undergoes periodic redefinition. The organisation values being "first in" in new product and market areas even if not all these efforts prove to be highly profitable. The organisation responds rapidly to early signals concerning areas of opportunity, and these responses often lead to a new round of competitive actions.

☐ **Type C:**

This type of organisation attempts to maintain a stable, limited line of products or services, while at the same time tries to move out quickly to follow a carefully selected set of the more promising new developments in the industry. The organisation is seldom "first in" with new products or services. However, by carefully monitoring the actions of major competitors in areas compatible with its stable product-market base, the organisation can frequently be "second in" with a more cost-efficient product or service.

14. ***The following statements represent a number of business values. To help us to understand the work environment in your business unit, <u>please indicate the extent to which it is valued in your business unit.</u>***

	Not valued at all						Valued to a very great extent
1. A willingness to experiment	1	2	3	4	5	6	7
2. Not being constrained by many rules	1	2	3	4	5	6	7
3. Being quick to take advantage of opportunities	1	2	3	4	5	6	7
4. Being innovative	1	2	3	4	5	6	7
5. Risk taking	1	2	3	4	5	6	7
6. Being competitive	1	2	3	4	5	6	7
7. Being achievement oriented	1	2	3	4	5	6	7
8. Having high expectations for performance	1	2	3	4	5	6	7
9. Being results oriented	1	2	3	4	5	6	7
10. Being action oriented	1	2	3	4	5	6	7

15. ***The following statements help us to understand the importance of cost information and the diversity of manufacturing operations within your business unit. Please indicate the extent to which you disagree/agree with each following statements:***

	Strongly disagree			Neutral			Strongly agree
1. Product costs must be accurate to compete in your markets	1	2	3	4	5	6	7
2. Cost data are important because of your cost reduction efforts	1	2	3	4	5	6	7
3. Cost data are an important factor in pricing decisions	1	2	3	4	5	6	7
4. The business unit performs many special cost studies	1	2	3	4	5	6	7
5. Capital expenditures are based on 'strategic reasons' instead of cost issues	1	2	3	4	5	6	7
6. Product lines are diverse.	1	2	3	4	5	6	7
7. Most products require different processes to design, produce and distribute.	1	2	3	4	5	6	7
8. There are major differences in volume/output across product lines.	1	2	3	4	5	6	7
9. The consumption of support department resources (e.g., engineering, purchasing, marketing) varies substantially across product lines.	1	2	3	4	5	6	7

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16. ***Regarding*** *the internal operating environment of your business unit, please indicate the extent to which you disagree/agree with each of the following statements. Please note if any of the decisions specified in items 1 -6 are not applicable to your business unit enter the term 'N/A' next to the item number.*

	Strongly disagree			Neutral			Strongly agree
1. New product introduction decisions are made only at the highest management level	1	2	3	4	5	6	7
2. Apart from minor investments, capital budgeting decisions are usually made only at the top management level	1	2	3	4	5	6	7
3. Pricing policies are set only by top management	1	2	3	4	5	6	7
4. Decisions to attempt penetration into new markets generally are made only by top management	1	2	3	4	5	6	7
5. Decisions on major changes to (including new introduction of) manufacturing processes are made only at the top management level	1	2	3	4	5	6	7
6. Personnel policy decisions are usually made by top management	1	2	3	4	5	6	7
7. Rules and procedures in your business unit are very clearly documented.	1	2	3	4	5	6	7
8.There is always an extensive reliance on rules and procedures to meet operating emergencies	1	2	3	4	5	6	7
9. Violation of the documented procedures is not tolerated.	1	2	3	4	5	6	7
10. Employee expectations are specified in detail.	1	2	3	4	5	6	7
11. Desired results are explicitly defined.	1	2	3	4	5	6	7
12. Work rules and/or specific work policies are widely used.	1	2	3	4	5	6	7
13. Direct supervision of employee activities takes place frequently.	1	2	3	4	5	6	7
14. Frequent monitoring of employee performance takes place.	1	2	3	4	5	6	7
15. Performance measures are precise and timely.	1	2	3	4	5	6	7
16. Performance reviews are detailed, comprehensive and frequent.	1	2	3	4	5	6	7
17. There is a strong link between the penalties imposed or rewards provided and the performance measures used.	1	2	3	4	5	6	7

17. ***How many hierarchical levels exist between top managers and line supervisors in your organization?*** *For example, if you have only middle management personnel between the top mangers and line supervisors, you should put 3.*

………. **levels**

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18. ***Total Cost*** *can be classified into* ***Direct Material Cost, Direct Labour Cost, Production Overheads*** *(indirect costs of production) and* ***General Overheads*** *(cost of general support, selling and management/administration etc.). Please indicate the approximate percentage of each of these categories in your* ***Total Cost:***

Direct Materials	________	%
Direct Labour	________	%
Production Overhead	________	%
General Overhead	________	%
	100	%

19. ***Regarding*** *your business unit information technology, Please indicate the extent to which you disagree/agree with each following statements:*

	Strongly disagree			Neutral			Strongly agree
1. The business unit's information systems (e.g. sales, manufacturing, etc.) are integrated with each other.	1	2	3	4	5	6	7
2. The information system offers user-friendly query capability.	1	2	3	4	5	6	7
3. Detailed sales and operating data are available in the information system for the last 12 months.	1	2	3	4	5	6	7
4. Many perspectives of cost and performance data are available.	1	2	3	4	5	6	7
5. Manufacturing and other operating data are updated in 'real time' rather than periodically.	1	2	3	4	5	6	7

20. ***Does*** *your business unit have an Enterprise Resource Planning system?*
(e.g. SAP R/3, Baan, Oracle). Yes ☐ No ☐

If yes, Please specify the vendor of your current ERP system and its approximate launching date:

Vendor	MM		YYYY			

Section C: About the external environment:

21. ***The*** *following statements describe some of the factors that constantly change in the external environment. Using the scale below, for each factor, please circle the number that corresponds to the predictability or unpredictability of the rate of change within your business unit.*

Highly Predictable	Fairly Predictable	Slightly Predictable	Neutral	Slightly Unpredictable	Fairly Unpredictable	Highly Unpredictable
1	2	3	4	5	6	7

1. Manufacturing technology	1	2	3	4	5	6	7
2. Competitors' actions	1	2	3	4	5	6	7
3. Customers' demand and taste	1	2	3	4	5	6	7
4. Product attributes/design	1	2	3	4	5	6	7
5. Raw material availability	1	2	3	4	5	6	7
6. Raw material prices	1	2	3	4	5	6	7
7. Labour union actions	1	2	3	4	5	6	7
8. Government regulation	1	2	3	4	5	6	7

22. *Using the following scale, please indicate the intensity of competition for your business unit in relation to:*

	Low			Moderate			Extremely high
1. Raw materials	1	2	3	4	5	6	7
2. Technical personnel	1	2	3	4	5	6	7
3. Selling and distribution	1	2	3	4	5	6	7
4. Quality and variety of products	1	2	3	4	5	6	7
5. Price	1	2	3	4	5	6	7

Section D: About yourself

23. *Using the following scale, please indicate how often you attended the various events sponsored by CIMA or consulted/visited CIMA's publications and website in the last 12 months.*

	Never	Once	more than once
1. Seminars	1	2	3
2. Annual conferences	1	2	3
3. Courses	1	2	3
4. Meetings	1	2	3
5. Factory visits	1	2	3
6. Social events	1	2	3
7. CIMA publications	1	2	3
8. CIMA website	1	2	3

24. *Using the following scale, please indicate how often you use the following networks to find out about the latest ideas in the field of management accounting.*

	Never			Moderate			Extensively
1. Colleagues within your own department.	1	2	3	4	5	6	7
2. Colleagues in other departments	1	2	3	4	5	6	7
3. Colleagues in the wider company	1	2	3	4	5	6	7
4. CIMA members	1	2	3	4	5	6	7
5. Other professional accounting associations' members	1	2	3	4	5	6	7
6. Suppliers	1	2	3	4	5	6	7
7. Customers	1	2	3	4	5	6	7
8. Consultants	1	2	3	4	5	6	7
9. Hardware and software vendors	1	2	3	4	5	6	7
Others please specify							

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The following questions are designed to enable us to classify your answers. We reiterate that all information you provide is strictly <u>**CONFIDENTIAL**</u> ***and any information identifying the respondent will not be disclosed under any circumstances.***

25. Where are you located in the organisational structure? (Please tick one box)

- ☐ at group head office
- ☐ at divisional head office
- ☐ at an operating unit
- ☐ not applicable, no group structure

26. Please insert your job title/position: -

27. How many years have you been in this current position? .... Years

28. Approximately, how many years of working experience do you have? .... Years
(Including experience prior to joining this business unit)

29. Please provide us with the following information which will only be used, in exceptional circumstances, to contact you directly in the event of a query.

Your E-mail .... Your telephone number ....

Please tick the box if you want a copy of the aggregated results of this study ☐

Thank you for taking the time to complete this questionnaire. Your assistance in providing this information is very much appreciated. We would appreciate any comments or suggestions you may care to make about any subject mentioned in the questionnaire.

Please return your completed questionnaire in the pre-paid and addressed enclosed envelope to: Mr. M.Al-Sayed, Department of Economics, Finance and Management, 8 Woodland Road, Bristol, BS8 1TN

Appendix 6: The reminder e-mail and letter

Dear CIMA member,

Last week a postal questionnaire "Management Accounting Innovations Survey" has been sent to you by Bristol University seeking your participation in a research project sponsored by CIMA. If you have already completed and returned the questionnaire, please accept our sincere thanks. If not, please do so. You can use the copy that you received or access the electronic version of this questionnaire.

Your participation is extremely significant to the successful completion of this study. Little is known about the diffusion of management accounting innovations in the UK and this project aims to determine the factors that influence adoption and implementation of new management accounting techniques in UK manufacturing companies.

Thanking you for your help and cooperation, and looking forward to receiving your response.

In order to ensure that only authorised respondents can access the survey questionnaire please use your CIMA ID to access the website.

Click **here** to go to the website.

Yours Sincerely,

CIMA & Bristol University

University of BRISTOL

CIMA

15/11/2007

Dear CIMA member,

About three weeks ago we asked if you would participate in the CIMA sponsored "Management Accounting Innovations Survey". If you have already completed and returned the questionnaire, please accept our sincere thanks. If not, we understand that your busy schedule may have delayed your response. However, we are writing again because your participation is important to successful completion of the project. Also your prompt response will facilitate the completion of Mr Al-Sayed's PhD dissertation, of which this study is a part.

As mentioned in our earlier letter, all information will be treated in the utmost confidence, as only aggregate results will be reported. If by some chance you did not receive the questionnaire, or misplaced it, please contact either of us and we will gladly send you another one. Alternatively, you can access the electronic version of the questionnaire on the following link: www.efm.bris.ac.uk/ecmas/mais/abc.htm

If you prefer, you can also obtain a printed copy of the survey questionnaire from the website (pdf version) and return it to:

Mr. M. Al-Sayed,
School of Economics, Finance and Management,
8 Woodland Road,
Bristol,
BS8 1TN.

We look forward to receiving your completed questionnaire by the end of November if possible. Thanking you for your help and cooperation, and looking forward to receiving your response.

Yours Sincerely,

Professor David Dugdale
Department of Economics, Finance and Management
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Tel: +44 (0)117 928 9049
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Appendix 7: The primary full list of management accounting innovations

Costing
Competitor cost assessment
Strategic costing
Value chain costing
Supply chain cost management
Total cost of ownership
Life cycle costing
Target costing
Kaizn cost procedures
Functional cost analysis
Attribute costing
Inter-Organisational cost management practices
Quality costing
Throughput costing
Strategic decision making
Strategic Pricing
Brand valuation
Planning, control and performance measurement
Benchmarking
Integrated performance measurement
Economic Value Added
Cash Flow Return On Investment (CFROI)
Market Value Added
Key Performance indicators
Competitor accounting
Competitive position monitoring
Competitor performance appraisal
Competitor profitability analysis
Customer accounting
Life time customer profitability analysis
Valuation of customers as assets
Customer profitability analysis
Managerial Philosophies/Practices
Theory of constrains
Business process reengineering
Total quality management
Just in time
Beyond Budgeting
Value Based Management

Appendix 8: Management accounting innovations' definitions

Activity Based Techniques (ABT): Any management accounting technique that uses business unit's activities as its base. Such techniques include: Activity Analysis (AA), Activity Cost Analysis (ACA), Activity Based Costing (ABC), Time Driven ABC, Activity Based Management (ABM) and Activity Based Budgeting (ABB).

Activity Analysis (AA):	Identifying the activities and procedures carried out to convert material, labour and other resources into outputs. Activities that do not contribute to the value of those outputs may be removed, replaced or diminished. AA does not require cost analysis and does not necessarily lead to a new overhead allocation method.
Activity Cost Analysis (ACA):	Based on Activity Analysis, activity cost analysis aims to identify the costs of each activity and the factors that cause them to vary.
Activity Based Costing (ABC):	Approach to the costing and monitoring of activities which involves tracing resource consumption and costing final outputs. Resources are assigned to activities, and activities to cost objects based on consumption estimates. The latter utilise cost drivers to attach activity costs to outputs.
Time-Driven ABC:	Approach to ABC based on the time required for each unit activity. The method avoids the use of interviews with operating managers in order to estimate percentage of time spent on different areas of work. It is claimed that "time-driven ABC" based on "time per transactional activity" is simpler to install and update and can highlight unused capacity.
Activity Based Management (ABM):	Refers to the entire set of actions that can be taken, on basis of activity based information that aim to increase efficiency, lower costs, improve asset utilisation and improve profitability.
Activity Based Budgeting (ABB):	Method of budgeting based on activity framework and utilising cost driver data in the budget setting and variance feedback process.
Balanced scorecard approach:	Approach to the provision of information to the management to assist strategic policy formulation and achievement. It emphasises the need to provide the user with a set of information which addresses all relevant areas of performance in an objective and unbiased fashion. The information provided may include both financial and non-financial elements, and cover areas such as profitability, customer satisfaction, internal efficiency and innovation.
Cash Flow Return on Investment (CFROI):	A valuation model that assumes the stock market sets prices based on cash flow, not on corporate performance and earnings. CFROI = Cash flow / Market Value of Capital Employed.
Competitive position monitoring:	The analysis of competitor positions within the industry by assessing and monitoring trends in competitor sales, market share, volume, unit costs, and return on sales. This information can provide a basis for the assessment of a competitor's market strategy.
Competitor performance appraisal:	The numerical analysis of a competitor's published statements as a part of an assessment of a competitor's key sources of competitive advantage.
Customer profitability analysis:	This involves calculating profit earned from a specific customer. The profit calculation is based on costs and sales that can be traced to a particular customer. This technique is sometimes referred to as "customer account profitability.
Economic Value Added (EVA^{TM}):	Profit less a charge for capital employed in the period. Accounting profit may be adjusted, for example, for the treatment of goodwill and research and development expenditure, before economic value added is calculated.
Economic value to customer (EVC):	An analysis aim at measuring the value of new products to current and potential customers. EVC of a new product= **the life-cycle costs of *current/reference* product – start-up and post purchase cost of the *new* product + any incremental value offered by the *new* product.**
Environmental cost management:	Identification, collection, analysis and use of two types of information for internal decision making: physical information on the use, flows and rates of energy, water and materials (including wastes); and monetary information on environment related costs, earnings and savings.
Life cycle costing (LCC):	The appraisal of costs based on the length of stages of product or service's life. Namely: design, introduction, growth, decline, and eventually abandonment (marketing perspective).
Quality costing:	Quality costs are those costs associated with the creation, identification, repair and prevention of defects. These can be classified into three categories: prevention, appraisal, and internal and external failure costs. Cost of quality reports are produced for the purpose of directing management attention to prioritize quality problems.
Strategic costing:	Using cost data, strategic and marketing information to develop and identify strategies that will sustain a competitive advantage.
Target costing:	Estimating a cost calculated by subtracting a desired profit margin from an estimated or market-based price to arrive at a desired production, engineering, or marketing cost, and to design a product which meet that cost.
Throughput accounting (TA):	Variable cost accounting presentation based on the definition of throughput (sales minus material and component costs). Sometimes referred to as super variable costing because only material costs are treated as variable.
Value chain analysis:	Use of the value chain model to identify the value adding activities of an entity. (Also **Value chain costing** : An activity-based approach where costs are allocated to activities required to design, procure, produce, market, distribute, and service a product or service.)

Appendix 9: Inter-correlation matrixes and item-total statistics

ABT attributes/Relative advantage

Inter-Item Correlation Matrix

	Relative advantage of using ABT/costing Q9.1	Relative advantage of using ABT/ cost managment Q9.2	Relative advantage of using ABT/budgeting Q9.3	Relative advantage of using ABT/pricing Q9.4	Relative advantage of using ABT/performance managment Q9.5	Relative advantage of using ABT/outsourcing decision Q9.10	Relative advantage of using ABT/forcucting Q9.11	Relative advantage of using ABT/capacity management and capital investment decisions Q9.12	Relative advantage of using ABT/value based managment tools Q9.13	Relative advantage of using ABT/just in time production systems Q9.14	Relative advantage of using ABT/total quality managment Q9.15
Relative advantage of using ABT/costing Q9.1	1.000	.040	.544	.596	.567	.490	.594	.396	.537	.446	.404
Relative advantage of using ABT/ cost managment Q9.2	.848	1.000	.646	.629	.551	.487	.630	.453	.492	.481	.402
Relative advantage of using ABT/budgeting Q9.3	.544	.646	1.000	.544	.664	.379	.608	.483	.417	.564	.433
Relative advantage of using ABT/pricing Q9.4	.596	.629	.544	1.000	.531	.376	.451	.390	.362	.366	.410
Relative advantage of using ABT/performance managment Q9.5	.567	.551	.564	.531	1.000	.470	.588	.442	.404	.404	.460
Relative advantage of using ABT/outsourcing decision Q9.10	.490	.487	.379	.376	.470	1.000	.616	.511	.343	.347	.393
Relative advantage of using ABT/forcusting Q9.11	.694	.630	.608	.451	.688	.616	1.000	.653	.671	.692	.404
Relative advantage of using ABT/capacity management and capital investment decisions Q9.12	.396	.453	.483	.390	.442	.511	.653	1.000	.565	.480	.306
Relative advantage of using ABT/value based managment tools Q9.13	.537	.492	.417	.362	.404	.343	.571	.565	1.000	.511	.450
Relative advantage of using ABT/ just in time production systems Q9.14	.446	.481	.664	.366	.404	.347	.692	.480	.611	1.000	.639
Relative advantage of using ABT/total quality managment Q9.15	.484	.402	.433	.418	.460	.303	.404	.306	.450	.630	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Relative advantage of using ABT/costing Q9.1	43.5294	99.974	.750	.772	.903
Relative advantage of using ABT/ cost managment Q9.2	43.6373	100.134	.772	.789	.902
Relative advantage of using ABT/budgeting Q9. 3	43.9020	98.763	.704	.574	.906
Relative advantage of using ABT/pricing Q9.4	43.8627	102.001	.629	.483	.909
Relative advantage of using ABT/performance managment Q9.5	43.4804	102.133	.677	.504	.907
Relative advantage of using ABT/outsourcing decision Q9.10	43.7059	103.556	.591	.478	.911
Relative advantage of using ABT/forcusting Q9. 11	43.8235	99.474	.782	.696	.902
Relative advantage of using ABT/capacity management and capital investment decisions Q9.12	43.7059	102.328	.627	.540	.910
Relative advantage of using ABT/value based managment tools Q9.13	44.0882	105.962	.624	.500	.910
Relative advantage of using ABT/ just in time production systems Q9. 14	44.2255	103.206	.651	.603	.908
Relative advantage of using ABT/total quality managment Q9.15	44.0000	104.079	.585	.549	.912

ABT attributes/Compatibility

Inter-Item Correlation Matrix

	Compitabilty of using ABT/ process & practices Q9.6	Compitabilty of using ABT/ culture Q9.7
Compitabilty of using ABT/ process & practices Q9.6	1.000	.752
Compitabilty of using ABT/ culture Q9.7	.752	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Compitabilty of using ABT/ process & practices Q9.6	3.7569	3.010	.752	.566	.[a]
Compitabilty of using ABT/ culture Q9.7	3.9306	2.680	.752	.566	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

ABT attributes/Cost

Inter-Item Correlation Matrix

	Cost of using ABT/ implement Q9.20	Cost of using ABT/ maintain Q9.21
Cost of using ABT/ implement Q9.20	1.000	.794
Cost of using ABT/ maintain Q9.21	.794	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Cost of using ABT/ implement Q9.20	4.2847	1.408	.794	.631	.[a]
Cost of using ABT/ maintain Q9.21	4.2500	1.531	.794	.631	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

ABT attributes/Ease

Inter-Item Correlation Matrix

	Ease of using ABT/learn and understand Q9.16	Ease of using ABT/implemet Q9.17
Ease of using ABT/learn and understand Q9.16	1.000	.493
Ease of using ABT/implemet Q9.17	.493	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Ease of using ABT/learn and understand Q9.16	3.2569	2.108	.493	.243	.[a]
Ease of using ABT/implemet Q9.17	4.4097	2.230	.493	.243	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

ABT attributes/Image

Inter-Item Correlation Matrix

	Using ABT impact on the BU image/ reputation Q9.8	Using ABT impact on the BU image/ sign of modernity and dynamism Q9.9
Using ABT impact on the BU image/ reputation Q9.8	1.000	.759
Using ABT impact on the BU image/ sign of modernity and dynamism Q9.9	.759	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Using ABT impact on the BU image/ reputation Q9.8	4.1929	2.588	.759	.576	.[a]
Using ABT impact on the BU image/ sign of modernity and dynamism Q9.9	3.9071	2.214	.759	.576	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Organisational culture dimensions

Inter-Item Correlation Matrix

	Innovation dimension of BU culture/willingness to expermint Q14 1	Innovation dimension of BU culture/no many rules Q14 2	Innovation dimension of BU culture/quick to take advantage of opportunities Q14 3	Innovation dimension of BU culture/being innovative Q14 4	Innovation dimension of BU culture/risk taking Q14.5
Innovation dimension of BU culture/willingness to expermint Q14.1	1.000	.445	.517	.663	.607
Innovation dimension of BU culture/no many rules Q14.2	.445	1.000	.558	.366	.595
Innovation dimension of BU culture/quick to take advantage of opportunities Q14.3	.517	.558	1.000	.639	.596
Innovation dimension of BU culture/being innovative Q14.4	.663	.366	.639	1.000	.586
Innovation dimension of BU culture/risk taking Q14.5	.607	.595	.596	.586	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Innovation dimension of BU culture/willingness to expermint Q14.1	17.3026	20.279	.684	.521	.831
Innovation dimension of BU culture/no many rules Q14.2	17.9868	21.470	.583	.438	.857
Innovation dimension of BU culture/quick to take advantage of opportunities Q14.3	16.9934	21.424	.712	.543	.826
Innovation dimension of BU culture/being innovative Q14.4	16.8355	20.549	.688	.582	.830
Innovation dimension of BU culture/risk taking Q14.5	18.0658	20.141	.741	.555	.816

Inter-Item Correlation Matrix

	Outcome orientation dimension of BU culture/being competitive Q14 6	Outcome orientation dimension of BU culture/ being achievment oriented Q14 7	Outcome orientation dimension of BU culture/having high expectation for performance Q14 8	Outcome orientation dimension of BU culture/being result oriented Q14 9	Outcome orientation dimension of BU culture/being action oriented Q14. 10
Outcome orientation dimension of BU culture/being competitive Q14.6	1.000	.457	.387	.294	.325
Outcome orientation dimension of BU culture/ being achievment oriented Q14.7	.457	1.000	.650	.573	.394
Outcome orientation dimension of BU culture/having high expectation for performance Q14.8	.387	.650	1.000	.688	.450
Outcome orientation dimension of BU culture/being result oriented Q14.9	.294	.573	.688	1.000	.453
Outcome orientation dimension of BU culture/being action oriented Q14.10	.325	.394	.450	.453	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Outcome orientation dimension of BU culture/being competitive Q14.6	21.7171	13.847	.457	.242	.818
Outcome orientation dimension of BU culture/ being achievment oriented Q14.7	21.8487	11.533	.682	.501	.753
Outcome orientation dimension of BU culture/having high expectation for performance Q14.8	21.6053	11.936	.726	.586	.741
Outcome orientation dimension of BU culture/being result oriented Q14.9	21.5000	12.543	.659	.521	.762
Outcome orientation dimension of BU culture/being action oriented Q14.10	22.1447	13.052	.509	.268	.806

Inter-Item Correlation Matrix

	Tight versus loose control dimension of BU culture/ employees expectations' specification Q16 10	Tight versus loose control dimension of BU culture/desired results definition Q16 11	Tight versus loose control dimension of BU culture/work rules usage Q16 12	Tight versus loose control dimension of BU culture/ direct supervision frequency Q16 13	Tight versus loose control dimension of BU culture/frequency of employees performance monitoring Q16 14	Tight versus loose control dimension of BU culture/performance measures preciesness and timelyness Q16 15	Tight versus loose control dimension of BU culture/performance reviews Q16. 16	Tight versus loose control dimension of BU culture/ the link between performance and rewared or penalty Q16 17
Tight versus loose control dimension of BU culture/ employees expectations' specification Q16.10	1 000	.548	.687	315	420	.435	.412	.460
Tight versus loose control *dimension of BU* culture/desired results definition Q16.11	548	1 000	.616	220	424	431	386	386
Tight versus loose control dimension of BU culture/work rules usage Q16.12	687	616	1 000	.312	.430	432	.462	409
Tight versus loose control dimension of BU culture/ direct supervision frequency Q16 13	.315	.220	.312	1 000	.391	.367	.225	.178
Tight versus loose control dimension of BU culture/frequency of employees performance monitoring Q16 14	.420	.424	.430	.391	1 000	527	.566	426
Tight versus loose control dimension of BU culture/performance measures preciesness and timelyness Q16 15	436	.431	.432	367	527	1 000	.728	.499
Tight versus loose control dimension of BU culture/performance reviews Q16.16	.412	386	.462	225	.566	728	1.000	.451
Tight versus loose control dimension of BU culture/ the link between performance and rewared or penalty Q16 17	460	386	.409	178	.426	.499	.451	1 000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Tight versus loose control *dimension of BU culture/* employees expectations' specification Q16.10	30.5667	51 603	.660	.536	.836
Tight versus loose control dimension of BU culture/desired results definition Q16 11	30.1333	53 016	.600	.447	.843
Tight versus loose control dimension of BU culture/work rules usage Q16.12	29 6133	51.782	.677	580	.834
Tight versus loose control dimension of BU culture/ direct supervision frequency Q16 13	30.0800	58.061	.381	.244	.866
Tight versus loose control dimension of BU culture/frequency of employees performance monitoring Q16.14	29 9267	53 303	637	.446	.839
Tight versus loose control dimension of BU culture/performance measures preciesness and timelyness Q16.15	30.2533	51 962	693	614	833
Tight versus loose control dimension of BU culture/performance reviews Q16.16	30.4000	51.664	.646	.604	.838
Tight versus loose control dimension of BU culture/ the link between performance and rewared or penalty Q16 17	30.8067	53.003	.556	.351	.849

Organisational structure

Inter-Item Correlation Matrix

	Centralization/ new product introduction Q16 1	Centralization/ capital budgeting Q16 2	Centralization/ pricing plicies Q16 3	Centralization/ new markets Q16 4	Centralization/ changes in manufactring processes Q16 5	Centralization/ personnel Q16 6
Centralization/ new product introduction Q16.1	1.000	.235	.270	.349	.195	.172
Centralization/ capital budgeting Q16.2	.235	1.000	.411	.388	.335	.376
Centralization/ pricing plicies Q16.3	.270	.411	1.000	.519	.232	.307
Centralization/ new markets Q16.4	.349	.388	.519	1.000	.305	.140
Centralization/ changes in manufactring processes Q16 5	.195	.335	.232	.305	1 000	438
Centralization/ personnel Q16.6	.172	.376	.307	.140	.438	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Centralization/ new product introduction Q16.1	27.5890	17.885	.349	.147	.722
Centralization/ capital budgeting Q16.2	27.4178	17.335	.523	.295	.664
Centralization/ pricing plicies Q16.3	27.8836	16.931	.513	.354	.666
Centralization/ new markets Q16.4	27.1918	18.584	.523	.378	.671
Centralization/ changes in manufactring processes Q16.5	27.7397	17.490	.438	.266	.690
Centralization/ personnel Q16.6	27.6918	18 587	.431	.291	.691

Inter-Item Correlation Matrix

	Formalization/ rules are very clearly documented Q16.7	Formalization/ extensive relience on rules to meet operating emergencies Q16.8	Formalization/ tolerance towards violation of rules Q16.9
Formalization/ rules are very clearly documented Q16.7	1.000	.705	.589
Formalization/ extensive relience on rules to meet operating emergencies Q16.8	.705	1.000	.646
Formalization/ tolerance towards violation of rules Q16.9	.589	.646	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Formalization/ rules are very clearly documented Q16.7	8.9536	9.271	.711	.527	.785
Formalization/ extensive relience on rules to meet operating emergencies Q16.8	9.4901	9.332	.758	.579	.741
Formalization/ tolerance towards violation of rules Q16.9	9.5430	9.583	.668	.453	.826

IT quality

Inter-Item Correlation Matrix

	IT quality/ systems integration Q19.1	IT quality/ user-friendly quary capability Q19 2	IT quality/ information availablity Q19.3	IT quality/ availabilty of cost and performance information Q19.4	IT quality/ real time updating
IT quality/ systems integration Q19.1	1.000	.622	.667	.533	.653
IT quality/ user-friendly quary capability Q19.2	.622	1.000	.573	.597	.572
IT quality/ information availablity Q19.3	.667	.573	1.000	.636	.579
IT quality/ availabilty of cost and performance information Q19.4	.533	.597	.636	1.000	.597
IT quality/ real time updating	.653	.572	.579	.597	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IT quality/ systems integration Q19.1	19.0461	32.627	.742	.588	.851
IT quality/ user-friendly quary capability Q19.2	19.8355	35.436	.703	.501	.860
IT quality/ information availablity Q19.3	18.3421	36.359	.736	.564	.854
IT quality/ availabilty of cost and performance information Q19.4	19.3158	35.343	.698	.523	.861
IT quality/ real time updating	19.2237	33.221	.718	.526	.857

Top management support

Inter-Item Correlation Matrix

	Top management support/ intrest Q9 22	Top management support/ ABT importance Q9.23	Top management support/ effective communication of ABT support Q9.24
Top management support/ intrest Q9.22	1.000	.920	.814
Top management support/ ABT importance Q9.23	.920	1.000	.874
Top management support/ effective communication of ABT support Q9.24	.814	.874	1.000

Inter-Item Correlation Matrix

	Top management support/ effective communication of ABT support Q9.24	Top management support/ intrest Q9.22	Top management support/ ABT importance Q9.23
Top management support/ effective communication of ABT support Q9.24	1.000	.819	.862
Top management support/ intrest Q9.22	.819	1.000	.906
Top management support/ ABT importance Q9.23	.862	.906	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Top management support/ effective communication of ABT support Q9.24	6.2828	12.399	.860	.750	.950
Top management support/ intrest Q9.22	5.7310	11.101	.895	.826	.925
Top management support/ ABT importance Q9.23	5.9034	11.213	.928	.864	.899

Internal champion

Inter-Item Correlation Matrix

	Internal champion support/ consideration Q9.25	Internal champion support/ adoption Q9.26	Internal champion support/ active use Q9.27
Internal champion support/ consideration Q9.25	1.000	.932	.903
Internal champion support/ adoption Q9.26	.932	1.000	.973
Internal champion support/ active use Q9.27	.903	.973	1.000

Inter-Item Correlation Matrix

	Internal champion support/ adoption Q9.26	Internal champion support/ active use Q9.27
Internal champion support/ adoption Q9.26	1.000	.973
Internal champion support/ active use Q9.27	.973	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Internal champion support/ adoption Q9.26	2.9028	3.515	.973	.946	.[a]
Internal champion support/ active use Q9.27	2.9306	3.604	.973	.946	.[a]

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Degree of decision usefulness of cost information

Inter-Item Correlation Matrix

	Product lines diversity(degree of potential cost distortion)/ product lines Q15.6	Product lines diversity(degree of potential cost distortion)/ diversity in products' processes Q15.7	Product lines diversity(degree of potential cost distortion)/diversity in products' volumes Q15.8	Product lines diversity(degree of potential cost distortion)/diversity in products' consumption of overheads Q15.9
Product lines diversity(degree of potential cost distortion)/ product lines Q15.6	1.000	.430	.373	.224
Product lines diversity(degree of potential cost distortion)/ diversity in products' processes Q15.7	.430	1.000	.414	.412
Product lines diversity(degree of potential cost distortion)/diversity in products' volumes Q15.8	.373	.414	1.000	.545
Product lines diversity(degree of potential cost distortion)/diversity in products' consumption of overheads Q15.9	.224	.412	.545	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Product lines diversity(degree of potential cost distortion)/ product lines Q15.6	12.1250	14.733	.421	.233	.716
Product lines diversity(degree of potential cost distortion)/ diversity in products' processes Q15.7	12.9868	14.199	.546	.305	.646
Product lines diversity(degree of potential cost distortion)/diversity in products' volumes Q15.8	11.4737	13.297	.594	.378	.615
Product lines diversity(degree of potential cost distortion)/diversity in products' consumption of overheads Q15.9	12.2237	13.155	.504	.342	.671

Intensity of competition

Inter-Item Correlation Matrix

	Competition intensity/raw material Q22.1	Competition intensity/technical personnel Q22 2	Competition intensity/selling and distribution Q22 3	Competition intensity/quality and variaty of products Q22 4	Competition intensity/price Q22 5
Competition intensity/raw material Q22.1	1.000	.114	.023	.287	.251
Competition intensity/technical personnel Q22.2	.114	1.000	.212	.218	.135
Competition intensity/selling and distribution Q22 3	.023	.212	1.000	.270	.248
Competition intensity/quality and variaty of products Q22.4	.287	.218	.270	1.000	.315
Competition intensity/price Q22.5	.251	.135	.248	.315	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Competition intensity/raw material Q22.1	19.6118	10.160	.256	.122	.548
Competition intensity/technical personnel Q22.2	19.0066	11.358	.258	.078	.532
Competition intensity/selling and distribution Q22.3	19.3355	11.191	.275	.132	.523
Competition intensity/quality and variaty of products Q22.4	18.8289	9.971	.447	.203	.423
Competition intensity/price Q22.5	18.0329	10.906	.382	.160	.468

Importance of cost information

Inter-Item Correlation Matrix

	Importance of cost information accurcy for compition Q15 1	Importance of cost information for cost reduction efforts Q15 2	Importance of cost information for pricing Q15 3	Importance of cost information for conducting special cost studies Q15 4	Importance of cost information for capital expenditures planning Q15. 5
Importance of cost information accurcy for compition Q15.1	1.000	.401	.535	.373	.024
Importance of cost information for cost reduction efforts Q15.2	.401	1.000	.154	.330	.019
Importance of cost information for pricing Q15.3	.535	.154	1.000	.293	-.063
Importance of cost information for conducting special cost studies Q15.4	.373	.330	.293	1.000	.147
Importance of cost information for capital expenditures planning Q15.5	.024	.019	-.063	.147	1.000

Inter-Item Correlation Matrix

	Importance of cost information accurcy for compition Q15.1	Importance of cost information for cost reduction efforts Q15.2	Importance of cost information for pricing Q15.3	Importance of cost information for conducting special cost studies Q15.4
Importance of cost information accurcy for compition Q15.1	1.000	.401	.535	.373
Importance of cost information for cost reduction efforts Q15.2	.401	1.000	.154	.330
Importance of cost information for pricing Q15.3	.535	.154	1.000	.293
Importance of cost information for conducting special cost studies Q15.4	.373	.330	.293	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Importance of cost information accurcy for compition Q15.1	14.6053	9.287	.612	.408	.513
Importance of cost information for cost reduction efforts Q15.2	14.5526	11.732	.380	.208	.663
Importance of cost information for pricing Q15.3	14.5526	10.275	.437	.304	.632
Importance of cost information for conducting special cost studies Q15.4	15.9539	9.978	.435	.194	.635