

# ABC Diffusion in the Age of Digital Economy: the UK Experience

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*Since the beginning of the 21<sup>st</sup> century, there has been a call for further research to trace the effects of the speedy changes in business environment on management accounting practices. This study assesses the impact of different information technologies on ABC adoption and implementation. It uses a cross-sectional survey of financial directors and controllers in the UK firms. Postal and electronic questionnaires have been used in order to collect the empirical data. The findings revealed that the rate of ABC adoption has shown a number of changes between 1999 and 2005. The proportions of ABC users and those currently assessing it have dramatically fallen. The percentage of firms rejecting ABC has slightly fallen as well. However, there has been a considerable increase in the number of firms that abandoned ABC implementation and those firms that gave no consideration for its implementation. These results indicate a decrease in the popularity of ABC. ERP systems seem to have a slightly low significant impact on the initial decision of ABC adoption in those firms that do not have any consideration for ABC and firms that have an ERP system before ABC adoption. Furthermore, the results indicate that firms use different information technologies in the ABC assessment and implementation. For ABC assessment, general software applications are the most preferable software packages while a mix of different ABC software packages is the most popular in the case of ABC implementation. Finally, the findings of this study provide an indication on the nature of the possible effect of general IT-related problems on ABC implementation.*

**Key words:** ABC, ERP, IT, Activity-based costing, new economy.

## 1. Introduction

“ICT has disrupted our peaceful existence by radically transforming the manner in which business is conducted across the world and alerting us to the many challenges that lay ahead.” Hunton (2002: 2)

Nowadays businesses are experiencing new changes and challenges. Being the age of digital economy might be the most important feature of the 21<sup>st</sup> century (Bhimani, 2003). Information and Communication Technology (ICT) dominates the business environment in the 21<sup>st</sup> century. Exploiting ICT resulted in the emergence of Enterprise Resource Planning (ERP) systems, e-commerce applications (e.g., e-business, e-procurement, e-government, virtual organisations), electronic data interchange, intranets and extranets. All these new technologies were used to invent and develop new business structures and forms which have not been possible before.

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Since the beginning of the 21<sup>st</sup> century, management accounting scholars call for tracing the effects of the speedy changes in business environment upon management accounting practices (e.g. Hunton, 2002; Bhimani 2003; Granlund and Mouritsen, 2003; Hartmann and Vaassen, 2003; Gunasekaran et al., 2004). Granlund and Mouritsen (2003: 17), for instance, argue that “researchers should increasingly follow these speedy developments of ICT, and investigate the potential and realized changes it may cause for accounting practice”. This is important today as the accounting profession must deal with many complex issues that never existed in the past (Hunton, 2002). In the future, advances in Information Technology (IT) will influence many aspects of business and accounting practice and thereby offer new and exciting research opportunities (Granlund and Mouritsen, 2003).

Management accounting evolution has been affected by changes in the environment where enterprises are conducting their businesses (Abdel-Kader and Luther, 2008). In 1980s management accounting practices were strongly criticised because of their failure to cope with the dramatic changes in production and competitive environment at that time. Perhaps in response to these criticisms new management accounting innovations such as Activity Based Costing (ABC) was developed.

It has been argued that IT has played a vital role in ABC dissemination and illumination of its managerial role through ABC software, which has reduced the implementation costs and enhanced activity based analysis process (Kaplan and Johnson 1987; Troxel et al., 1990). Different types of information technologies have been used to assess and implement ABC techniques. According to Innes and Mitchell (1995), three main types of information systems (IS) have been used as activity based software: spreadsheet or database packages, in-house developed software and specialized standalone ABC packages. A new type of ABC software has emerged with the emergence of ERP systems in the late 1990s. This new type is a result of integrating analytic ABC applications with ERP modules which has provided an enterprise-wide ABC environment (Shaw, 1998).

This study responds to recent calls from management accounting scholars to examine management accounting practices in the new economy. In addition to exploring the current status of ABC adoption and implementation in manufacturing and non-manufacturing sectors in the UK after five years of the last ABC survey, this study aims at assessing the impact of different information technologies on ABC adoption and implementation. The impact of IT on the initial adoption decision of ABC and on the success of different levels of ABC implementation is the focus of this study.

The remainder of this paper is organised in four sections. In the next section, prior ABC adoption and implementation research and the role of IT on ABC evolution and diffusion are discussed and then the research questions are developed. This is followed by a section that details the research method employed in this study. Then the findings are reported in

section 4 and the implications of the results were discussed in section 5. The final section provides the study's conclusions, limitations and future research directions.

## **2. Prior Literature and Development of Research Questions**

Two areas of research are important for this study – ABC adoption and implementation and the role of IT in ABC evolution and diffusion. We review the relevant literature related to these two areas as follow.

### **2.1. ABC Adoption and Implementation**

It has been argued that ABC has a long history started decades before its birth in the late eighties. ABC has gone through five evolution stages. The *first* stage is when ABC was serendipitously implemented before its emergence in the eighties (Troxel, *et al*, 1990). There were some cases where ABC principles were adopted since the 1930s. This adaptation was a result of the necessity to have more sophisticated costing system in each of these cases for different reasons. These systems with ABC characteristics were just considered as sophisticated traditional systems and were used for normal financial purposes (Troxel, *et al*, 1990). The *second* stage of ABC evolution has witnessed its emergence during the eighties as a result of the changes in the internal and external environment of the industry that presented above. By the late 1980s the features of ABC, as a new costing technique that overcomes the shortcomings of traditional costing methods, were identified and recognized (Troxel, 1990; Kaplan, 1994). However, as a result of the lack of a particular structure and a solid conceptual framework, ABC systems of this phase were developed on *ad hoc* basis without a particular structure (Troxel, *et al*, 1990). The main emphasis of these systems was still, like traditional costing approaches, on financial purposes (Troxel, *et al*, 1990).

During the *third* stage of ABC evolution, from late 1980s to mid 1990s, the strategic role that ABC can play was identified and it has been recognized that ABC should be used as a tool for decision making rather than as a replacement for existing cost accounting systems (Troxel, *et al*, 1990). Also during this phase, ABC has been viewed as a separate system that has the potential to have more uniform and structured implementation approach (Troxel, *et al*, 1990). At this stage IT played a vital role in ABC dissemination and illumination of its managerial role. The importance of this role was expressed by Kaplan and Johnson (1987: 6) by clarifying that “[t]he computing revolution of the past two decades has so reduced information collection and processing costs that virtually all technical barriers to design and implementation of effective management accounting systems have been removed”. ABC software, which was available at that time, reduced the implementation costs and enhanced activity based analysis process (Troxel, *et al*, 1990). The role of IT was expanded during the fourth stage of ABC evolution (from mid 1990s to early 2000). At this stage, IT played a role in ABC diffusion and implementation. A high level of IT sophistication appeared to be an important factor in getting ABC to the usage stage for the majority of the companies that adopted the technique at this stage (Krumwiede, 1998b).

A number of surveys have been carried out in order to study the diffusion and adoption of ABC (e.g., Cobb *et al.*, 1993; Drury and Tayles, 1994; Innes and Mitchell, 1995; Innes

and Mitchell, 2000; Limerick and Affleck-Graves, 2001). Most of these studies have been carried out during the fourth phase of ABC evolution (mid 1990s to early 2000). These studies show an increased awareness of ABC, but the rate of adoption has been slow and does not seem to match the attention that ABC model has achieved (Brown et al, 2004). These studies have also shown large differences between countries and even between different surveys in the same country. To some extent this can be explained by the fact that these studies have been carried out at different points of time and using different definitions of ABC. For example, Gosselin (1997: 106) argues that ABC can be considered as three levels of activity management:

1. Activity Analysis: an ABC system is limited to identifying the activities and procedures carried out to convert material, labour and other resources into output. Activities that do not contribute to the value of these outputs may be removed, replaced or diminished.
2. Activity Cost Analysis: in addition to activity analysis, an ABC system is used to identify the costs of each activity and the factors that cause them to vary (i.e. cost drivers).
3. Activity Based Costing: In addition to the activity analysis and Activity Cost Analysis, an ABC system is used as a new overhead allocation method.

Using ABC has gone beyond merely producing product cost information. Different researchers (Innes and Mitchell, 1990, 1991; Shank and Kaplan, 1990; Brimson, 1991; Mitchell, 1994) have identified different purposes of using ABC information. Table 1 summarises these purposes.

This study builds on previous studies and explores the current status and purposes of ABC adoption in the UK by addressing the following research question:

**RQ1:** What is the current status and purposes of ABC adoption in the UK?

## **2.2. The Role of Information Technology in ABC Adoption and Implementation**

Little attention has been given to the role of IT in the ABC adoption and implementation in the previous research. This could be understandable as most of these research studies were conducted before the impact of IT became clearly influential on business' environment, structures and forms. Prior literature on the impact of IT can be classified into three types: studies on the impact of ERP systems on management accounting practices in general, studies on the impact of different ABC software packages, and studies on the impact of IT quality and sophistication. These three types of studies are reviewed in order to develop this study's main research questions.

**Table 1: Applications of Activity Based Costing**

<b>Purpose</b>	<b>Author</b>	<b>Description</b>
Stock valuation	Innes and Mitchell (1990); Mitchell (1994)	Using ABC as a basis of stock valuation for financial reporting.
Product or service pricing	Shank and Kaplan 1990	Using ABC cost information as a reliable basis for pricing products and services.
Output decisions	Jonson and Kaplan (1987); Shank and Kaplan 1990	ABC provides a detailed tracing of resources consumed by product or service output .These detailed information give a more relevant indication of a decision's cost impact.
Cost reductions	Innes and Mitchell (1995); Brimson (1991); Bellis-Jones and Hand (1989); Morrow and Hazell (1992)	ABC logic leads to different types of analyses which focus on cost reduction possibilities. Examples include: Value added analysis, core/support diversionary and activity mapping
Budgeting	Brimson and Fraser (1991); Yoshikawa et al. (1992); Kaplan (1994)	ABC logic is used as a basic framework for activity based budgeting. ( see the following sections)
New product or service design	Jonez and Wright (1987); Dolinsky and Vollmann (1991)	ABC provides information about cost drivers to the designer which can promote cost-effective designs.
Customer profitability analysis	Bellis-Jones (1989)	ABC methodology could be used to identify the cost of customers as well.
Performance measurement	Carlson and Yong, (1993)	Different ABC information could be used as a set of performance measures (e.g. activity cost, cost driver volumes and cost drivers rates)
Cost modelling	Cooper (1994)	ABC allows a more refined approach to cost analysis for modelling (ABC hierarchy) comparing with the traditional cost/volume/profit models which categorize costs simply as fixed or variable.

### **2.2.1. The impact of ERP systems**

Studying the impact of ERP on ABC adoption and implementation is indirect and new. That is, several studies have tried to assess the impact of ERP systems on management accounting and control by studying the impact of ERP systems on the a) management

accounting profession (e.g. Caglio, 2003; Granlund and Malmi, 2002; Scapens and Jazayeri, 2003) and b) on management accounting and control techniques (e.g. Booth et al., 2000; Granlund and Malmi, 2002; Scapens and Jazayeri, 2003). These studies were motivated by the assumption that ERP systems are difficult to change (Davenport, 1998) and, thus, the expected change will be in the organizational practices to fit the new technology not vice versa (Granlund and Malmi, 2002). Regarding change in management accounting practice, “these studies view ERP systems as causal factors with the potential to shape management accounting practices – i.e. they see ERP systems as possible drivers of change.” (Scapens and Jazayeri, 2003: 210). However, this expectation has not been observed in practice. The conclusions of Granlund & Malmi’s (2002) study were built on ten exploratory case studies. Eight out of ten companies applied ABC and their ABC systems were not configured into ERP systems. In their assessment to the influence of ERP systems on ABC adoption, they realized that “ERPs did not influence these companies’ decisions to adopt ABC as many of these firms were already familiar with the concept” (Granlund & Malmi, 2002:306). Booth et al. (2000) and Hyvönen (2003) also tried to identify any correlation between the use of ERP systems and the use of new management accounting practices. Their overall results were that there was no correlation between the adoption of ERP systems and the use of modern cost accounting techniques (Booth et al., 2000; Hyvönen, 2003). Due to these conflicting results, this study explores the possible role of ERP on ABC initial adoption decision. We address the following research question:

**RQ2:** Does the availability/unavailability of ABC module in a firm’s ERP system or its capability/incapacity to support ABC techniques affect the initial adoption decision of ABC?

### **2.2.2. The impact of ABC software**

Different types of IT have been used as ABC software. According to the results of Innes and Mitchell’s (1995) survey, three main types of IT have been used as activity based software: general software applications, in-house developed software, and specialized standalone ABC packages. In a survey of 143 companies, Shields and McEwen, (1996) found that most companies surveyed used commercial software to help structure their ABC design and to process ABC information. The use of standardized commercial ABC software versus in-house developed software did seem to have an important impact on the success of ABC. The choice of software as a technical IS could be important for accountants and MIS specialists, “but this choice is relatively unimportant to non-accountants or for the ultimate success of an ABC project” (Shields and McEwen, 1996:21). Shields and McEwen’s (1996) study ignored the general application software which seems to be very popular in the UK as (65%) of Innes and Mitchell’s (1995) respondents said that their ABC systems were based on spreadsheet or database packages. Moreover, their study did not consider implementing ABC as a module in ERP systems. This is because the first ERP system that contains ABC module appeared two years after Shields and McEwen’s (1996) survey (Shaw, 1998).

This study aims to identify the role of the different types of IT on ABC adoption and implementation. In addition to the inclusion of all types of ABC software in studying their effect on ABC success, this study explores whether there are any correlation

between the type of ABC software used in ABC assessment stage and the result of this stage i.e. the decision to implement or reject ABC. Furthermore, this study seeks to give an explanation for the popularity of general purpose applications as a base for ABC system in the UK by exploring the relationship between the level of sophistication of the ABC system as classified by (Gosselin, 1997) and the type of IT used. Thus, the following research questions are addressed:

**RQ3a:** Is the overall success of ABC in a firm related to the type of IT used in ABC implementation?

**RQ3b:** Does the type of IT used during the assessment stage of ABC implementation have an effect on the decision to implement or reject ABC?

**RQ3c:** Is the type of ABC software related to the level of activity management that the firm decides to implement?

### **2.2.3. The impact of IT quality and sophistication**

Prior literature is in conflict regarding the impact of IT quality and sophistication on ABC adoption and implementation. For example, regarding ABC adoption, Cooper (1988) argues that firms that acquire higher quality IT are more likely to adopt ABC as the costs of measurement are lower. Anderson (1995) has found that higher quality IT results in managers' satisfaction with the information provided by existing systems which make them unwilling to devote resources to ABC implementation. Also, evidence has been found by Anderson and Young (1997) that the management evaluation of ABC overall value is negatively related to IT quality.

Regarding ABC implementation, Krumwiede (1998b) suggests that the impact of IT quality differs according to ABC implementation stages. A positive relationship with both considered then rejected and approved for implementation stages indicates that higher quality IT "may serve as a disincentive to adopting ABC or to continuing with its implementation" (Krumwiede, 1998b: 264). Results from a survey conducted by IMA indicate that a high level of IT sophistication appears to be an important factor in getting to the usage stage for the majority of the companies (Krumwiede, 1998a). The focus of these studies was on the different characteristics of IT in use in both ABC adopters and non-adopters (e.g. level of integration, user-friendly using, the variety of cost and performance information, etc.). According to Granlund and Mouritsen, (2003), "the one-way perception that IT is there only to support and enhance accounting procedures is partial" (p:79). Granlund and Mouritsen, (2003) have mentioned two possible types of problems that make IT not unproblematic: first, the limitations that IT could put on the design and implementation of management accounting systems; second, the general IT-related issues like hardware and skill problems. As the first type of problems has been examined in the previous studies mentioned above, this study explores the impact of general IT-related problems on the overall success of ABC implementation. The following research question is developed:

**RQ4:** Do general IT-related problems have any effect on ABC overall success?

### 3. Research Method

This study uses a cross-sectional survey of financial directors and controllers in the UK British firms. Postal and electronic questionnaires have been used to collect the empirical data. Questionnaires in cost management research are considered as the most favourable research method. Bjørnenak and Mitchell in (2002) showed that about 21%<sup>1</sup> of research papers in both UK and USA academic journals have adopted questionnaires as a research method in researching an important issue in management accounting discipline, ABC. Many of ABC adoption and implementation studies have used this technique (e.g. Anderson, 1995; Shields and McEwen, 1996; Gosselin, 1997; Krumwiede, 1998a; Brown et al, 2004). E-mail interviews have been carried out to gain further explanation of the responses for some cases. The questionnaire has been also reviewed by a number of academics (accounting lecturers and PhD students).

FAME<sup>2</sup> database, which provides extensive information about public and private British companies, was used to select the sample frame of this study. We selected active and independent companies with at least turnover of £50 as well as a registered office address in England, Scotland or Wales. This resulted in 522 manufacturing and 134 financial service companies. After excluding holding companies, the total number was 568 companies. A customized form that includes firm's address, website, e-mail, telephone number and financial contact information has been constructed and applied for the 568 companies.

In order to satisfy the research questions of this study, firms were classified into five groups according to the main stages of ABC implementation as follows: 1) Firms do not consider ABC implementation; 2) firms assess ABC at the time of the survey, 3) firms rejected ABC after assessment; 4) firms abandoned ABC after implementation and 5) Firms use ABC. The hard copy of the questionnaire begins with a filter question to identify in which stage the company is. According to the firm's ABC status the respondent is directed to the relevant questions that he/she is asked to answer. While in the online version of the questionnaire, the first page of the questionnaire contains five hyperlinks, each one takes the respondent directly to a different page that contains questions related to the ABC stage of his/her firm. The questionnaire was divided into three groups of questions:

1. Questions about the respondent and different aspects of the firms' business background (performance, competition etc.). All respondents were asked to answer these questions.
2. Questions to be answered by firms that have any type of experience with ABC (stages 2, 3, 4, 5).
3. Questions related to each of the five main stages of ABC implementation.

Postal questionnaires were mailed to all 568 companies and were addressed to the financial directors. Financial directors were the target recipients as they were the best

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<sup>1</sup> The highest percentage.

<sup>2</sup> It refers to Financial Analysis Made Easy.

placed to provide informed responses to the range of issues covered in this survey. The package consisted of the questionnaire, a return addressed reply-paid envelope and a covering letter that presented the aim of the study and its importance and introduced the link of the online version of the questionnaire as an alternative. Two weeks later a reminder letter that contains the link of the online version of the questionnaire were sent to all non-respondents. One week later e-mails were sent to all non-respondents whose companies' e-mail addresses were available from FAME (135 companies), asking the recipient<sup>3</sup> to forward the e-mail, which contains a cover letter and the link of the online version of the questionnaire, to the financial director of the company. One week later a second copy of the questionnaire was sent to all non-respondents followed by e-mailing a second round of the e-mail questionnaire. As the response rate, after this follow-up letters and e-mails, was low, a decision was made to contact all remaining non-respondents by phone to encourage their participation. This process provided some feedback about why individuals had not responded to the original mail-out: they were too busy; their firm's policy is not to do surveys; the respondent is on summer holiday; and in some cases the contact was no longer work for the company or, in one case, passed away. As a result of the phone calls, 91 personal e-mail addresses and 24 fax numbers were obtained to resend the questionnaire to the most appropriate respondents and a promise from those just returned from their holiday to answer the hard copy of the questionnaire as soon as they can. A final follow up to non-respondents after the phone calls was sent via e-mails and faxes that include another covering letter and a copy of the questionnaire.

The analysis in this paper is based on 61 responses by finance directors and controllers (41), management and cost accountants (8), and other accounting staff (12). Respondents typically had a considerable experience of the firm, averaging 8 years of employment.

## **4. Findings**

### **4.1. ABC Current status:**

#### **4.1.1. The rate of ABC adoption:**

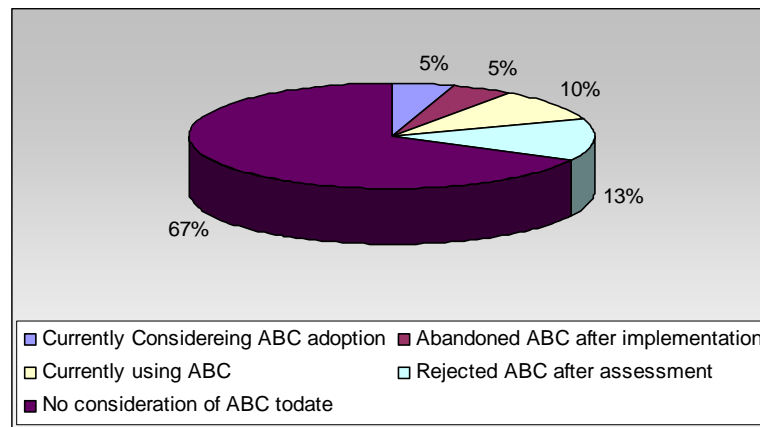
As shown in Figure 1, approximately 10% (n=6) of respondents are currently using ABC. This is a markedly lower than most U.K. previous surveys (see Table 2). The remaining respondents were split to 4.9% (n=3) that are currently considering ABC adoption, 13.1% (n=8) that rejected ABC after assessment, 4.9% (3) that abandoned ABC after implementation, and 67.2% (n=41) that did not have any consideration of ABC to date, see Table 3.

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<sup>3</sup> The vast majority of these e-mails belong to a certain person in the company who is responsible to financial inquiries.

**Table 2: ABC adoption rates in the UK**

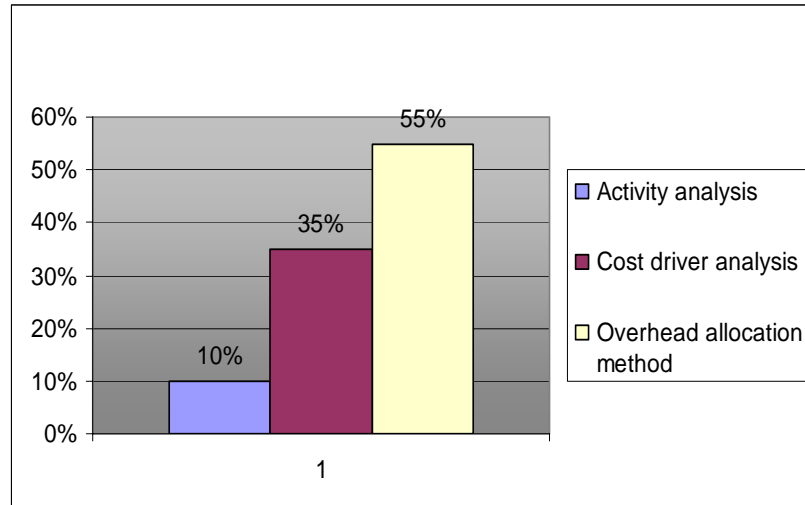
Study	Sample	ABC adoption%
Cobb et al. (1993)	Manufacturing industry & Financial Services	6
Drury and Tayles (1994)	Manufacturing industry	4
Innes and Mitchell (1995)	The largest 1000 companies	20
Innes and Mitchell (2000)	The largest 1000 companies	18
Limerick and Affleck-Graves (2001)	The largest 1000 companies	19.5
This study	Manufacturing industry & Financial Services	10

**Figure (1): ABC adoption status****Table 3: The relationship between the company sector and ABC adoption status**

	Manufacturing		Non-manufacturing		Total	
	n	%	n	%	n	%
ABC Users	5	83.3	1	16.7	6	100.0
Under consideration	1	33.3	2	66.7	3	100.0
Rejected	8	100.0	0	0.0	8	100.0
Abandoned	2	66.7	1	33.3	3	100.0
Not considered	33	80.5	8	19.5	41	100.0
Total	49	100	12	100	61	100

#### 4.1.2. ABC systems design

Companies that have an experience with ABC (current and previous users) and those which are assessing the technique currently were asked to point out the main objective of introducing or adopting ABC in their firms. In order to identify this objective the activity management levels that have been identified by Gosselin (1997) were used. Figure 2 shows that 55% (n=11) of these companies has adopted or introduced ABC as an overhead costing system. While 35% (n=7) of them has introduced ABC as a cost driver analysis system. The minority of these companies 10% (n=2) has considered ABC as an activity analysis technique.



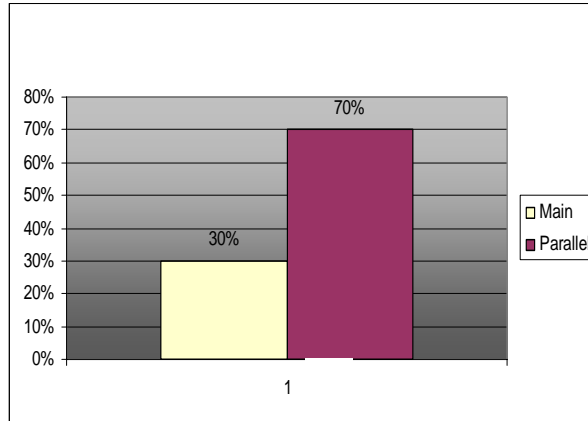
**Figure (2):** Activity Management Levels

Table 4 presents the distribution of these objectives according to ABC adoption status in these companies:

**Table 4:** The relationship between ABC systems objectives and ABC adoption status

	Activity analysis	Cost driver analysis	overhead allocation method	Total
Currently using ABC	1	3	2	6
Currently Considering ABC adoption	0	1	2	3
Rejected ABC after assessment	1	2	5	8
Abandoned ABC after implementation	0	1	2	3
<b>Total</b>	<b>2</b>	<b>7</b>	<b>11</b>	<b>20</b>

In 70% (n=14) of these cases ABC was used or introduced as a parallel system with the previous costing system and in 30% (n=6) of cases it had replaced the previous costing system and used as the main system (see Figure 3)



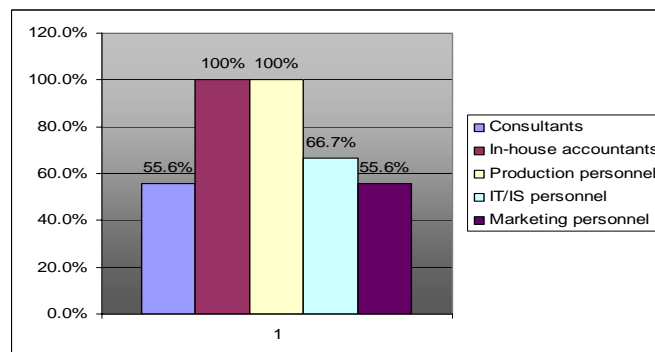
**Figure (3):** The use of ABC System

Table 5 presents the distribution of the relationship between the objectives of adopting ABC and the form of this adoption.

**Table 5:** The relationship between ABC systems objectives and the form of ABC adoption

	Main		Parallel		Total	
	n	%	n	%	n	%
Activity analysis	1	50	1	50	2	100
Cost driver analysis	1	14.29	6	85.71	7	100
Overhead allocation method	4	36.36	7	63.64	11	100

In-house accountants and production personnel were the most common participants in establishing ABC systems of ABC current and previous users (n=9). IT/IS personnel represent the second party involved in ABC system design in these companies (66.6%). Figure 4 presents the different parties that involved in ABC systems design.



**Figure (4)** participants in ABC system design

Table 6 contains a summary of the participants involved in ABC current and previous users. This is combined with the users' assessment of the significance of each participant's role in ABC design process.

**Table 6: Participants in ABC systems design**

Proportion of ABC (current & previous) users relied on this participant*				
	n	%	Average rating+	SD
In-house accountants	9	100.0	6.2	0.7
Production personnel	9	100.0	5.7	1.3
Consultants	5	55.6	4.3	0.6
IT/IS personnel	6	66.7	4.3	1.6
Marketing personnel	5	55.6	2.3	1.5

\*This represents the number of ABC current and previous users that this particular participant has involved in their ABC system design as a percentage of all ABC current and previous users, i.e. 9 respondents 3 of them have abandoned the system.

+ These ratings are computed from 7 point scales ranging from very significant (7 points) to not very significant (1 point)

#### 4.1.3. ABC success

ABC current users (n=6) were asked to rate the overall success of ABC systems in their companies using a scale of seven points ranging from very successful (7 points) to very unsuccessful (1 point). Most of the respondents, 83.3% (n=5), selected the fifth point which expresses a low level of success. While 16.7% (n=1) selected the neutral point.

Regarding the different areas that represent the potential applications of ABC information that have been presented in Innes and Mitchell's (1995) study, Table 7 presents these different purposes to which ABC systems were being put to use by ABC users and indicates respondents' satisfaction regarding each type of application. Activity Based Management applications (performance measurement, cost modelling and customer profitability analysis) represent the most common usage of ABC information among other applications and the level of satisfaction with this application is the highest as well. Only 50% of ABC users use its information to support new product design and product pricing. This combined with low satisfaction rate was given to this application.

**Table 7: Purposes inherent in ABC adoption**

Purpose	Adopters		Average rating*	SD
	n	%		
Performance Measurement	5	83.3	4.5	2.3
Cost Modelling	6	100	4.5	1
Customer Profitability Analysis	5	83.3	4.2	2.4
Cost Management and Reduction	4	66.7	3.3	2.8
Stock valuation	4	66.7	3	2.4
Product Output Decisions	4	66.7	3	2.5
Cost Budgeting	4	66.7	3	2.5
New Product Design	3	50	2	2.4
Product Pricing	3	50	1.8	2.1
External Reporting by Division	1	16.6	7	0

\* These ratings are computed from 7 point scales ranging from very satisfactory (7 points) to very unsatisfactory (1 point)

Another application has been identified by a respondent was “External Reporting by Division” and it has been given seven points as a rate of satisfaction. This organization has adopted International Financial Reporting Standards in preparing its accounts. According to the financial director, as reporting under International Financial Reporting Standards requires the disclosure of Profit & Loss and net assets by Division to reflect the way this organisation manages its business internally, there was a need to a method that could be used as a base to allocate different shared costs and net assets between the divisions of the organisation. ABC model was used to provide information on how to drive the allocation of these shared costs and net assets by Division.

#### **4.1.4. Reasons for not considering ABC**

Lack of relevance/suitability to the firm’s business, lack of internal champion support satisfaction with current cost/cost management systems, lack of management interest/support and lack of expertise and resources were identified by previous research as important factors to not considering ABC adoption. This study asked the respondents to give a rate of significance of the influence of each of these factors on the decision of making no assessment of ABC. Table 8 presents the average rating for each of these factors combined with the standard deviations.

**Table 8** Reasons for not considering ABC

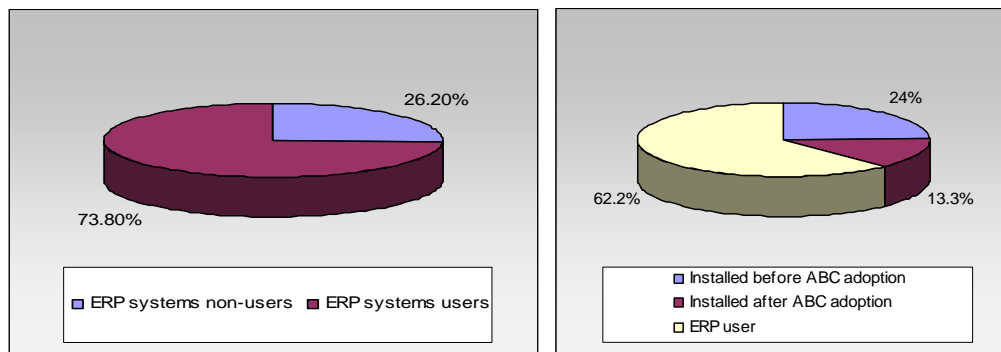
	Proportion of non-ABC users		Average rating*	SD
	n	%		
Lack of relevance/suitability to the firm's business	41	100	4.88	2.01
Lack of internal champion support	40	97.5	4.88	2.01
Satisfaction with current cost/cost management systems	41	100	4.44	1.94
Lack of management interest/support	40	97.5	3.63	2.26
Lack of expertise and resources	41	100	3.37	2.07

\* These ratings are computed from 7 point scales ranging from very significant (7 points) to not very significant (1 point)

**4.1.5. Information systems technology**

**4.1.5.1. ERP systems**

Respondents are classified into two categories: ERP users, 73.8% (n=45), and non-ERP users, 26.2% (n=16). While the non-users of respondents' companies are non-ABC users as well, ERP users, as shown in Figure 4.6, are split to: 68.9% (n=28) do not have any consideration to ABC adoption, 24% (n=11) installed the ERP system before ABC adoption or introduction, and 13.3% (n=6) installed after ABC adoption.



**Figure (5):** ERP systems status

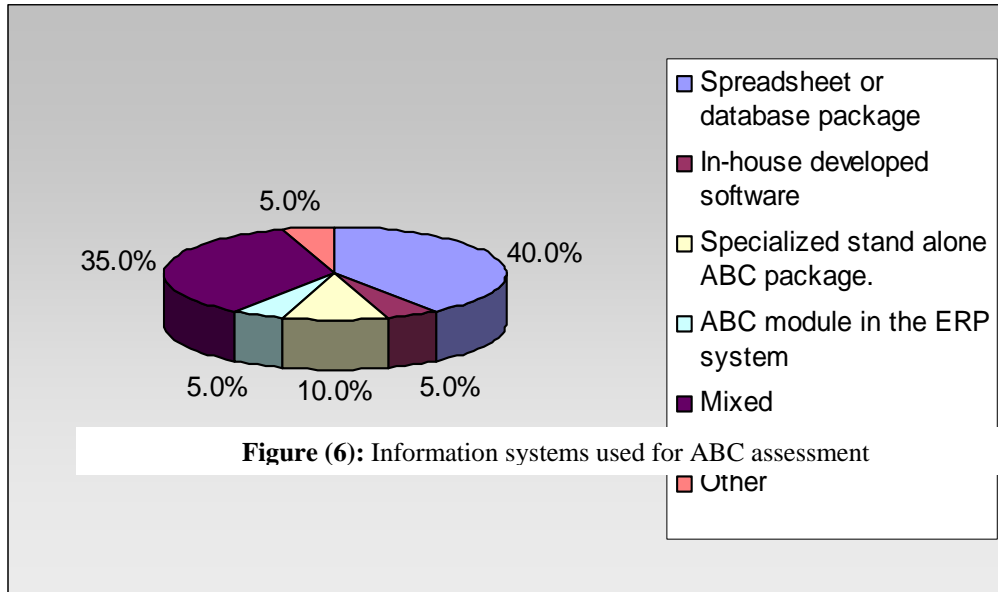
**4.1.5.2. ABC information systems**

This study presents a map of ABC information systems that are used in the UK companies for both assessing ABC and implementing ABC.

**A. Information systems used in ABC assessment**

As presented in Figure 6, general software application is the most popular information systems used in the ABC evaluation. That is, 40% (n=8) of the companies that assessed or are currently assessing ABC have used spreadsheets and database packages. The second most popular approach is using two or more of different software applications to do the assessment. Thirty five percent (n=7) of the assessment process has used pairs or a

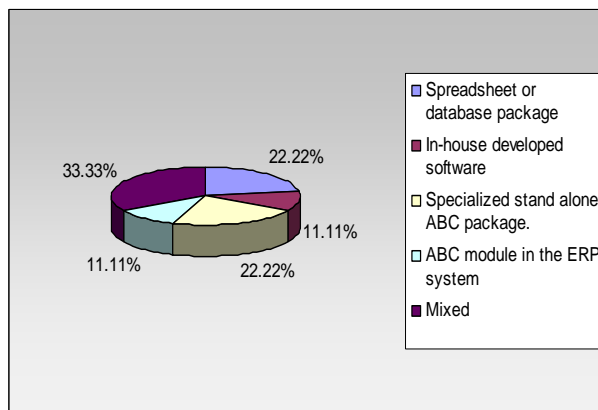
set of ABC software packages. 10% (n=2) of assessment cases have used a specialized standalone ABC commercial packages, while only 5% (n=1) have used in-house developed software and the same percent of companies used ABC module in ERP system as an assessment information system.



Interestingly, in one case, none of the above ABC information systems were used in the ABC assessment process. This case was a service company in which its major cost is staff. Time recording systems in this company have provided the basis for ABC assessment.

**B. Information systems used in ABC implementation**

Regarding the software that were used in ABC implementation, 33.3% (n=3) of current and previous ABC users have used a mix of different software packages to implement the technique. General software applications (spreadsheets or database packages) and specialized standalone software were used to assess ABC in 44.4% (n=4) of ABC users. In addition, in-house developed software and specialized standalone ABC commercial packages got the lowest percentages of use for implementation, 11.1% for each type.



**Figure (7):** Information systems used for ABC implementation

## 4.2. The impact of IT on ABC adoption and implementation:

### 4.2.1. The impact of ERP systems:

In order to address the second research question of this study “Does the availability/unavailability of ABC module in a firm’s ERP system or its capability/incapacity to support ABC techniques affect the initial adoption decision of ABC?” Respondents were asked different questions according to their ABC adoption status in order to identify their views regarding the impact of ERP systems on ABC initial adoption decision. Firms that installed an ERP system before considering ABC adoption and implementation (8 firms out of 11 had ERP systems before ABC) were asked about the extent to which the existence of ABC module in their ERP system affected their decision to adopt ABC, using a 7 point scale questions ranging from very influential (7 points) to not very influential (1 point). The average rating for this influence was 3 points (SD=1.6). While respondents whose firms had an ERP system installed and do not have any consideration to ABC adoption (n=28) were asked to rate the extent to which the absence of ABC module in their ERP systems was a reason for making no consideration of the technique. Using 7 point scale questions ranging from very significant (7 points) to not very significant (1 point), the average rating for this influence was 3.07 points (SD=2.08).

### 4.2.2. The impact of general IT-related problems

The third research question of this study was mainly concerned with exploring the impact of general IT-related problems on the overall success of ABC implementation. In order to answer this research question “Do general IT-related problems have any effect on ABC overall success in adopting firms?” ABC users, current (n=6) and previous (n=3), were asked to rate the significance of a number of general IT-related problems. These problems include: problems related to the design, customization or integration of information systems, hardware problems, IT skill problems, network problems and system failures and breakdowns. Table 9 presents the average rating that has been given to each of these problems in a descending order. Design, customization or integration of IS problems seem to be the most problematic IT-related issues.

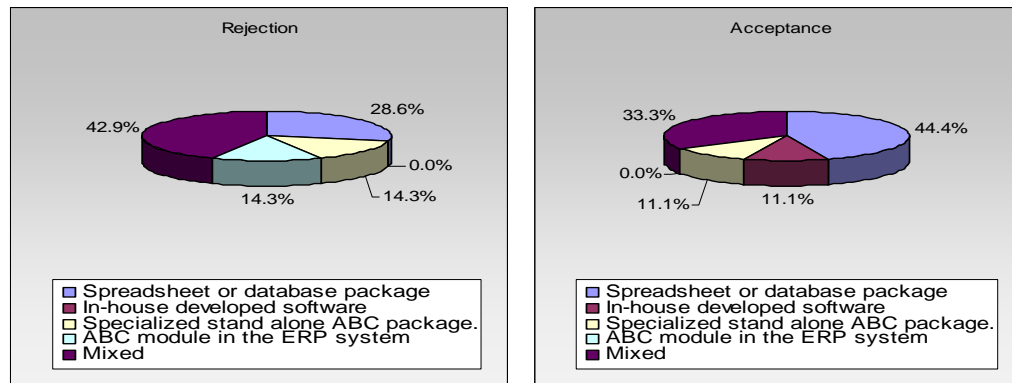
**Table 9:** The impact of IT-related problems on ABC adoption

	Proportion of ABC users		Average rating*	SD
	n	%		
Design, customization or integration of information systems problems	9	100	4.1	1.96
IT skill problems	9	100	3.2	2.33
System failures and breakdowns	9	100	3.0	2.40
Hardware problems	9	100	1.9	1.27
Network problems	9	100	1.7	0.71

\* These ratings are computed from 7 point scales ranging from very significant (7 points) to not very significant (1 point)

### 4.2.3. The impact of ABC software:

This study intended to explore the impact of different ABC available software packages on ABC implementation. This potential impact was proposed to be on the decision of ABC evaluating stage of ABC implementation, approving or rejecting the technique (RQ3b). Figure 8 shows that in 49.9% (n=3) and 28.6% (n=2) of the rejection cases (n=7) mixed information technologies and general software applications were used respectively during the assessment period of the technique. While in the acceptance cases (n=9), in 44.4% (n=4) and 33.3% (n=3) of them, general software applications and mixed information technologies were used respectively as a base for ABC assessment.



**Figure (8):** The impact of ABC information systems on the assessment decision

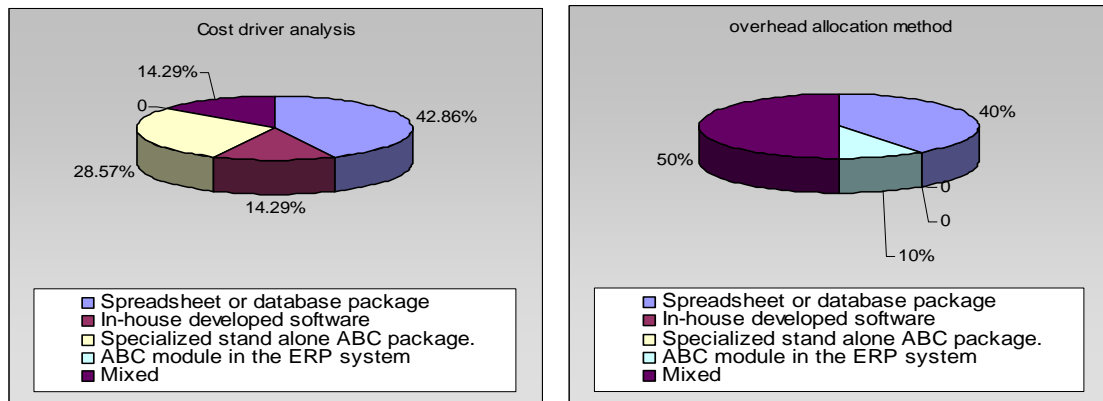
Another potential impact explored by this study is the impact of ABC software on the overall success of ABC in a firm (RQ3c). Table 10 presents the types of ABC information systems used by ABC current and previous users (n=9) combined with the average rating of the overall success of ABC. In order to highlight this impact a correlation study should be conducted, but unfortunately it is difficult from this small data set to study the correlation between ABC software and ABC overall success.

**Table 10:** The types of ABC information systems

	Proportion of ABC users		Average rating*	SD
	n	%		
In-house developed software	1	11.11	5.0	-
ABC module in the ERP system	1	11.11	5.0	-
Spreadsheet or database package	2	22.22	4.5	0.7
Specialized stand alone ABC package.	2	22.22	3.0	2.8
Mixed	3	33.33	2.3	2.3

\* These ratings are computed from 7 point scales ranging from very successful (7 points) to not very successful (1 point)

Finally, the relation between the type of ABC software and the level of ABC system was explored as well. Figure 9 shows that 42.86% and 28.75% of the companies that introduced ABC as a cost driver analysis tool (n=7) have used spreadsheets or database packages and specialized standalone software respectively as a base to assess ABC. While 50% of the companies that introduced ABC as an overhead allocation system (n=10) have used different types of information systems in the assessment of ABC. Spreadsheets and database packages were used in 40% of these cases.



**Figure (9):** The relation between ABC information systems and activity management level

## 5. Discussion

A new picture of ABC adoption status is drawn from this survey. A comparison between this study and Innes and Mitchell's (2000) study (see Figure 10), shows that an increase (20.3%) in the percentage of companies that do not have any consideration to ABC adoption and an increase in the percentage of abandonment after implementation case (4.9 %). While other ABC adoption status have experienced a decreasing in their percentages during the last six years<sup>4</sup>.

<sup>4</sup> 1999 is the year of Innes & Mitchell's (2000) survey

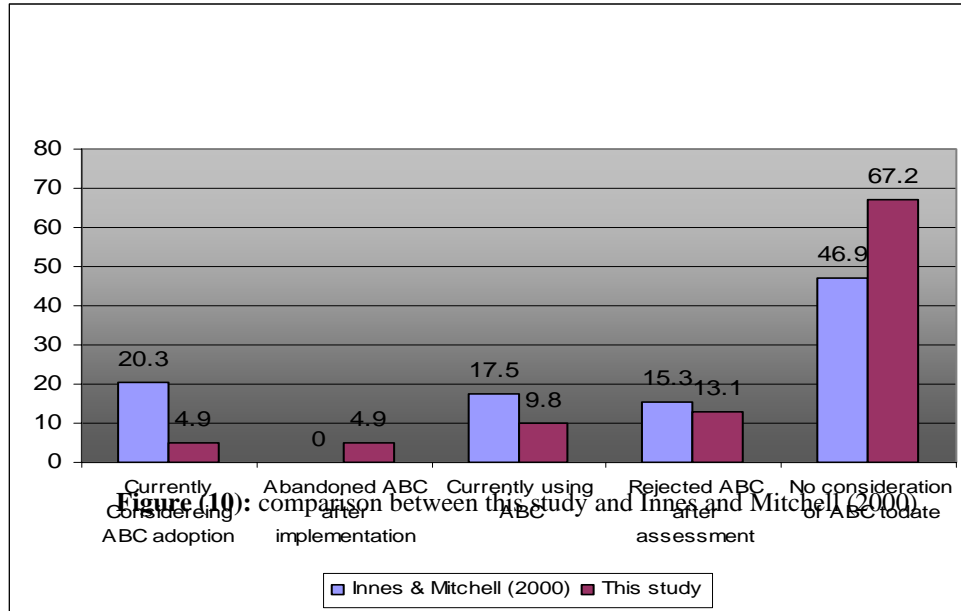


Figure 10: A comparison between Innes and Mitchell’s (2000) and this study

The percentage of these companies which are currently considering ABC adoption has considerably decreased from about 20% to just less than 5%. The number of companies that have rejected ABC after assessment has decreased in a small percentage from about 15% to about 13%. These results are indicative of a decrease in the popularity of ABC. However, Table 5 showed that the proportion of companies that are considering ABC adoption currently from the non-manufacturing sectors is greater than this from manufacturing sectors. This could reflect that the interest in ABC could be higher in non-manufacturing sectors comparing with manufacturing sectors.

The survey results on ABC systems design indicate that the main objective of adopting ABC is to use it as an overhead allocation method and in most of the cases it was used as a parallel system to the previous costing system (see Table 6 and Figure 2). While when it was adopted as a cost driver analysis system, in the majority of the cases it was used as a parallel system. Using ABC as a cost driver analysis system in parallel with the original costing system could be seen normal as it is used for decision making purposes rather than costing purposes. But using ABC as overhead allocation method in parallel with the original costing system could be a translation to the low level of success of the technique as the results indicated.

This survey covered the broad range of applications that Innes and Mitchell (1995) have considered in their survey. Although the level of satisfaction with the most common usage of ABC information among other applications (Activity Based Management applications) is the highest between other usages, this level of satisfaction is still low (4.5), which has been reflected on the overall success of ABC system in the adoption firms. An interesting finding is that 66.7% (n=4) of ABC users are using ABC systems for stock valuation (see Table 4.6). In addition to supporting Innes and Mitchell (1995) findings, this result shows an increasing in the proportion of those who use ABC

information for this application<sup>5</sup>. Another interesting finding was the discovery of a new application for ABC systems. This was “External Reporting by Division” which came as a response to International Financial Reporting Standards to disclose Profit & Loss account and net assets by Division. This requirement has led to use ABC system as a base to allocate different shared costs and net assets between the divisions of the organisation. This finding shed a light on the importance of considering changes in financial accounting and reporting practice as these changes could play a role in ABC adoption and implementation.

This study has highlighted the role of the support of the ABC internal champion in creating the initial interest in ABC in the UK context. Approximately 98% (n=40) of the companies that do not have consideration to adopt ABC considered the lack of internal champion support as a factor for not assessing the technique. Moreover, the influence of internal champion support on the ABC adoption decision was equal to the lack of relevance/suitability of ABC to the firm’s business. This finding is similar to Brown et al.’s (2004) conclusion in the Australian context that the support of an internal champion is associated with initial interest in ABC.

One of the main findings of this study is the UK’s information systems technology map which covers two areas: A) the current adoption status of ERP systems and the potential impact of this technology on ABC adoption (see Figure 5). B) The information technologies that are used in the UK companies for assessing and implementing ABC and their relations with different aspects of ABC implementation (see Figures 6 and 4).

Analysing this map shows a considerably high level of penetration of ERP systems in the UK firms as approximately 75% of the respondents reported to have an ERP package. But a considerably small proportion of these companies, in which their ERP supports ABC, has used an ABC module built in the ERP systems, as the only software package for assessing or implementing ABC. Most of these companies that have used such an ABC module have used another software package along with it (mainly general software application and specialised commercial software). The interpretation of this case could be that using ERP systems for ABC assessment could be difficult, complex or it could be because of the reality that using other available software will be a cost effective choice comparing with using the ABC module which could be used later if the technique accepted. But using ABC module along with other software to implement ABC could be a result of using a different software package for different ABC applications or for different stages of ABC implementation or simply participants in ABC design and implementation do not trust the real time ABC information provided by ABC module in the ERP system. As real time information provided by the ERP system might distort ABC information and even gives the decision makers a misleading impression about the costs of the operations (Cooper and Kaplan, 1998). Another potential explanation for this result is that these companies, that have installed ERP system after ABC adoption and implementation, could be in a transition period where a decision to move towards using

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<sup>5</sup> See Innes and Mitchell (1997) “Survey research on activity based costing: a reply to Dugdale and Jones” to Dugdale and Jones (1997) where they advocated this type of use of ABC information in their reply.

the ABC module in the ERP system instead of the old or previous ABC software has been taken. This explanation reflects the belief that implementing ABC in an enterprise-wide ABC environment is the peak of ABC usage which only ERP systems technology could provide the base for such environment (Nair, 1999).

Furthermore, this study's results related to the potential influence of ERP systems on ABC adoption suggest that ERP systems had a slightly low significant impact on the initial ABC adoption decision. This conclusion supports that there is no correlation between the adoption of ERP systems and the use of modern cost accounting techniques (Booth et al., 2000; Hyvönen, 2003). This could support Scapens & Jazayeri's (2003) view that the potential influence of ERP systems on management accounting practice is an evolutionary and path-dependent process rather than merely a direct impact.

Regarding to the second element of UK's information systems technology map, ABC software types and their relation to different ABC aspects, the finding of this study shows that the popular information technologies that were used in ABC assessment and ABC implementation seems to be different. This study found that general software application (spreadsheets or database packages) is the most preferable software for ABC assessment either as the only assessment software or combined with other type of software (see Figure 6). This could indicate that the more sophisticated information systems technologies (specialized stand alone ABC commercial packages, in-house developed software, and ABC module in ERP system) seem to be unsuitable for the purpose of assessing the technique as using the general software applications, which are easily available, avoids the cost of the sophisticated solutions. The decision of accepting or rejecting the technique seems to be unrelated to the type of the software used during the assessment period as both general software application and mixed information technologies were mainly used in both cases of accepting and rejecting ABC technique (see Figures 8).

In the case of ABC implementation, the results show that using a mix of different ABC software packages is the most popular. However, this mix in most cases consists of using the software that has been used during assessment period (mainly general software application or specialized stand alone ABC commercial packages). In the case of using ABC module in an ERP system, the explanations that have been provided above could be used to explain this choice of using a mix of software packages.

The relations between the choice of ABC software that was used for ABC implementation and the level of management activity that ABC system provides were explored. The results gives an explanation to the findings of Innes and Mitchell (1995) which indicated that the general application software was very popular in the UK as (65%) of their survey's respondents' ABC system were based on a spreadsheet or database package. This type of software can be related to the level of the activity management that ABC system was designed to fulfill. From the results of this study, it seems that the sophistication of ABC software can be related to the sophistication of the activity management level of the ABC system (see Figure 9).

Finally, the impact of general IT-related problems was examined in this study. In contrary to the belief that such problems are among the most severe implementation problems (Granlund and Mouritsen, 2003); this study's findings, presented in Table 9, indicate a slightly low significant impact of these IT-related problems on ABC implementation. In other words these problems do exist, but they are not that severe as it has been believed to be.

## **6. Conclusions, Limitations and future research**

The main conclusions of this study are summarised as follow:

- The rate of ABC adoption has shown number of changes between 1999 and 2005. The proportions of ABC users and of those currently assessing it have dramatically fallen, the percentage rejecting it has fallen slightly while a considerable increase has been apparent in both those who abandoned its implementation and those who currently giving no consideration to it. These results are indicative of a decrease in the popularity of ABC. However, the proportion of companies that are considering ABC adoption currently from the non-manufacturing sectors is greater than this from manufacturing sectors. This could reflect the fact that the interest in ABC could be higher in non-manufacturing sectors comparing with the interest in ABC in manufacturing sectors.
- The survey results on ABC systems design indicates that the main objective of adopting ABC is to use it as an overhead allocation method and in most of the cases it was used as a parallel system to the previous costing system. While when it was adopted as a cost driver analysis system, in the majority of the cases it was used as a parallel system. Using ABC as a cost driver analysis system in parallel with the original costing system could be seen normal as it is used for decision making purposes rather than costing purposes. But using ABC as overhead allocation method in parallel with the original costing system could be a translation to the low level of success of the technique as the results indicated.
- Confirming previous research in the Australian context (Brown et al, 2004). The findings of this study showed the important role of the support of internal ABC champion in the initial decision to adopt ABC. This factor came in its significance before the need for top management support.
- UK's information systems technology map is the main result of this research. Analysing this map showed that:
  1. ERP systems seem to have slightly low significant impact on the initial ABC adoption decision in those companies that do not have any consideration and companies that has ERP system before ABC adoption. This conclusion support prior research conducted in other European countries and Australia.
  2. Regarding ABC software packages used in ABC assessment and implementation, general software applications are the most preferable software for ABC assessment. However, the decision of accepting or rejecting the technique seems to be unrelated to the type of the software used during the assessment period.

While a mix of different ABC software packages is the most popular in the case of ABC implementation. The type of ABC software used for the implementation was found to be related to the level of the activity management that ABC system was designed to fulfil. In other words, it seems that the sophistication of ABC software could be related to the sophistication of the activity management level of the ABC system. Unfortunately, it was difficult to determine the type of relation between the overall success of ABC and different types of ABC software packages because of the limited data in this regard.

- The findings of this study provided an indication on the nature of the possible effect of general IT-related problems on ABC implementation. The belief was that such problems have severe negative effect on ABC implementation (Granlund and Mouritsen, 2003); the finding of this study was provided evidence to the contrary to such belief. These problems are limited and have a low significant impact on ABC implementation according to this study's findings.

Some limitations of this study must be noted. Surveys are limited by a lack of direct contact with the researched phenomenon and the verbal exchange. This limitation makes the validity of the collected data dependent on the reliability of the response of the respondents (Innes and Mitchell, 1997). To deal with this problem, further explanation was gained from the respondents using e-mail interviews when it was needed. Another limitation of this study is that in some cases the analysis was based on a considerably small number of responses, which could affect the generalizability of some of the findings of this research. This limitation should be considered mainly when the analysis is concerned with research questions that relates to ABC users only (6 companies).

Similar to Hyvönen's (2003) study, the current study has the problem related to the definition of ERP system. This study was concerned with single-vendor based ERP systems which consist of different modules. Therefore classifying respondents simply to ERP users or non-users depending of the above definition ignores the level of integration these systems and does not distinguish between users of ERP systems cover all aspects of the business and those systems that support only the core functions.

As this study is an exploratory study, different research opportunities were identified. First, there is a need to follow up the respondents' view and claims regarding the influence of information systems technology on ABC adoption and implementation. Case study approach which permits a more direct and detailed investigation of the full effects of information technology could provide a better understanding of these effects, especially in the case of the ERP system. As Scapens & Jazayeri (2003) suggest, longitudinal case research would be the preferable strategy to reveal the process of the potential influence of ERP. Second, although the adoption of ABC technique seems to be decreasing, a new factor that could encourage this adoption was identified. This was "External Reporting by Division" which came as a response for International Accounting Standards requirement to disclose Profit & Loss account and net assets by Division. ABC adoption and implementation research should be expanded to identify and explore such new factors that might change the picture of ABC adoption again. Lastly, a replication of this study five years later could be a good future research which might provide a new

picture of ABC adoption in the UK and a clearer map of the influence of information technology on ABC.

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