

ACTIVITY BASED COSTING IN THE NON-MANUFACTURING SECTOR IN IRELAND: A PRELIMINARY INVESTIGATION

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Introduction

The popularity of the term "activity based costing" can be specifically traced to the Harvard Business School case series on the John Deere Components Works (Harvard, 1987). The following year, the first articles to use the term were published in the *Journal of Cost Management* (Cooper, 1988, Cooper and Kaplan, 1988). By the early 1990s, the term activity-based costing had gained world-wide currency and academics turned their considerable attention towards investigating this phenomenon. It is also of interest to practising management accountants and many books have been written with a practical emphasis (for example, Player and Keys, 1999; Hicks, 1992).

Relative to other English-speaking countries, little is known about the implementation of activity-based costing in Ireland. The few studies that have been published focus on manufacturing concerns. The objective of this research is to collect data on the adoption and use of activity-based costing information within Irish non-manufacturing firms. Specifically, the focus of this paper is on the reported usage of ABC within the firms sampled; the reasons why companies are reluctant to adopt ABC; the benefits obtained by those who adopted ABC, and finally, the problems encountered in implementing ABC and how there were overcome. Due to the paucity of research in this particular field, it is anticipated that the findings will contribute a considerable amount of new information. Also, in providing academics with some insights that await further investigation, the findings may be of benefit

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to those companies that are contemplating a change from their traditional cost accounting systems to an ABC system in the future.

This paper is structured as follows: By way of background to this study, the next section provides a brief review of the relevant literature. This is followed by a description of the research methodology used in this study together with the specific research questions. The results and discussion section follows this. The concluding section of the paper highlights the limitations of this study, draws some tentative conclusions and suggests areas for future research.

Literature Review

Since the early 1980s, there has been a vast amount of literature suggesting that traditional cost accounting methods are becoming obsolete (for example, Kaplan, 1983; Johnson and Kaplan, 1987; Jeans and Morrow, 1989; Luck, 1989; Roztocki, 1998). One major focus of these criticisms is that the reliance on a single cost driver — e.g. direct labour hours — to assign overheads may lead to the distortion of product/service costs (Cooper, Kaplan, Maisel, Morrissey and Oehm, 1992). In turn, such erroneous product cost information may result in, for example, incorrect selling price decisions, improper 'make or buy' decisions and the misallocation of capital and resources, whereby too much resources are deployed on the less profitable product/services and not enough to the more profitable.

The many advocates of activity based costing suggest that this new cost accounting technique will overcome the deficiencies of traditional cost accounting methods. ABC differs from traditional cost accounting in that overhead costs are traced to products/services using cost pools and activity cost drivers rather than volume based overhead absorption rates. In brief, ABC assumes that products consume activities and activities consume overhead resources. Thus, a causal relationship is established between organisational activities and the products/services produced. As a result, it is argued that the true cost of a product/service can be determined with more accuracy than under traditional cost accounting systems. ABC is not only a conceptually superior costing system but it also allows for a greater visibility of what drives costs. This transparency facilitates cost management including the identification and elimination of non value-added activities. Further, ABC information can be used in providing more accurate customer profitability information.

On the other hand, activity based costing is not without its limitations, many of which relate to issues of implementation, such as:

- The desire to change to an ABC system is often met with reluctance at top-management level.
- Problems are often encountered in identifying appropriate cost pools and related activity cost drivers.
- ABC implementation is costly and time consuming. This includes, for example, the costs involved in adapting the internal accounting system together with the time involvement of all staff involved in the new accounting system.
- ABC systems may be too complex for the needs of the organisation. Complexity is brought about by a desire to cater for a vast number of activities, cost drivers, product/services and cost elements. However ABC systems that are too complex often fail to meet management requirements. It is therefore important to evaluate the scope of and role for the proposed system, if implementation is to be successful.

As previously mentioned, little research has been conducted in Ireland on the adoption and role of ABC systems within Irish companies. The published research focuses exclusively on manufacturing operations, as distinct from the retail or service sector. The first major survey on management accounting practices in Ireland was conducted by Clarke (1992), who mailed a questionnaire to management accountants working in the top 320 manufacturing companies in Ireland (based on sales turnover) and received a 40% response rate. Included in this research were questions relating to the use of new management accounting practices/techniques, including ABC. (A similar but independent questionnaire was also used by Nulty (1992) around the same time and reported similar findings). Clarke reported that 14% of the respondents had implemented ABC. The main benefits reported with these techniques and the obstacles to their introduction were also investigated. Approximately one-third of respondents indicated their intention to introduce the technique within two years. However, this aspiration was not achieved, since Clarke, Hill and Stevens (1999) subsequently reported, based on a larger sample size, that about 12% of (manufacturing) firms use ABC. They discovered that the type of industry was not correlated with the decision to consider or implement ABC. However, overall size, as measured in terms of overall sales, together with the ownership status of the company — i.e. Irish indigenous or subsidiary of multinational — had a significant impact on the decision to adopt ABC. Subsequently, Pierce and O'Dea

(1998), surveyed management accountants (receiving a 32% response rate) and reported that some 13% of their respondents had used ABC either "very frequently or often". However, the extent to which ABC was used in the provision of information to management was rated as "2" out of "5" (where 5 represents very frequently) compared with a mean score of 3.85 for standard costing information.

It is interesting to note that Clarke, Hill and Stevens (1999) reported that approximately 55% of responding companies had not even considered using ABC. A small number of companies (slightly in excess of 10%) had considered the adoption of an ABC system but had decided against its implementation. Among those companies that had reported using ABC, the main benefits were cited as follows:

- More accurate cost information for product costing and pricing.
- Improved cost control and management.
- Improved insight into cost causation.
- Better performance measures.
- More accurate customer profitability analysis.

Pierce and O'Dea (1998) also reported on advantages of ABC information, which include facilitating decisions on loss-making product lines and also that ABC data is "believable and transparent" (p. 55).

Respondents in the Clarke, Hill and Stephens (1999) study reported implementation problems and difficulties with ABC, including:

- Difficulty in identifying cost pools and cost drivers.
- Inadequate computer software.
- Lack of adequate resources.
- The cost of change.
- Management inertia.

Further, the main reasons reported in the Clarke, Hill and Stevens (1999) study for considering but rejecting ABC included the following:

- Control over overhead is already adequate.
- No management commitment to the introduction of ABC.
- An ABC system is too expensive to implement.
- Difficulties in identifying cost pools and drivers.

- Managers would not understand/accept ABC data.

Although it may appear that ABC implementation may be problematic, literature suggests that the increased knowledge and understanding about the business make it worth the investment (Glad 1993).

Activity Based Costing in the Non-manufacturing Sector

As a technique, ABC has its roots in the manufacturing sector and most of the literature on activity-based costing emphasises its use in a manufacturing setting. Yet, it must be acknowledged that significant and growing economic activity takes place in the non-manufacturing sector. In the Republic of Ireland, for example, for 1999, 63% of the workforce was engaged in the service sector (69% in Northern Ireland) compared with 28% in industry (26% in Northern Ireland). It is important to note that activity based costing principles apply to all types of business. For example, service companies face the same changing environment that has necessitated modifications in cost management practices in manufacturing companies in order for them to remain competitive. Strong competition for existing services together with customers requiring greater service choice will force a compression of profit margins. Since service companies are more people-intensive than manufacturing, there is greater need to focus on the myriad of activities that are performed in order to serve the customer. In the service arena, determining and lowering the "cost to serve" is a critical success factor. The challenge is to make the less expensive service also the preferred service among customers. For example, retail banks can provide basically the same service either through a cash teller or an automated teller machine (ATM). The ATM is significantly cheaper for banks, and generally, the preferred service option among customers. For service-orientated companies, there is urgency to use ABC as a growth and profit-enabling tool, through identifying and modifying non-value added activities and improving customer profitability. Finally, ABC product costing information may not be acceptable for financial reporting purposes but this (negative) consideration is not relevant in the service sector due to the absence of stock valuation considerations.

Many service companies have successfully implemented ABC including:

- Multifood Distribution Group is a food-service provider in Denver. They report that ABC "kept us from bringing on new customers that we might have lost money on ... Our cost to serve is based largely

on our transportation costs, so we rank customers in terms of potential profit from zero to 250 miles, 250 miles to 500 miles, and 500 to 1,000 miles. Our potential for business growth is greatest in rural areas, but we had to be selective because those are also the most remote areas for us to deliver" (Leahy, 1998, p. 65).

- Healthspan Transportation services in the USA reports that, through analysing ABC data, it was recognised that when the scheduled call service was busy, the emergency room service was often idle. As a result, the emergency room service was used to respond to scheduled calls and greater usage efficiency was achieved with a consequent (positive) impact on profitability (Leahy, 1998).
- For Northeast Utilities, New England's largest Electricity Utility Company, activity based measures focus on customer requirements and improving the company's market responsiveness. Improved information on the costs of maintenance, inspections, hook-ups, and meter readings gave managers a better idea about the level of quality and reliability customers require and how their costs of delivery of each service compare to that of their competitors. The Finance Manager estimates that, since the late 1980s, through activity-based cost measurements, the company has eliminated 30% to 40% from its cost structure without an adverse effect on its operations (Lazare, 1997).
- Fair Oaks Ford, an automotive retailer in Illinois, USA had a pilot study on ABC conducted in the company. It was discovered that there were many areas in which ABC could bring significant improvements in the business. For example, a non-value added activity — waiting at the service and parts counter — was identified as being costly and this was re-organised. Further, performance measurements were developed based on cost drivers for various activities. The dealer is now in a position to determine potential opportunities for productivity improvement by benchmarking their activity performance to industry peers (Booth and Balachandra, 1999).

Research Methodology

The research methodology adopted in this study was that of the postal questionnaire, addressed to the chief management accountant of 395 non-manufacturing companies. Target companies were selected from

the January 2000 edition of *Business and Finance*, where the top 1,000 Irish companies were ranked on the basis of annual turnover. Although this listing identified the main activity of the company — e.g. pharmaceutical manufacturer — classification ambiguities remain, typically when a company is described, for example, as an industrial holding company or as both a manufacturer and distributor. In such situations, firms were circulated with the questionnaire so that the overall target sample is bigger than strictly warranted. Larger companies were selected as they generally have a greater need for more comprehensive management accounting systems and also because they have greater resources. In addition, various studies indicate that larger companies tend to be first in adopting new management accounting techniques, and, as such, are more likely to have adopted or at least considered adopting activity based costing.

A postal questionnaire was the most appropriate method of primary research for the following reasons:

- Postal surveys can reach a widely dispersed and large sample simultaneously and there is no interviewer access problem, although a potential non-response bias must be acknowledged (Kanuk and Berenson, 1975). However, a problem of interpretation by respondents makes postal surveys a less than perfect method of research.
- They allow respondents time to reflect on the questions (and possibly look up records) so that they can give more considered or precise answers. This should ensure that more reliable information is obtained.
- Conducting a postal survey and its analysis is usually less time consuming and costly than other investigation methods.

The questionnaire was addressed to the chief management accountant and sent with an appropriate covering letter explaining the aims of the survey. It also stressed the importance of the study and the need for co-operation. Although respondents were guaranteed confidentiality of their responses, it was decided not to request sensitive information such as annual turnover, cost structure or overall profitability. Thus, it is not possible to correlate these important background variables with the adoption/non-adoption of ABC.

Because of the exploratory nature of this study, no formal hypotheses were stated or subjected to statistical testing. The survey results

are presented using descriptive statistics and are outlined in the following section.

Results and Discussion

A total of 64 responses were received, which represents a disappointing 16.2% response rate, lower than recent surveys on management accounting practices conducted in Ireland. While a small portion of the low response rate may have been attributable to incorrect targeting of respondents, the low response rate may also have been due to the general lack of interest in this study. In turn, this may reflect the low adoption rates of ABC by companies in this sample, together with a lack of understanding of the benefits of ABC information to respondents. Out of the 64 responses, 54 were considered usable. (A number of responses were received after the required date and are not included in the following statistics). The classification of responding companies is listed in **Table 1** below:

TABLE 1: INDUSTRY ANALYSIS OF RESPONDENTS

Industry	Number	%
Distribution	19	35%
Retail	13	24%
Professional Services	8	15%
Transportation	6	11%
Software design/development	3	6%
Telecommunications	2	3%
Other (various)	3	6%
Totals	54	100%

Adoption of Activity Based Costing

The responses were classified by the firms' status or position with respect to the adoption of ABC — i.e. either adopted, assessing, would consider adopting ABC in the future, rejected or did not consider ABC. As reported in **Table 2**, 19% (10 firms) reported that they used ABC. Indeed, if one makes allowances for 'optimistic or generous' responses in relation to this question, it is possible that the use of ABC information among responding firms is possibly smaller than indicated by respondents. In this context, it is interesting to note that one of the recent surveys on ABC in the UK reported that 17% of firms had

adopted ABC and the adoption rate was 20% for non-manufacturing firms (Innes, Mitchell and Sinclair, 2000).

The remaining number of respondents (44) to this survey constitutes the non-adopters of ABC. Thus, in relation to the overall respondents, 13% (7 firms) were currently assessing ABC, 28% (15 firms) indicated that they do not use ABC currently but they would consider it in the future, 5% (3 firms) considered but rejected ABC and 35% (19 firms) had not considered implementing ABC. Clearly, the biggest single category relates to firms that have not yet considered adopting ABC. The initial conclusions, therefore, are that only a small fraction of non-manufacturing companies in Ireland have adopted ABC and that a significant proportion has not yet considered it. This conclusion complements earlier findings on manufacturing companies.

TABLE 2: STATUS OF ABC IN IRISH NON-MANUFACTURING FIRMS

	Number	%
Adopted ABC	10	19%
Assessing — i.e. considering ABC at the moment	7	13%
Not using ABC but may consider it in future	15	28%
Have not considered ABC	19	35%
Rejected — i.e. considered ABC but decided against it	3	5%
Totals	54	100%

The relatively low reported adoption rates by companies in this sample is interesting when one considers the long and widespread interest in ABC in the academic literature and management journals. In order to provide some reasons for the low adoption of ABC among firms in this sample, this study examines various perceptions about the costs and benefits of ABC.

Advantages of Activity Based Costing

It is plausible to argue that no new management accounting technique will be implemented unless the perceived benefits outweigh the perceived costs. Respondents were asked about the benefits of using ABC. The results are presented in **Table 3** and distinguish between the actual advantages experienced by those companies that have adopted ABC and the advantages perceived by firms that have not adopted ABC. Two tentative inferences can be made. Firstly, **Table 3** confirms previous arguments in the literature regarding the actual advantages of ABC information. For example, 70% of the respondents (that adopted ABC) agree that ABC provides more accurate profitabil-

ity analysis. In addition, 60% of the ABC-adopters agree that ABC provides an improved insight into cost causation and facilitates cost control and management.

Secondly, there is a marked difference in the responses of adopters and non-adopters. Generally speaking, the reported *actual* advantages are greater than the *perceived* advantages reported by non-adopters. The following are some examples.

- 70% of ABC-adopters believe that ABC results in more accurate profitability analysis, while only 39% of non-adopters believe this.
- 60% of ABC-adopters believe that ABC improves cost control and management, while only 45% of non-adopters believe this.
- 60% of ABC-adopters believe that ABC encourages a greater understanding of opportunities available to reduce costs, while only 43% of the non-adopters agree with this.
- 60% of ABC-adopters believe that ABC results in improved decision making, while only 45% of non-adopters believe this.

The marked differences in the responses between the adopters and non-adopters suggest a (relative) lack of understanding of ABC on the part of the non-adopters. In other words, management accountants in those companies that have not adopted ABC do not perceive advantages associated with this technique. In turn, this may explain their reluctance to adopt ABC. Unfortunately, this study was not able to investigate whether these perceptions were, in fact, correct. Alternatively, it could be that this difference is to be expected and may be consistent with cognitive dissonance. The concept of cognitive dissonance has already been suggested as a basis for explaining accounting behaviour (*Report of the Committee on the Behavioural Content of the Accounting Curriculum*, 1973). It is based on the idea that participants in an activity will possess more positive views on it than non-participants.

TABLE 3: ADVANTAGES OF ABC

	Adopters of ABC		Non-adopters of ABC	
	Number	%	Number	%
More accurate profitability analysis	7	70%	17	39%
Improves insight into cost causation	6	60%	24	55%
Improves cost control and cost management	6	60%	20	45%
Better understanding of cost reduction opportunities	6	60%	19	43%
Improved managerial decision making	6	60%	20	45%
More accurate cost information for service costing and pricing	5	50%	25	57%
Number of respondents	= 10/10		= 44/44	

In order to shed some additional light on why so few companies in this sample had adopted ABC, further analyses was conducted. The non-adopting firms (No. = 44 from **Table 1**) were classified into four categories as follows:

- Category **A** consists of the seven companies that have not adopted ABC but are considering adopting it at the moment.
- Category **B** consists of the 15 companies that have not adopted ABC but would consider adopting it in the future.
- Category **C** consists of the 19 companies that have not adopted ABC and would never consider adopting it.
- Category **D** consists of the three companies that have not adopted ABC and have previously considered it but decided against it.

This allows the perceived advantages of adopting ABC to be reported by category and is shown in **Table 4**. Generally speaking, the overall percentage responses for the perceived advantages, subject to some exceptions, are greater for those firms that are considering the adoption of ABC, relative to other firms. For example 86% of firms currently considering ABC consider that ABC will result in more accurate cost information for costing and pricing. This contrasts with only 40% of respondents that would not consider ABC. In addition, companies that had considered but rejected ABC reported relatively lower fig-

ures for these perceived advantages. This suggests that the rejection decision was made on rational grounds — i.e. comparing cost with benefits. However, it should be acknowledged that the sample sizes for each category are rather small.

TABLE 4: PERCEIVED ADVANTAGES OF ABC (NON-ADOPTERS)

	A	B	C	D
	Considering	May consider	Not consider	Rejection
More accurate cost information for service costing and pricing	86%	86%	40%	50%
More accurate profit analysis	86%	57%	33%	0%
Improves insight into cost causation	71%	64%	60%	50%
Improves cost control and management	57%	71%	40%	0%
Better understanding of opportunities available to reduce costs	29%	64%	48%	100%
Improved decision making	71%	79%	33%	0%
Number of Respondents =	7/7	14/15	15/19	2/3

Problems of Implementation of Activity Based Costing

ABC is not without its implementation problems and difficulties. These difficulties can be divided between those of a conceptual/technical nature of ABC information and those relating to the specific organisational context. As noted by Cooper, Kaplan, Maisel, Morrissey and Oehm (1992, p. 323), "the education to overcome technical ignorance of ABC concepts is quite different from the educational process to overcome defensive behaviour that attempts to block organisational change". **Table 5** summarises the findings regarding the problems associated with implementing ABC. For adopting firms, the most se-

vere problem was that of identifying cost drivers (reported by 89%). Other "conceptual" problems associated with ABC — e.g. tracing cost drivers to products — were also important. However, the "institutional" problems of implementing ABC — e.g. lack of resources — were not so significant. Perhaps, this is explained by the fact that if the "institutional" problems were severe in the first place, then ABC would not have been subsequently implemented.

TABLE 5: TYPES OF PROBLEMS ENCOUNTERED WHILE IMPLEMENTING ABC

	No.	%
<i>Conceptual problems associated with implementing ABC:</i>		
Difficulties in collecting data on cost drivers	8	89%
Difficulties in tracing cost drivers to products	7	78%
Difficulties in identification/selection of cost pools and drivers	5	56%
Difficulties in defining distinct activities	5	56%
<i>Institutional problems associated with implementing ABC:</i>		
Education of managers/accountants	6	67%
Lack of staff time	5	56%
Lack of clear direction on how to implement an ABC system	4	44%
Lack of adequate resources	4	44%
Reluctance to change traditional accounting methods	3	33%
Inadequate software	3	33%
Number of respondents = 9/10		

Overcoming the problems of implementation

For firms that had adopted ABC, respondents were asked how the implementation problems were overcome. Typical responses are reported in **Table 6**. Despite the limitations associated with the use of a postal survey questionnaire in this study, these responses provide organisational and behavioural insights that could usefully be explored in subsequent studies.

TABLE 6: RESPONSES TO OVERCOMING ABC IMPLEMENTATION PROBLEMS

"Careful analysis of management requirements is essential."

"Make ABC a priority in the company, an objective which must be met."

"Training at all levels is a must."

"Recording of time was a problem and time is the main cost driver. Daily reminders to employees via the computer system has improved things."

"It is important to keep cost drivers to a minimum."

"A very simple approach was taken initially. This was only for the short term."

The above comments highlight the importance of a number of reported factors on overcoming ABC implementation problems. First, it is important to know what the (ABC) project is expected to accomplish. As recently noted by Leahy (1998), unchecked ABC initiatives can take on a life of their own and sometimes do not align with a company's strategy. To ensure that this does not happen, the ABC system should be managed with an overview of what a firm wants to achieve by having the data in the first place. Also a good implementation plan is essential so as to ensure the implementation process is managed effectively. Secondly, a commitment to activity based costing by all employees, at all levels in the organisation, is a must for its implementation to be a success. It is essential that employees understand the system and their contribution to it. All employees must be educated in the principles and mechanics of ABC. Thirdly, complexity must be avoided, as otherwise the system may be too difficult to install or maintain.

Level of satisfaction with Activity Based Costing

The final research question was concerned with the level of satisfaction among those firms that had adopted ABC. Adopting firms were asked to indicate their level of satisfaction on a Likert-type scale of 1 to 10, where 1 is equal to unsatisfied and 10 represents complete satisfaction. The results are presented in **Table 7**. Overall, there was more satisfaction reported than dissatisfaction. For example, 22% of respondents rated their satisfaction levels at between 1 – 4, compared with 44% who rated their satisfaction levels on a scale of 7 – 10. How-

ever, this question suffers from the limitation of being asked of management accountants only. Since management accounting information is intended to satisfy the information needs of users, it would have been appropriate to also ask this question to the users rather than the preparers of ABC data. Finally, respondents were asked whether they would advise similar companies to implement ABC. The overwhelming majority (90%) indicated that they would and none of the companies said they would not.

TABLE 7: LEVEL OF SATISFACTION WITH ABC

Satisfaction Level	Number	%
1 - 4 (low)	2	22%
5 - 6 (medium)	3	33%
7 - 10 (high)	4	44%
Number of respondents = 9/10	9	100%

Conclusions and Summary

This paper reports findings on the adoption of ABC among non-manufacturing firms in Ireland together with reasons for its adoption or rejection and associated problems of implementation. Before any tentative conclusions can be drawn, it is important to stress the limitations associated with this study. The response rate was low and no attempt was made to identify non-response bias by, for example, comparing early and late responses (Oppenheim, 1966). Thus, generalisations from this study are not intended to, and cannot, be made. Simply, as befits the preliminary nature of this study, data has been accumulated about a number of responding companies. Secondly, survey questionnaires may encounter the problem of question interpretation. Thirdly, and this has already been mentioned, the respondents were the preparers of accounting information rather than the users.

ABC is a contemporary management accounting system put forward to remedy some of the shortcomings of traditional cost accounting systems. Proponents of ABC advocate that ABC is a superior costing system and that ABC data also facilitates better cost control, profitability analysis and value based management. Despite its proclaimed advantages, the reported uptake of ABC in Ireland, among manufacturing companies, has been relatively low. This study indicated similarly low adoption rates for non-manufacturing firms. Only 19% of the respondents reported that they had adopted ABC but a

significant proportion of firms (35%) had not even considered adopting it.

The findings of this research suggest that the reluctance to adopt ABC in non-manufacturing firms can be partly attributed to a lack of belief in/knowledge about the advantages of ABC. For example, Table 3 reveals that, in general terms, the actual advantages to those that have adopted ABC are greater than the advantages perceived by those companies that have not adopted ABC. For companies that had adopted ABC, there were implementation problems to be overcome, both of a "conceptual" and "institutional" nature. Overall there was a high level of satisfaction with ABC among those that had adopted it. Finally, 90% of the ABC-adopting respondents said they would advise other similar companies to follow suit.

The findings of this paper suggest a number of areas for future research, of which some stem from its methodological limitations. For example, using case study research, one could attempt to investigate why and how companies implement ABC, the pitfalls in implementing it, and its success in achieving intended goals. Additionally, one could investigate whether ABC adoption was designed to improve performance or to give the external appearance of being modern, rational and efficient, consistent with Hoque and Alam (1999). Furthermore, contingency theory emphasises the influence of environmental conditions on organisational form. Since the early work of Burns and Stalker (1961), the list of contingencies has expanded. Recently, Brignall (1997) has used a contingency theory framework to focus on the design of cost systems in service organisations. *A priori*, one would expect that certain contextual and background variables might influence the adoption or non-adoption of ABC systems. It is likely that future research embedded in contingency theory will allow meaningful hypotheses to be stated and tested and therefore make a significant contribution to our understanding of cost management systems within non-manufacturing organisations.

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