

Activity Based Costing Implementation Success in Australia

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ABSTRACT: It has been asserted that Activity-Based Costing (ABC) is a procedure which improves the accuracy of product/service costing and also assists managers in understanding and evaluating how resources are used across a firm's value-chain in delivering strategic outcomes. However worldwide adoption rates of ABC are relatively low and, it is claimed that the rate of new adoptions is declining. This could suggest that ABC is not perceived as being successful in delivering expected benefits. Based on a similar research study in the US, this project surveyed a number of Australian organizations to gauge whether they perceived their ABC implementation to be successful or not. The findings indicate that Australian organizations that have fully implemented ABC view it as successful compared with traditional cost management systems, the results being similar but stronger than those found in the US study. This raises the question of why are existing adoption rates relatively low, and the rate of new adoptions allegedly declining.

Keywords: Information and Knowledge Management, Performance measurement and management, Data acquisition and analysis

INTRODUCTION

During the past twenty years activity-based costing (ABC)¹ has gained a high profile in professional and academic journals and textbooks in management accounting as a technique which improves the accuracy of product/service costing and also assists managers in understanding how resources are used across a firm's value-chain to deliver strategic outcomes. It is attractive to firms in competitive environments that demand continuous cost reduction, particularly where existing cost systems fail to provide such decision support. However, while many organizations are aware that technology and the global economic environment have made traditional cost accounting systems less relevant, they need to perceive net benefits before implementing ABC, given that restructuring the necessary systems can be significant and costly.

Contemporary management accounting literature and textbooks typically argue that ABC systems are "better" than traditional systems. However, Foster and Young (1997, 68) note "What is strikingly absent from the research literature is any systematic analysis of what better means, how better should be measured, and what challenges are encountered in making these measurements". Foster and Swenson (1997) called for more replication, extension and refinement of ABC success measures. This research attempts to contribute to such aspects of the ABC literature. Further, worldwide ABC adoption rates appear to be relatively low and the rate of new adoptions allegedly declining (Kennedy and Bull 2000), which begs the question of whether or not existing ABC implementers view it as being successful. If ABC implementers have found it not successful, then that could explain the low (and allegedly declining) implementation rates.

In addressing the above issues, this study seeks to explore the perceived success or otherwise of ABC in those organizations in Australia where it has been fully implemented. To date there has been no research in Australia which has focused specifically on the question of ABC success in organizations which have adopted it. McGowan's (1998) US study surveyed the perceived benefits of ABC implementation at four sites - three manufacturing and one service. Those sites were not at the full implementation stage, ranging between approximately 50 percent and 90 percent complete. The examination of ABC sites at system maturity has been identified as a research imperative (Swenson 1995; Krumwiede 1998). This study extends the work of McGowan (1998) by examining only fully implemented ("mature") ABC sites in Australia and also includes a broader cross-section of industries – media, education, local government, health, agribusiness and some others, as well as manufacturing.

ABC IMPLEMENTATION RATES

While ABC implementation rates generally increased during the early 1990's, Innes et al. (2000) reported a slight fall between 1994 and 1999 in ABC implementation by large UK corporations (from 21 percent to 17.5 percent). A replication of this study in 2001 of New Zealand corporate sector Chartered Accountants, reported an adoption rate of 20.3 percent (Cotton et al. 2003). A large scale US survey (in the food and beverage industry) revealed an 18 percent implementation rate (APQC/CAM-I 1995), while a study of Canadian businesses indicated 14 percent had implemented ABC (Armitage and Nicholson 1993).

There have been few studies of ABC implementation rates in Australia. Booth and Giacobbe (1997, 1999) surveyed 213 manufacturing firms and reported a 12 percent rate of active implementation decisions. This was reasonably consistent with Clarke and Mia (1995) who found an ABC implementation rate of 13 percent in Australia's largest manufacturing firms. These rates were relatively low when compared with those indicated above for the UK, USA and New Zealand, but closer to that reported for Canada.

Generally, however, worldwide implementation rates appear low in light of the apparent superiority of ABC over traditional cost systems. Cotton et al. (2003, 3-4) note:

After the initial flush of articles advocating the use of ABC and extolling the virtues of the technique, several writers began to express some reservations. Some questioned the substance of its practical application (Bjornenak 1997; Gosselin 1997; Malmi 1999) arguing that it may be a fad or a fashion, riding a wave of popularity, rather than providing a genuine enhancement ... Reservations such as these may provide a partial explanation for the relatively low adoption rates that have been consistently observed in different countries ... There is some evidence that worldwide adoption

rates for ABC have peaked at around 20% and a declining number of firms are giving it further consideration (Kennedy and Bull 2000).

Reasons for such low worldwide implementation rates have not been determined with any certainty. One reason could be that ABC adopters have found it not successful in delivering expected net benefits. It is informative, therefore, to explore whether or not those who have implemented ABC perceived it as being successful.

ABC SUCCESS

Definition of Success

Deciding that some variable defines success depends on the individual value placed on the ABC system. There can be a diverse number of variables that may be used to measure ABC success. Examples of ABC success measures tested in prior research include - decision use, decision actions taken, dollar improvements and manager evaluation (Foster and Swenson 1997); user attitude, technical characteristics, perceived usefulness in improving job performance and organisational process impact (McGowan 1998); management evaluation and dollar improvements (Shields 1995); employee satisfaction (McGowan and Klammer 1997); overall use and accuracy (Anderson and Young 1999); and increase in firm value (Kennedy and Affleck-Graves 2001).

While measures of ABC success such as “dollar improvements” or “increase in firm value” are empirically appealing they are fraught with possible confounding variables that are extremely difficult to control. Kennedy and Affleck-Graves (2001, 20) admit “despite the strong and robust evidence in this paper, it is not possible to prove definitely that there is a causal link between ABC implementation and subsequent increases in shareholder value”.

Shields (1995, 153) states that “Providing a definition, however, was problematic as the literature is vague about what constitutes success, and discussions with ABC experts during construction of the survey did not result in consensus about a tangible definition.” The approach that Shields (1995) adopted was to allow the user to rate the degree of success with whatever definition they deemed relevant. It has been argued, for example, that if a user perceives satisfaction with an information system *per se*, then the system is successful, consequently user satisfaction can be a proxy for system success (McGowan and Klammer 1997; McGowan 1998).

McGowan (1998, 30) argued that if users’ attitudes toward a system are unfavourable, it is likely that they will not accept it. She posited that “measures that describe the users’ reactions to the innovation, such as attitudes and satisfaction, are appropriate surrogates for assessing the success of an informa-

tion system". This view of success has provided the most robust basis for ABC success measurement in research to date, and is therefore the one adopted in this study.

Stages of ABC Implementation

Drawing on the innovation and information systems implementation literatures, Krumwiede (1998) argued that Anderson's (1995) study of the early ABC implementation process at General Motors suggested a theory that success factors differ and vary in importance during the several stages of implementation. He concluded that if this were true, then studies that examine only certain stages, or that pool firms at different stages, may generate conflicting results. This is supported by Baird et al (2004) who, relying on Gosselin's (1997) three stages of ABC implementation, argued that prior studies seldom recognised the different adoption stages. Liu and Pan (2007) while studying the transportability of ABC concepts to a developing country (China) also suggest that the stages of implementation should be segmented in the research design.

Anderson and Young (1999) found that there were significant differences in determinants of respondent's evaluation depending upon the stage of ABC system implementation. Essentially, six stages of implementation can be identified, as follows:

- initiation – feasibility analysis is done
- adoption – decision to invest some level of resources is made
- adaptation – analysis is made of firm's activities and cost drivers, ABC information is available but not yet used by non-accounting staff for decision-making
- acceptance – occasionally used by upper management for decision-making, but still considered a project or model
- routinization – commonly used by upper management for decision-making and considered a normal part of the information system
- infusion/integration – used extensively and fully integrated within the primary financial system

For the purposes of this research, "routinization" and "infusion/integration" are classified together as the "mature" stage. It has been argued that it is more significant and less ambiguous to evaluate ABC at system maturity (Swenson 1995; Krumwiede 1998) and further that "satisfaction appears to increase with higher stages of implementation" (Krumwiede 1998, 268). This study contributes to the ABC implementation literature by confining the scope of analysis to "mature" sites only.

ABC Implementation Success in Australia

There has been limited research so far into ABC implementation success in Australian organizations. Baird, et al. (2004) surveyed 400 randomly chosen Australian business units. They argued that low adoption rates found in earlier studies may have been because those earlier studies had not distinguished between the different stages or degrees of adoption. They suggest one explanation may be “accounting lag, i.e. the time lapse between development of theory and application in practice” (p.).

Chenhall and Langfield-Smith (1998) examined the experiences of five manufacturing corporations in Australia adopting new management accounting systems (including activity-based techniques). Benefits identified included accurate product costing, timely information, improvements in profitability and improvements in physical operations and the working environment.

Booth and Giacobbe (1999, 1997) reported on a survey of 213 manufacturing firms and noted comments by some “adopters” that ABC had been a success. However, the authors cautioned that most of the firms surveyed had only been using ABC for a short period of time, which would make it difficult to fully assess any benefits. Also, the majority were still using their existing costing systems as well – i.e. the ABC system had not been infused or integrated within the primary system.

Clarke and Mia (1995) surveyed large Australian manufacturing firms, 12 of whom reported they were “adopters”. However the authors conceded a limitation of the study was the interpretation of the respondents’ meaning of “ABC adoption”. The results of the study were generally similar to those of Booth and Giacobbe (1999, 1997) in relation to users overall view of ABC success.

Norris (1993) conducted semi-structured interviews with nine subjects in a division of a large manufacturing company with responses indicating user support for ABC. Factors identified which influenced user perceptions were the expectation of benefits such as improved information, improvements in communications across functions, greater confidence in decision-making, more useful, reliable, understandable information, and finally, greater efficiency.

The above studies focused only on manufacturing organizations and did not examine ABC success *per se* in relation to implementation stage. This study extends the literature in these areas in the Australian context.

RESEARCH QUESTIONS AND PROPOSITIONS

This research draws on the “success” proxies (attitudes and satisfaction) developed by McGowan (1998) (which were based on Shields (1995) approach to defining ABC success) and also on qualitative *a priori* success measures suggested by Foster and Swenson (1997).

User Attitude

The management accounting literature has argued that ABC systems are better than traditional systems in that they improve the accuracy, reliability and relevance of product/service costing and highlight how various resources are used across an organization's value-chain – enabling an evaluation of value-adding and non-value-adding activities. Compared with the traditional (pre-1970's) environment, the current business environment is characterized by greater investments in technology and automation (and consequently greater overhead costs), greater product diversity, greater global competition and greater consumerism. In such an environment, a system which delivers more accurate, reliable and relevant cost information upon which to base short and long-term decision-making is advantageous for users. Consequently the following proposition is suggested:

Proposition One: Individuals report positive attitudes toward the implementation of ABC.

Technical Characteristics Rating

Traditional cost systems have been criticized for failing to provide information with the appropriate levels of technical attributes necessary to aid decision-making. Such attributes, seen as necessary in a management information system, are accuracy (Bailey and Pearson 1983; Argyris and Kaplan 1994; Billington 1999; Booth and Giacobbe 1999), timeliness and reliability (Belardo et al. 1982; Bailey and Pearson 1983; Chenhall and Morris 1986), understandability (R. Booth 1997), and accessibility (Bailey and Pearson 1983; Cokins 1996, R. Booth 1997).

The literature argues that ABC information is more accurate than traditional cost information (Argyris and Kaplan 1994; Cooper and Kaplan 1998), more reliable (Innes and Mitchell 1995), more timely (Bailey and Pearson 1983; Cokins 1996), more accessible (Bailey and Pearson 1983; Cokins 1996, R. Booth 1997) and more understandable (Cooper and Kaplan 1998). In view of the above, the following proposition is put:

Proposition Two: Individuals perceive that the technical characteristics of the information produced by their ABC system are superior to those of a traditional cost system.

Perceived Usefulness in Improving User Job Performance

Perceived usefulness is defined by Davis (1989, 319) as “the degree to which a person believes that using a particular system would enhance his or her job performance.” Users are more satisfied with, and use more extensively, those decision support systems that bring positive change to their work environment (Barki and Huff 1985). It is argued that, compared with traditional systems, ABC assigns costs to objects more accurately and reliably, and also assists users in understanding and evaluating how resources are used across a firm's value chain in delivering strategic outcomes. While it might be asserted that the system is potentially more complex because of the necessity to analyse activities and

collect data on the consumption of activity drivers, advances in hardware technology and software have made these tasks less complex and time consuming than they otherwise would be. Consequently, ABC can provide relevant and timely information for decision-making, which leads to the following proposition:

Proposition Three: Individuals perceive that their ABC system information is more useful in improving their job performance than that of a traditional cost system.

Impact on Organisational Processes

The challenge faced by managers “must be to meet what have traditionally been contradictory requirements: continuously deliver customised, high-quality goods and services; and at the same time keep costs down and get products to market quickly” (Boynton and Victor 1994, 303). Traditional cost systems have been criticised for failing to allow management to meet such challenges by failing to facilitate the implementation of cross-functional approaches, obscuring the interconnection of time, quality, capacity, flexibility and cost which are needed to operate their business (Cokins 1996; Booth 1997). ABC is seen as providing information which transcends particular processes and functions and highlights inefficiencies, enabling a focus on waste reduction and productivity improvement (Cokins 1996). It is also described as a tool that supports managerial movement toward continuous improvement and concentrates on diagnostics and tactical issues (Cokins 1996; Cooper and Kaplan 1998). Because ABC provides information on value-adding and non-value-adding activities in relation to achieving objectives, users are equipped to better focus on attaining organizational goals. The above suggests the following proposition:

Proposition Four: Individuals perceive that the implementation of their ABC system has resulted in more improved organisational processes compared with those of a traditional cost system.

RESEARCH METHOD

A mail survey in late 2000 was used to collect the data for the study. Subjects were identified by contacting consulting and software firms, academics with relevant ABC research experience, and also through the inspection of the professional and academic literature. Seventy-seven ABC sites were identified.

A senior manager of each of the seventy-seven ABC sites was contacted to assess their site’s suitability for the study and to request participation. It was necessary to ascertain the ABC maturity of each site, given that the aim of this research was to focus on “mature” ABC sites. The restriction of the survey to mature sites only was necessary as including sites from other stages of implementation would have introduced heterogeneity within the sample, potentially leading to conflicting research results (Krumwiede 1998). Also, mature site analysis has been overlooked with most previous research con-

centrating on the earlier implementation stages (Foster and Swenson 1997; McGowan and Klammer 1997; McGowan 1998).

The managers of twenty-eight sites indicated that they had rejected or abandoned the ABC system, four ABC sites were in the early implementation stages and fifteen managers declined the request to participate. Therefore, thirty ABC sites met the required criteria and agreed to participate. The criteria were derived from Krumwiede (1998), and required the respondents to have been using the ABC information for decision making, and to have considered it to be a normal part of their information system (i.e. routine or infused/integrated). All managers participating in the study judged that their ABC system met these “mature” criteria.

Questionnaire Distribution

The senior manager involved in the initial discussion was the contact point for each site and indicated the number of questionnaires to be sent. The unit of analysis identified was the individual user of ABC information. Users were required to be at a “managerial level” within an ABC site, and to participate had to have experience with both an ABC system and a traditional cost system since he/she was asked to compare attributes across the two cost systems. It is important to ensure respondents meet the necessary specifications to participate in the study. Researchers have found that user ratings of success differed according to hierarchy and function (Baird et al., 2004; Major and Hopper, 2005).

Reply paid envelopes were provided to ensure that the questionnaire was sent directly back to the researcher to preserve respondent anonymity. One hundred and sixty-eight packages were mailed to the 30 ABC sites participating. Follow-up questionnaires were sent two weeks after the initial mailing. A total of 67 responses were received, giving a response rate of 39.9 percent. Two of these had to be discarded due to the respondents not having actual knowledge of a traditional cost system leaving a useable sample of 65 (39.7 percent). Mean values of the variables from the first 20 returns and those from the last 20 were compared to examine for non-response bias. No significant differences were identified, suggesting the absence of non-response bias. The demographic information regarding the ABC sites and the respondents are shown in Table 1. Responses were received from all 30 sites and represented a range of industries.

[INSERT TABLE 1 HERE]

Measures

The questionnaire was divided into parts that reflected the propositions of this study. Each part included items to measure the four success variables of interest. The items were the same as those used by McGowan (1998).

User Attitude

User attitude was measured by asking respondents to circle their response to the statement, “My overall attitude toward the implementation of ABC is” on a five-point likert scale anchored 1 = strongly favorable and 5 = strongly unfavorable.

Technical Characteristics Rating

Respondents were asked to rate their perception of the ABC information and that produced by a traditional cost management system on five technical characteristics. The five technical characteristics are accuracy, accessibility, reliability, timeliness, and understandability. A five-point likert scale anchored at 1 = extremely high and 5 = extremely low was utilised.

Perceived Usefulness in Improving User Job Performance

This variable was operationalised through ten questions in which users were asked to rate their perception of the usefulness of the ABC information compared with traditional cost information on a five point likert scale anchored 1 = strongly agree and 5 = strongly disagree. Eight questions related generally to dimensions of the variable, while the final question tested the overall perception of the usefulness of the ABC system, and question six related directly to improved job performance. The ten questions were drawn from McGowan’s (1998) study, which were based on Davis (1989). Conceptually, this measure was conducive to factor analysis which would allow for a reduction in the number of individual statistical tests. However, because the number of responses was below the statistical threshold of at least five times the number of variables (Hair et al. 1995) a factor analysis was not appropriate in this case.

Impact on Organisational Processes

Organizational processes included the quality of decisions, efficiency and waste reduction, innovation, relationships across functions, communications across functions, and the overall focus on the goals of the entity. Respondents were asked to rate the perceived impact that ABC implementation has had on each dimension on a five point likert scale anchored at 1 = strongly agree and 5 = strongly disagree.

RESULTS

To test the statistical hypotheses associated with propositions one to four the following were employed - Hotelling’s t^2 , parametric one sample and paired sample t-tests and non-parametric Wilcoxon signed-rank tests. Because there were multiple dependent variables associated with propositions two to four the multivariate Hotelling’s t^2 test was employed. Hotelling’s t^2 is the statistical test of significance for between-group differences in mean score profiles (Dillon and Goldstein 1984). This test was considered appropriate as it controls for family-wise error and the associated likelihood of a Type one error occurring. If the test revealed a significant result, subsequent statistical tests (both parametric and non-parametric) were carried out on the individual dependent variables within each hypothesis to analysis

the nature of the significant result. The non-parametric Wilcoxon signed-rank tests were conducted for all hypotheses. The parametric one sample t-test was used for propositions one, three and four and the parametric paired sample t-test was used for proposition two.

Both parametric and non-parametric statistical testing was used for two reasons. Firstly, the likert scale employed in this study has only rank meaning with the output classified as ordinal data, consequently the use of non-parametric statistical methods is more appropriate (Cooper and Emory 1995). However, to allow comparison with McGowan's (1998) findings parametric statistical methods were also used.

The assumption of normally distributed data necessary for using parametric statistical procedures was met for testing propositions two to four, but was not met for proposition one. Care must therefore be exercised when interpreting the one sample t-test result of proposition one. However, the Wilcoxon ranked-sign test which was also employed makes no assumption regarding the distribution patterns of the variables and can therefore be more appropriately relied upon.

Proposition One - User Attitude

This proposition suggested respondents would have a positive attitude towards the implementation of an ABC system. The result of the one sample t-test reveals that there is a statistically significant difference between the mean score (1.83, Std Dev = 0.1796) and the test value of three ($t = -13.100$, $p < 0.001$). The negative t value indicates that the difference lies below neutral (i.e. 1 = strongly favourable, 2 = favourable). This is supported by the non-parametric Wilcoxon signed-rank test ($Z = -6.599$, $p < .001$). The results suggest that users report positive attitudes towards the ABC system in mature sites, thus supporting Proposition One.

Proposition Two - Technical Characteristics

Proposition two suggested that the information provided by the ABC system is more accurate, accessible, reliable, timely and understandable than that produced by a traditional cost system. The result of the multivariate Hotelling's T^2 test ($F = 7.52$, $p < 0.001$) revealed that there was a significant difference between the mean ratings of the ABC and traditional cost information system. To analyze the nature of the difference, paired sample t-tests and Wilcoxon signed-rank tests were conducted. The results presented in Table 2 revealed that there were significant differences in ratings of all five technical characteristics. Specifically, the results provide evidence that users perceive the information produced by the ABC system to be technically superior to that produced by a traditional cost system. This result was also supported by the non-parametric Wilcoxon signed rank tests (accuracy: $Z = -4.889$, $p < .001$; accessibility: $Z = -3.984$, $p < .001$; reliability: $Z = -4.36$, $p < .001$; timeliness: $Z = -4.598$, $p < .001$; understandability: $Z = -4.093$, $p < .001$). Proposition Two is therefore supported.

[INSERT TABLE 2 HERE]

Proposition Three - Perceived Usefulness in Improving Job Performance

This proposition examined, across ten dimensions, the perceived usefulness of ABC information in improving user job performance. The multivariate Hotelling's T^2 test results ($F = 6.5075$, $p < .0001$) revealed there was a significant difference between the mean ratings of the ten dimensions and the test value of three. To investigate further the constitution of the difference, parametric one-sample t-tests and non-parametric Wilcoxon signed-rank tests were conducted. Table 3 presents the results for the ten dimensions, which show that there were significant differences across all ten dimensions, confirming that the respondents perceived the ABC system to be more useful in improving their job performance than a traditional cost system, thus supporting Proposition Three.

[INSERT TABLE 3 HERE]

Proposition Four - Impact on Organisational Processes

Proposition four examined the perceived improvement in organisational processes due to the implementation of the ABC system compared with a traditional cost system. The Hotelling's t^2 test statistic ($F = 6.5075$, $p < .0001$) was significant. Once again, to investigate the nature of the significance, parametric one-sample t-tests and non-parametric Wilcoxon signed-rank tests were performed. The results presented in Table 4 reveal that the significance was across all six dimensions, consequently supporting Proposition Four.

[INSERT TABLE 4 HERE]

Overall the results obtained were similar to, but stronger than, those found by McGowan's (1998) US study. It is suggested that this could be a function of ABC system maturity, which would support the findings of Swenson (1995) and Krumwiede (1998). Once an ABC system has been fully implemented and users are familiar with it, they are better able to utilize it and better able to make informed judgments concerning its attributes. Also, because mature installations would have experienced both the costs and the benefits of ABC, they would be in a more informed position to make overall cost/benefit judgments in relation to its implementation. It is suggested that "earlier than mature" sites would have experienced more of the ABC implementation costs than the benefits, and consequently would report less positive attitudes and opinions.

DISCUSSION

We set out to examine whether ABC implementation in mature sites were perceived as being a success. The results indicate that users do perceive their ABC implementation as successful. This finding is a key contribution to the ABC literature as it suggests that the low adoption rates are not the result of a perceived lack of success of ABC in practice.

Further we highlighted the need to segment the stage of ABC adoption when researching success by examining sites at ABC maturity. Past researchers (Baird et al, 2004; Krumwiede, 1998; Gosselin, 1997) have been critical of studies that have confounded the ABC implementation stages. More generally, this should be a consideration for any study examining a new system implementation.

This study also addresses a need for more “systematic analysis of what better means, how better should be measured, and what challenges are encountered in making these measurements” in relation to ABC (Foster and Young 1997, 68). The concept of success itself is ‘in the eye of the beholder’. Indeed, Larsen and Myers (1999), when studying business process reengineering and the adoption of an enterprise resource planning system, found that success is a moving target. It changed based on who you asked and at what time you asked. The lesson here is to clearly articulate the success measure to ensure comparability with other studies and therefore help advance theory.

This research highlighted that perceived success (or lack thereof) is not a determinant of low ABC adoption. The question now is why then were there such low reported ABC implementation rates. Baird et al. (2004) subsequently found much higher ABC implementation rates (78%) in their study. They suggested that one explanation for the earlier findings of low implementation rates were due to the ‘accounting lag’. However, they argued that reported low implementation rates may also have been found in earlier studies because they had not distinguished between the different levels or degrees of implementation. The study reported here, however, was based on only one level of implementation being fully implemented “mature” ABC sites, and therefore we suggest “accounting lag” is more likely the reason for subsequent increases in reported ABC implementation rates.

Cagwin and Bouwman (2002, p. 3) state “there is some evidence that previously used measures of ABC success ... are predictors of improvement in financial performance”. This may support the accounting lag explanation that while only users perceived ABC as a success, evidence of that in the form of improved financial performance did not result until a number of years later.

An alternative explanation of the low level of implementation is the mediating effects other world class manufacturing practices have on success in combination with ABC. This is supported by other research findings that show a relationship between ABC and enterprise resource planning systems (Baxendale and Jama, 2003), balanced scorecard (Theriou, Theriou and Papadopoulos, 2007), customer profitability analysis (Kuchta and Troska, 2007) and total cost of ownership (Wouters, Anderson and Wynstra, 2005).

Limitations of this study include the inability to randomly distribute the questionnaire to a large sample of ABC system users. The use of senior managers to distribute the questionnaire posed a threat, however the assurance of respondent anonymity (through the use of reply-paid envelopes returned direct to the researcher, and other measures) reduced this risk. Tests for non-response bias were carried out, the results providing no evidence of such bias. While the usable sample size (65) was not large, it was comparable with those of a number of other studies including McGowan (1998), and canvassed a sufficiently large number of organizations and sites (30).

Despite these limitations, this research has important implications for both management accountants and management in general. Given that users of ABC do consider it a success it follows that the information retrieved from the ABC system is better able to be used to improve organisation performance. Therefore, the attributes of ABC do warrant consideration by managers and accountants in this globally competitive, product diverse environment.

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FOOTNOTES (to be inserted as indicated by the superscripts in the manuscript)

¹ Note: Activity Based Costing (ABC) and Activity Based Cost Management (ABCM) have technically different meanings, however for the purposes of this paper no distinction between these terms is necessary or made, both being referred to under the umbrella term Activity Based Costing (ABC)

² McGowan (1998) reversed the scale in data analysis, which had the effect of a positive t-value.

Table 1: Demographic Data					
Respondents:			ABC Site: (65 managers from 30 sites)		
Supervisory Experience	Mean 14 years Range 3 – 40 years		No. of yrs ABC in use at site	Mean 5.6 years Range 1.2 – 17 years	
No. of employees supervised	Mean 42 employees Range 3 – 65 employees		No. of employees at site	Mean 810 employees Range 40 – 8200 employees	
Age	Under 35 11 36 – 45 21 46 – 55 27 Over 55 <u>6</u> Total 65		Industry	Manufacturing 14 Education 9 Local Government 9 TV Broadcasting 24 Health 4 Emergency Management 1 Agribusiness 3 Unspecified <u>1</u> Total 65	

Table 2: Results of Proposition Two - Technical Characteristics of Activity-Based and Traditional Cost System Information in Mature Sites

Variable	Variable Dimensions ^a	n	Trad.		ABC		t-value
			Mean	Std. Dev.	Mean	Std Dev.	
Technical Characteristics	Accuracy	60	3.26	0.96	2.20	0.65	-6.39***
	Accessibility	60	3.28	0.90	2.38	0.88	-4.87***
	Reliability	61	3.29	0.98	2.35	0.77	-5.44***
	Timeliness	59	3.47	0.95	2.45	0.91	-5.55***
	Understandability	60	3.28	1.05	2.31	0.92	-5.09***

^a Variable scaling (1 = extremely high, 5 = extremely low)

*** p<.001

Table 3: Results of Proposition Three - Perceived Usefulness of Activity-Based Information in Improving User Job Performance in Mature Sites

	n = 65			
Variable Dimensions ^a	Wilcoxon Signed Rank Test	One Sample t-test		
	Z ^b	Mean	Std. Dev.	t-value
Improvements in the quality of work	-4.77***	2.415	0.788	-5.978***
Greater control over work-related procedures	-5.668***	2.231	0.766	-8.098***
Accomplish tasks more quickly	-2.679***	2.738	1.050	-2.008*
Support for the critical aspects of the job	-6.009***	2.138	0.747	-9.293***
Increased job productivity	-4.503***	2.462	0.792	-5.4807***
Improved job performance	-5.064***	2.369	0.762	-6.676***
Accomplishing more work than under the old system	-2.007***	2.800	0.795	-2.029*
Enhanced effectiveness on the job	-5.4***	2.308	0.748	-7.458***
Makes it easier to do job	-3.973***	2.477	0.937	-4.4997***
Overall, I find ABC useful in my job	-6.025***	2.092	0.765	-9.567***

^a Variable scaling (1 = extremely high, 5 = extremely low)

*** p<.001, ** p<.01, * p<.05

Table 4: Results of Proposition Four - Organisational Processes in Mature ABC Sites

	n = 65			
Variable Dimensions ^a	Wilcoxon Signed Rank Test	One Sample t-test		
	Z ^b	Mean	Std. Dev.	t-value ^b
Quality of decisions	-6.626***	2.046	0.672	-11.452***
Efficiency and waste reduction	-5.671***	2.262	0.735	-8.103***
Innovation	-4.188***	2.508	0.813	-4.885***
Relationships across functions	-4.434***	2.400	0.915	-5.286***
Communications across functions	-4.712***	2.385	0.861	-5.766***
Overall focus on the goals of the entity	-4.632***	2.292	0.996	-5.730***

^a Variable scaling (1 =strongly agree, 5 = strongly disagree)

^b Test value (mean = 3)

*** p<.001, ** p<.01