

# What determines ABC success in mature sites?

**Suzanne Byrne**

*Faculty of Business, University of Southern Queensland*

Ph: 61746312790; Fax: 61746312625; Email: [byrnes@usq.edu.au](mailto:byrnes@usq.edu.au)

## **Abstract**

### *Purpose*

The purpose of this paper is to examine ABC success determinants in mature ABC sites.

### *Methodology*

The study surveys 65 managers of service and manufacturing organizations using ABC.

### *Findings*

The stepwise regression results indicate that top management support is the key determinant of ABC success in mature ABC sites.

### *Research Implications*

This research shows that top management support continues to be critical to ongoing ABC success. Past research has shown that top management support is critical in the early stages of ABC adoption (Shields and Young, 1989; Shields, 1995; Foster and Swenson, 1997) and if withdrawn is a major cause of ABC implementation failure (Cokins, 1999). Despite the technical benefits of ABC adoption the extent of change, the resource commitment and the management of conflict and power means that careful consideration of the determinants of success is crucial. Many researchers have examined this at initial implementation or have confounded their results by not distinguishing the stage of adoption. Very few have researched beyond the initial implementation to examine what factors continue to ensure ABC success once fully integrated. Other determinants examined were resource adequacy, education, performance improvement and reward link, competition intensity.

### *Practical Implications*

Practically any ABC adoption needs to secure top management support from inception through to routinisation and integration.

### *Originality/Value*

The novelty of this study is in the way ABC success is measured and that the sites examined are only mature adoption sites. By examining only "mature" ABC sites the differences in the stages of implementation are not confounded in the results.

## **Keywords**

activity based costing, ABC success, ABC determinants

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## **What determines ABC success in mature sites?**

### **1. Introduction**

Research in ABC over the last two decades has assessed the integrity of the ABC innovation (for example, Foster and Gupta, 1990; Noreen, 1991; Roth and Borthick, 1991; Banker and Johnson, 1993); its implementation and adoption rates (for example, Cooper and Kaplan, 1999; Armitage and Nicholson, 1993; Innes and Mitchell, 1995,1997; Malmi, 1997); and has tried to measure its success and to identify the factors that determine success (for example, Anderson, 1995; Shields, 1995; Foster and Swenson, 1997; Anderson and Young, 1999). Disappointingly, its link to profitability has been found to be uncertain (Bromwich and Bhimani, 1989; Gordon and Silvester, 1999) and there was discovery that ABC adoption had

been low (Gosselin, 1997).

There have been a number of factors put forward to explain low adoption rates or abandonment of the system. They include the neglect of issues of power and politics (Englund and Gerdin, 2008), the mismanagement of conflict (Chenhall, 2004); that ABC is an enabler of other improvement initiatives (Cagwin, 2005); that there is a time lag between implementation and benefits (Baird, Harrison and Reeve, 2004; 2007); that product diversity can be managed in ways other than with ABC such as through automated manufacturing technology (Abernathy, Lillis, Brownell and Carter, 2001) and that culture will influence its adoption and use (Baird, Harrison and Reeve, 2004; 2007). There was also a contra-view that activities don't cause costs but strategic decisions do (Piper and Walley, 1991; Malmi, 1997).

A further proposal is that adopter firms have not found it a success thus resulting in lower adoption by others. However, Kennedy and Affleck-Graves (2001) found that ABC adopter firms outperformed matched non-adopter firms on a range of market-based performance measures over a three year period. They concluded that the adoption of ABC significantly increased firm value. Innes and Mitchell (1995b) found that ABC was a major practical development in UK management accounting, and that once adopted, users indicated that the benefits of the system far outweighed the costs. In a laboratory experiment, Dearman and Shields (2001) found that subjects with activity-based costing content and structure knowledge had good judgment performance compared to those without the activity-based costing knowledge. So it seems that lack of ABC adopter success would not explain low adoption or abandonment.

This leads to the question of what determines ABC adoption success. Several researchers (for example, Shields, 1995; Shields and Young, 1989; Foster and Swenson, 1997) have conducted exploratory research investigating success determinants. The aim of this paper is to extend this research by examining factors previously found to impact on ABC success in mature ABC sites. The determination of ABC success has been subject to critical review with the suggestion that past findings are difficult to compare due to the stage of implementation not being clearly articulated in the research design. This study sets out specifically to simply examine the key determinants of ABC success according to users at mature ABC sites.

Krumwiede (1998) argues that Anderson's (1995) study of the early ABC implementation process at General Motors suggests a theory that success factors differ and vary in importance during the several stages of implementation. He concludes that if this is true then studies that pool firms at different stages may generate conflicting results. Anderson and Young (1999) found that there are significant differences in determinants of respondent's evaluation of ABC depending upon the ABC system maturity. It is therefore arguable that a more significant and less ambiguous stage to evaluate ABC is at system maturity (Swenson, 1995; Krumwiede, 1998).

Further, previous research has been conducted predominately in the manufacturing sector and predominantly using accounting managers or financial controllers as respondents. For example, Shields (1995), Foster and Swenson (1997), Gosselin (1997) and Baird et al.'s (2007) research were conducted using predominantly manufacturing firms and with predominantly financial controller respondents. In the cases where operational personnel were surveyed they were in the minority and their responses were not examined separately.

By specifically targeting only 'mature ABC sites' and only 'users' as respondents in the research design it is argued that confounding results will be minimised thus leading to a better understanding of associations. Shields (1995) suggests that the management accounting literature devotes limited attention to methodological issues and to the importance of replication and systematic extension of prior research.

The next section reviews the literature. This is followed by an outline of the research method and a report of the results. The discussion and conclusion are presented in the final section.

## **2. Literature Review**

Several studies have examined the determinants of ABC success. The research of Foster and Swenson (1997), Shields and Young (1989) and Shields (1995) provided the initial insight into the determinants of ABC success. Shields (1995) focused attention on behavioural and organisational variables at the individual, system and organizational levels. Shields (1995) argued that ABC is an administrative innovation (not just a technical innovation) and therefore focus on the behavioural and organizational contexts. Shields (1995) used stepwise regression to reduce 17 possible independent factors down to five variables of ABC success determinants. Foster and Swenson (1997) used these five success determinants to examine alternative approaches to measuring ABC success. These five key success determinants were the basis for determining the success determinants used in this study. They are top management support, adequacy of resources, continuous education, performance evaluation and reward link and competition intensity.

*Top management support:* Chenhall and Langfield-Smith (1998) surveying five manufacturing corporations found that top management support influenced the successful adoption of new management accounting innovations. The loss of top management support is seen to be a major cause of ABC implementation failure (Cokins, 1999). Top management support has been found to be critical to the initial success of ABC implementation in that top management can focus the resources, goals and strategies on initiatives they deem worthwhile (Shields and Young, 1989; Shields, 1995; Foster and Swenson, 1997; McGowan and Klammer, 1997). Gosselin (1997) suggested that when top managers commit to a new system they exert control to ensure its success. Top management support is also directly associated with local management involvement that is seen as important is garnering local union support (Anderson and Young, 1999). Baird et al. (2007) examining three different levels of activity management adoption found that top management support was crucial to all levels according to their financial controller respondents.

The notion of top management support is also linked to issues of power and politics. England and Gerdin (2008) illustrate that through the lens of power and politics successful and unsuccessful implementations can be explained. Whether it be resistance from one fraction or group (as in the case of Major and Hooper, 2005) or whether employees were concerned with their operations being visible and therefore subject to greater scrutiny of employers (as in the case of Malmi, 1997) or the positive where managers delighted in being involved and were encouraged by the extra attention to their operations (as in the case of Bhimani and Pigott, 1992). They conclude the political perspective by arguing that "support from management, unions and informal champions, training and linkage to rewards and strategies may prevent conflict from emerging in the first place" (p.157). Hoozee and Bruggeman (2010) also found that leadership and collective worker participation impact on ABC outcomes. This study proposes that top management support continues to be critical to users in a mature ABC site.

*Resource adequacy:* The adequacy of resources has been found to be crucial to user acceptance and success of the system at the ABC implementation stage (Shields and Young, 1989; Shields, 1995; Foster and Swenson, 1997). Limited resources, particularly employee's time and technological (computer) resources, are among the main barriers to ABC implementation and use (Cobb et al., 1993; Anderson, 1995; Booth and Giacobbe, 1999). Sufficient internal resources are desirable so that employees do not believe that an ABC initiative is pressuring them to do more without adequate support (Shields, 1995). Thus, resource adequacy will continue to determine ABC success at mature ABC sites.

*Continuous education:* Training provides a mechanism for employees to understand and accept ABC as well as to feel comfortable with it (Shields, 1995). After adoption of an ABC system, ongoing training becomes critical for firms wishing to move to higher stages of implementation, through integrating the system into their existing financial system (Krumwiede, 1998). Foster and Swenson (1997, p. 131) examined a proxy for continuous education but only captured the "type of training being provided for users of the ABC system" without details of the ongoing nature. Further training is needed to ensure efficient use of the information provided by the ABC system (McGowan and Klammer, 1997). Baird et al. (2007) also found that training had a significant and positive association with higher levels of activity management but not with lower levels. Given that this study is examining organizations that have full ABC adoption there is an expectation that continuous education will be a crucial ABC success determinant for users in an organization that has reached a mature ABC stage.

*Performance evaluation/Reward link:* Shields (1995) argued that success with ABC was most frequently associated with using ABC data for performance measurement. This is related to motivational theory. Argyris and Kaplan (1994) argued that a user's attitude toward the ABC system is affected by the belief that their reward is associated with successful implementation. Linkage of performance measurement and reward systems is argued to become critical for success at later stages of ABC implementation (Anderson, 1995). While McGowan and Klammer (1997) found only a weak relationship between ABC success and linkage to performance evaluation, Krumwiede (1998) suggests that they may have found a higher significance if the implementation levels had been segmented to separate the lower level (earlier) implementations from more advanced (integrated) ABC systems. Baird et al. (2007) also did not find any significant association with success and the link to performance evaluation and compensation. However, this may be due to the respondents being financial controllers rather than the operations personnel whose performance and therefore reward may have been more directly linked to the use of better cost information. It is argued that ABC success according to users in mature sites will be influenced through linkages of performance evaluation and reward systems.

*Competition Intensity:* Competition has long been cited as a major pressure for the adoption of a "better" cost system (Shields and Young, 1989; Shields 1995; Cokins, 1996; Foster and Swenson, 1997; Booth, 1997; Cooper and Kaplan, 1998). Changes in the external environment of service industries have forced many efficiency imperatives as, for example, banks and telecommunication organizations have faced extensive deregulation. Other examples include health and education industries which have been forced to accurately cost the services they provide, while even utility companies are now competing across geographic boundaries (Cooper and Kaplan, 1998) and local governments are turning to ABC in the hope of better costing systems to cope with the increasing competitive environmental changes (Hoban, 1995). Gosselin (1997) found that competitive strategy influenced the adoption of

new innovations as it sets the need for cost management information. Shields (1995) argued that with linkage to competitive strategy, performance evaluation and compensation are important in motivating and rewarding employees to appropriately focus on ABC information to improve their firms' competitive position. Following from the above, the intensity of competition will in part determine ABC success in mature sites.

Following from the discussion above it is hypothesized that these determinants, singly and together, act as determinants of the success of the ABC system. The formal hypotheses is

**H1: Top management support, resource adequacy, performance evaluation/reward link, continuous education and competition intensity are determinants of ABC system success in mature ABC adoption sites.**

## **2. Research Method**

The study employed a survey-based method in late 2000 using a questionnaire to investigate the determinants and successfulness of ABC systems in Australian firms. Sampling involved identifying ABC adopter firms by contacting consulting and software firms, scanning professional and academic literature and through discussions with known academic experts in the ABC field. This approach was necessary as there was no readily available source for such a purpose. Although Baird et al. (2007) used the Kompass Australia database to randomly select financial controllers in firms in Australia to assess levels of activity management it was not appropriate for this study. Given the focus on methodological issues it was important to ensure that the sites had adopted full ABC and was at a mature stage of use. Seventy-seven ABC sites were identified.

To conform to the study's purpose it was necessary to distinguish ABC firms that had moved beyond implementation to a stage of maturity. This purpose was important for a number of reasons. Firstly, to advance our understanding of ABC success as previous research examining ABC have tended to concentrate on the implementation stage (Shields and Young, 1989; Shields, 1995; Foster and Swenson, 1997; McGowan and Klammer, 1997; McGowan, 1998). Secondly, criticism of past research has revealed that studies failing to identify the different ABC stages have not only promoted heterogeneity within the sample but have also lead to conflicting research results (Krumwiede, 1998). Krumwiede (1998) argued that the acceptance, use and benefits of an ABC system would differ significantly at the various stages. Thirdly, evidence exists to suggest that adopters of an ABC system are unable to judge the effectiveness of the system in the early stages of implementation (Clarke and Mia, 1995).

In this study the ABC users must be using the information for decision making, and consider it to be a normal part of their information system. This criterion for judging maturity was based on the definition of the various stages put forward by Krumwiede (1998, p.243). Krumwiede (1998) suggests that ABC systems change with the needs of the firm and adoption lies on a continuum between acceptance, routinisation and integration. Upon initial contact questions were asked of the senior manager regarding their stage of adoption and that specifically the firm had moved beyond the acceptance stage, and was at the more mature stage where the ABC information was commonly used in their job performance. It was important that the initial senior manager contacted judged their stage of maturity rather than artificially applying a time-in-use variable that may not capture their true stage of maturity. This is in keeping with the recognition that individual firms have different needs, resources and approaches towards the ABC system and this will affect how quickly or slowly the ABC system becomes routine and integrated.

Despite the above it was expected that the ABC system would have been in use for at least one year to be a part of the normal routine of the firm and to ensure that participants surveyed had sufficient experience to make the judgements necessary for this study. It is also acknowledged that past studies have recorded the ABC system time in use. Previous studies have suggested three years as a suitable time period for strategic and control systems to develop and influence operations (Simons, 1987; Chenhall, 1997). However Foster and Swenson (1998) argued that benefits from an ABC system start appearing in a relatively short time period after use commences and found no significant difference when testing for differences in user's perceptions of ABC benefits over time using a one year grouping criterion. So apart from the initial senior manager deciding on the ABC system maturity it was expected that the ABC system had been operating at maturity for at least one year.<sup>1</sup>

To select the final sample, a senior manager of each firm identified was contacted and asked: (a) if their firm had adopted ABC; (b) whether the ABC system was commonly used and considered a normal part of their information system; and (c) the time period ABC had been used. Twenty-eight firms were excluded because they either had rejected or abandoned the ABC system. A further four firms were excluded because they were in an early implementation stage or still involved in a pilot study of the system. Of the remaining 45 firms, 30 agreed to participate in the study. All firms participating in the study agreed that they were able to judge the effectiveness of their ABC system and were classified as "mature sites." The range of years ABC had been in use at the sample sites was 1.2 years to 17 years with an average of 5.6 years.

### 3.1 Questionnaire Distribution

The unit of analysis identified was the individual user of ABC information. The user must have knowledge of both an ABC system and a traditional cost system since he/she was asked to compare several attributes across the two cost systems. After fully explaining the research project and objectives, the senior manager involved in the initial discussion was the contact point for each firm and was asked to distribute the questionnaire to the appropriate activity-based cost information users. Financial preparers of the system were specifically excluded.

Therefore the sample was not strictly random, however was not influenced by the researchers. Notwithstanding, this does present a potential for bias. This limitation was deemed necessary to balance the considerations of time and cost of data collection and of the need to assure anonymity to encourage participation.

A total of 168 questionnaire packages<sup>2</sup>, including reply paid envelopes, were mailed to 44 sites<sup>3</sup> identified for the 30 individual firms participating. Follow up questionnaires were sent

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<sup>1</sup> To analyse the soundness of this decision an examination of the time-in-use variable was conducted by splitting the respondents into two groups representing those that had been using ABC for greater than one year and less than three years and those that had been using ABC for three years or more. For each of the ABC success variables used in this study (ie. attitude, technical characteristics, perceived usefulness and organisational process impact) respondents were grouped according to their ratings on the five point likert scale. The results of the Cramer's V analysis showed that there was no significant differences between those sites that had employed ABC for less than three years and those that had employed ABC for three years or greater. This provides some evidence that the one-year criterion employed in this study is appropriate.

<sup>2</sup> The number of questionnaires sent to each firm was determined by the researcher in consultation with the initial senior manager contact.

<sup>3</sup> Some firms had more than one 'site' location where the ABC system was used.

two weeks after the original mail out. To examine for non-response bias, the responses from the first 20 returns (30%) and those from the last 20 were compared to test if responses differed between the two groups. No significant difference was discovered between the two groups ( $p= 0.458$ ).

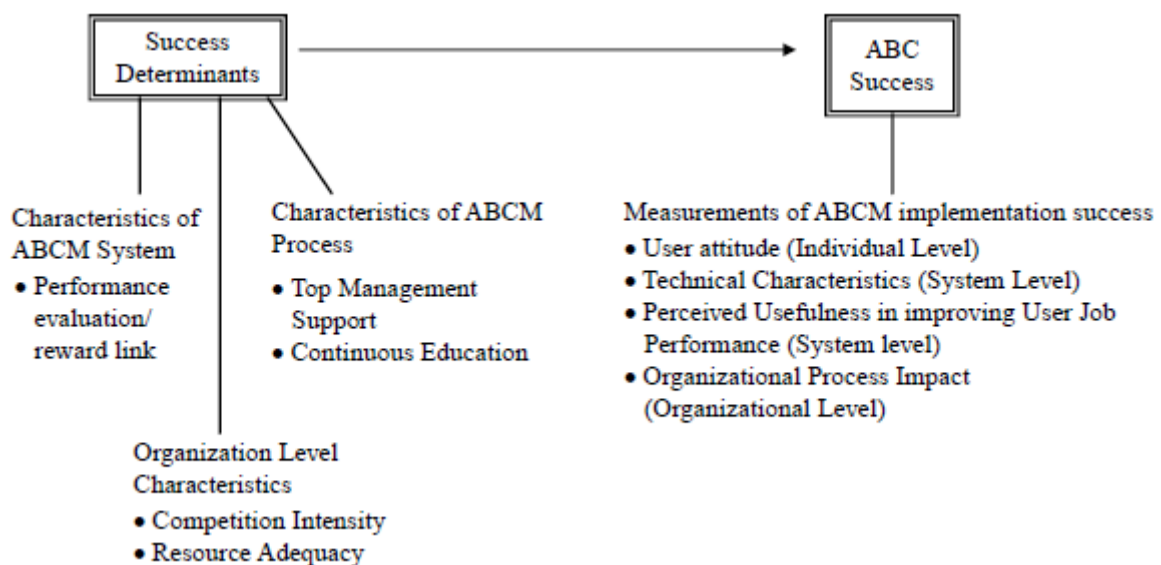
Sixty-seven responses were received giving a response rate of 39.88%. However, two were excluded because the respondent did not have actual knowledge of a traditional cost system with which to compare the firm's current system, thus leading to a final sample of 65 (38.7%). This offered support for the validity of the survey instrument in that subjects understood what was being asked. The final sample size was 65 useable questionnaires (useable response rate of 38.69%). This study has been specifically aimed at users of the system, since, preparers may have a positive bias toward the success of the ABC system (Krumwiede, 1998).

The industries of the thirty firms represented in the final useable sample (of 65 subjects) were manufacturing (14), education (9), local government (9), TV broadcasting (24), health (4), emergency management (1), agribusiness (3) and unspecified (1). Given the assurance of anonymity the responses received could not be traced back to an identified firm only the industry. The mean number of employees at the sample firms was 810 with a range of 40 to 8200. The average number of employees supervised by the respondents was 42 employees and the mean number of years of supervisory experience was 14 years.

### 3.2 Measures

The questionnaire was divided into two main parts that mirror the two major categories of variables in this study. The first category of variables relates to the determinants of ABC success and the second category relates to the measures of ABC success. Figure 1 displays the categories of success determinants and success measures.

Figure 1: ABC success determinants



### 3.2.1 ABC determinants

Five ABC success determinants focused on in this study are top management support, continuous training, resource adequacy, performance evaluation/reward link, and competition intensity. The first four determinants were drawn from research conducted by Foster and Swenson (1997), Shields and Young (1989) and Shields (1995). The fifth determinant, competition intensity, was developed through arguments put forward by Shields, (1995, 1997) and Pemberton et al. (1996).

To measure the five determinants, ten questions were used. The questions were either adopted from prior research or developed for this study. Table 1 presents each question's origin and indicates their number placement on the questionnaire. The questions were placed randomly to minimise the likelihood of bias. Two questions were utilised per determinant in an attempt to reduce the measurement error that could occur due to the reliance on a single response. All questions were measured on a five point likert scale anchored at 1 = very high and 5 = very low. The final measure was the average score of the two questions. To assess construct reliability item to item correlation coefficients were computed. Table 1 presents the results of this analysis, which according to the rule of thumb suggested by Hair et al. (1998) show that all correlation coefficients are greater than 0.3 and significant, thus supporting the reliability of the measures.

Table 1: Sources of ABC Success Determinants and Item to Item Pearson Correlation Coefficients

Determinant	Shields & Young, 1989	Shields, 1995	New	Item to Item Pearson Correlation Coefficients
Top Management Support	Q.1 & Q.5	Q.1 & Q.5		0.481**
Continuous Education	Q.7		Q.8	0.595**
Resource Adequacy		Q.10	Q.6	0.490**
Performance Evaluation/ Reward Link	Q.2 & Q.3	Q.3		0.606**
Competition Intensity			Q.4 & Q.9	0.587**

\*\* p<0.01

### 3.2.2 ABC

Following on from Anderson's (1995) argument that ABC success is multidimensional a composite measure of ABC success was used. This was to address a call for research on the development of better success measures (Shields, 1995) and to explore further the use of a composite measure as introduced by Foster and Swenson (1997). So although it is acknowledged that success could relate to increased profitability or shareholder value in this study it was more appropriate to use a success measure that captured the many dimensions that previous researchers have argued are relevant in a costing environment.

The variables used in this study in the composite measure of ABC success were user attitude, technical characteristics, perceived usefulness and improvement in organisational processes. These variables were chosen because they attempt to measure ABC success from an individual user's perspective. Previous research have either used an individual variable to



measure ABC success at this level of analysis thus resulting in an under-specification of the complex nature of ABC success or have used a composite score for success at a higher level of analysis. That is, examined ABC success from a wholistic organisation point of view using variables such as dollar improvements and top management evaluation as the components that comprise the composite score (Foster and Swenson, 1997).

The variables used in the composite ABC success measure were given an equal weighting in the final measure. The composite ABC success measure was the average of the final scores of user attitude, technical characteristics, perceived usefulness and organisational processes. Each of these variables are discussed in turn.

*User Attitude:* User attitude was chosen to be part of the composite measure as it is a good proxy for ABC success (Anderson, 1995; Shields, 1995; McGowan and Klammer, 1997; Krumwiede, 1998; McGowan, 1998). If users have a favourable (positive) attitude toward the system compared with an unfavourable (negative) attitude then the system implementation is successful. In line with previous studies, 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 favourable and 5 = strongly unfavourable. Descriptive statistics for user attitude are presented in Table 2.

*Technical Characteristics Rating:* The technical characteristics of the output of an information system have also been identified as important to users. High quality, accurate, relevant and accessible information are factors that are perceived to be useful in output information (Lucas, 1975; Fuerst and Cheney, 1982; Kraemer et al., 1993). The very reason for the advancement of ABC systems is their inherent technical superiority to that of traditional management accounting systems in the current competitive global environment. To measure technical characteristics in this study respondents were asked to rate their perception of the information produced by the ABC system on five technical characteristics. The five technical characteristics are accuracy, accessibility, reliability, timeliness, and understandability. This measure is similar to a measure adopted by McGowan (1998). A five point likert scale anchored at 1 = extremely high and 5 = extremely low was utilised. The final score was the average of the responses on the five technical characteristics, giving a score ranging from 1, representing an extremely high rating, to 5 representing an extremely low rating.

To assess the uni-dimensionality of the technical characteristics measure a factor analysis was performed. The factor analysis revealed one factor with an eigenvalue greater than one explaining 65.25% of the variance, thus confirming the uni-dimensionality and reliability of the measure. Cronbach’s alpha supported the above findings, yielding a value of 0.8599. Descriptive statistics for the technical characteristics rating are presented in Table 2.

Table 2: Descriptive Statistics

		Mean	Median	Std. Dev.	Actual Range		Theoretical Range	
					Min.	Max.	Min.	Max.
ABC Success Determinants (Independent Variables)	Top Management Support	2.60	2.5	0.98	1	4.5	1	5
	Continuous Education	2.85	3	0.90	1.5	5	1	5
	Resource Adequacy	2.79	3	0.94	1	5	1	5
	Performance Evaluation/Reward Link	2.94	3	1.33	1	5	1	5
	Competition Intensity	1.81	1.5	1.02	1	5	1	5
ABC Success Measures (Dependent Variable)	User Attitude	1.83	2	0.719	1	4	1	5
	Technical Characteristics	2.33		0.67	1	4.8	1	5
	Perceived Job Usefulness	2.4		0.62	1	4.4	1	5
	Organisational Processes	2.3		0.63	1	4	1	5
	<b>Composite ABC Success Measure</b>	<b>2.2</b>		<b>0.52</b>	<b>1.21</b>	<b>3.63</b>	<b>1</b>	<b>5</b>

*Perceived Usefulness in Improving User Job Performance:* This variable explored the usefulness of the ABC system compared with a traditional system in improving the user's job performance. The importance of the user's perception of the information output being useful in the performance of the user's job is an important aspect to judging ABC success. The information may be technically accurate, reliable and timely and yet not useful in the performance of one's job. Perceived usefulness in improving user job performance 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 based on Davis (1989, 1994) and supported by Adams and Nelson (1992) and McGowan (1998).

The final score was the average of the responses on each dimension. A factor analysis was conducted to assess the measure's dimensionality. One factor with an eigenvalue greater than one was extracted that explained 58.352 percent of the variance. In addition a Cronbach Alpha of .917 supported the reliability of the measure. Descriptive statistics for the perceived usefulness in improving user job performance rating are presented in Table 2.

*Impact on Organisational Processes:* The final variable included in the composite ABC success measure examined the perceived improvements that the adoption of an ABC system has had on various organisational processes. The organisational processes were 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. It was important to include in the composite ABC success measure a variable that captured the impact that the adoption of the ABC system had on organisational processes. One of the espoused benefits of an ABC system is its identification of activities. These activities can then be scrutinised and assessed as value or non-value adding, with the non-value adding activities

being discarded or at least significantly reduced. It was therefore important to include in a measure of ABC success the benefits that the adopted system could introduce.

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. The final score was obtained by calculating the average of the responses on the five dimensions. Thus the theoretical range was one, representing improvements in organisational processes, to five representing a deterioration in organisational processes.

A factor analysis was conducted and showed that only one factor with an eigenvalue greater than one was extracted. This factor explained 57.95% of the variance. The reliability was assessed by computing a Cronbach Alpha. This revealed a satisfactory result of .8508. Descriptive statistics for the improvements in organisational processes rating are presented in Table 2.

As indicated earlier the final composite measure of ABC success was the average final scores of the variables described above of user attitude, technical characteristics, perceived usefulness in improving user job performance and improvements in organisational processes. This method ensured that each variable was given an equal weighting in the final score. To assess the unidimensionality of the composite score a factor analysis was conducted. The analysis extracted only one factor with an eigenvalue greater than one capturing 60.4% of the variance. A Cronbach Alpha score of .7798 confirmed the reliability of the composite measure. Although we have utilised measures that capture various facets of ABC success, the composite score is unidimensional. This result illustrates that the approach has been successful at capturing the complexity of ABC success while maintaining parsimony. That is, the richness of the ABC success concept has not been compromised for the sake of obtaining only one variable for the purpose of statistical regression analysis and to reduce measurement error.

#### **4. Analysis and Results**

The hypothesis explores five determinants of ABC success. The determinants measured are top management support, resource adequacy, continuous education, performance evaluation/reward link and competition intensity. Table 2 presents the descriptive statistics.

To test the hypothesis a stepwise regression was performed. Stepwise regression allows a sequential approach to variable selection that considers all variables for inclusion or elimination prior to developing the model (Hair, et al., 1995). This technique was chosen to reduce specification error<sup>4</sup> and eliminate the possibility of reducing the statistical significance of the overall model due to unnecessary predictor variables. The assumptions relevant to multiple regression (normality, linearity, homocedasticity and independence) were tested by the examination of residual scatterplots. No problems were evident.

Prior to performing the stepwise regression an examination of the association of the individual determinants with ABC success was undertaken. The correlation matrix presented in Table 3 shows that Top Management Support, Continuous Education and Resource Adequacy are significantly correlated with ABC success. Performance/reward measure and competition intensity did not have a significant correlation with ABC success. Further

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<sup>4</sup> Specification error is the inclusion of irrelevant variables or the omission of relevant variables.

bivariate analyses presented in Table 4 also reveals that there is no significant associations between Performance Evaluation/Reward Link and Competition Intensity. Given this lack of association, these two variables were therefore not included in the stepwise regression (Hair, et. Al., 1995).

Table 3: Correlation Matrix of ABC Success Determinants

	Top Management Support	Resource Adequacy	Continuous Education	Performance Evaluation/Reward Link	Competition Intensity	Composite ABC Success Measure
Top Management Support	1.000					
Resource Adequacy	.413**	1.000				
Continuous Education	.437**	.431**	1.000			
Performance Evaluation/Reward Link	.305*	.285*	.262*	1.000		
Competition Intensity	.317*	.266*	.273*	.281*	1.000	
Composite ABC Success Measure	.393**	.310*	.286*	.175	.199	1.000

\*\* p<0.01, \* p<0.05

Table 4: Simple Regression of Individual Success Determinants on ABC Success

	B	Std. Error	Beta	t	Significance
<b>Top Management Support</b>					
Constant	1.669	.176		9.495	.000
T.M.S.	.204	.063	.393	3.227	.002
R <sup>2</sup> = 0.154; F = 10.413; p = .002					
<b>Continuous Education</b>					
Constant	1.748	.210		8.333	.000
C. E.	.160	.071	.286	2.258	.028
R <sup>2</sup> = 0.082; F = 5.097; p = .028					
<b>Resource Adequacy</b>					
Constant	1.693	.216		7.842	.000
R. A.	.181	.074	.310	2.458	.017
R <sup>2</sup> = 0.096; F = 6.040; p = .017					
<b>Performance Evaluation / Reward Link</b>					
Constant	2.003	.160		12.505	.000
P.E./R.L.	6.704E-02	.050	.175	1.345	.184
R <sup>2</sup> = 0.031; F = 1.809; p = .184					
<b>Competition Intensity</b>					
Constant	2.020	.134		15.041	.000
C.I.	.102	.066	.199	1.533	.131
R <sup>2</sup> = .04; F = 2.350; p = .131					

Table 5 : Stepwise regression of ABCM success determinants on ABC success

<i>Model</i>	<i>Sum of squares</i>	<i>df</i>	<i>Mean square</i>	<i>F</i>	<i>Significance</i>			
Regression	2.429	1	2.429	10.413	0.002			
Residual	13.294	57	0.233					
Total	15.723	58						
$R^2 = 0.154; R^2 \text{ adj.} = 0.140$								
<i>Variables</i>	<i>Coefficient</i>	<i>Variables in equation</i>			<i>Variables not in equation</i>			
		<i>SE of coefficient</i>	$\beta$	t-value	<i>Sig.</i>	<i>Partial correlation</i>	<i>sign.</i>	t-value
Constant	1.669	0.176		9.495	0.000			
Top management support	0.204	0.063	0.393	3.227	0.002			
Continuous education						0.138	0.301	1.043
Resource adequacy						0.140	0.294	1.060

Table 5 presents the results of the stepwise regression conducted.

The stepwise model developed above explains 15.4% of the variance in perceived ABC success, which is significant as indicated by the F-value of 10.413 ( $p < .01$ ). The results provide partial support for the hypothesis. Top management support was the only determinant that explained a significant variation in ABC success. The positive t value suggests that as top management support increases so does ABC success. This supports Cokins (1999) who argued that the loss of top management support is seen to be as major cause of ABC implementation failure. Shields and Young (1989), Shields (1995), Foster and Swenson (1997), McGowan and Klammer (1997), Chenhall and Langfield-Smith (1998) and Englund and Gerdin (2008) found that top management support was critical to the success of an ABC system in the initial implementation stages. Continuous education and resource adequacy were also significant determinants on ABC success when tested independently. However, in the stepwise regression the variability explained of ABC success relative to top management support became insignificant.

## 5. Discussion and Conclusion

The purpose of this study was to examine the determinants of ABC success in mature ABC sites in Australia. Results show that top management support continues to be critical to ongoing ABC success according to users of the ABC system. This is consistent with the findings of previous research that have examined top management support in early stages of ABC implementation (Foster and Swenson, 1997; McGowen and Klammer, 1997) and of financial controllers (Baird et al., 2007). However, surprisingly other ABC success determinants found important at the early adoption stage were not associated with perceived success at a more mature stage of adoption. Several researchers (for example, Krumwiede, 1998; Anderson and Young, 1999; Swenson, 1995) argued for the importance of distinguishing the various stages of ABC implementation. This research provides support for this and the results suggest that ABC success determinants differ upon initial implementation and later maturity.

Anderson and Young (1999) also found differences in their models between mature ABC systems and recently implemented ABC systems relating to the use of ABC data. They found

that for mature ABC systems use depends on management support and the reward environment whereas for early implementation the use was tied to the ABC development team. Cooper et al. (1992) concluded that based on their study of 8 implementations, top management sponsorship was a key success determinant. The result is indirectly supported by Gosselin's finding that firms adopting the full ABC system tend to be more formal and mechanistic (rather than informal and organic). Given the cost of implementing an ABC system it seems that a more formal approach with top management support would be warranted.

Shields (1995) in a survey of firms using ABC found that generally there was top management support for ABC; it was a stand-alone canned software system; that training was provided in implementation but not necessarily in use; and there was not a strong link to performance evaluation and reward systems. However, when testing independently the association of behavioural and organisational variables with success they found support for top management support; linkage to competitive strategies; linkage to performance evaluation and compensation; training; non-accounting ownership and adequate resources. Another explanation for the difference in the findings is the participants in the research. This research surveyed users of the ABC information. Assessing the extent of success from a user perspective is important given that ultimately the system was adopted to give them better information for decision making. Foster and Swenson (1987) found no differences in the results of determinants on success of their total sample and the sub-sample of finance/accounting personnel. The significance of the determinants on success from their sample of operating managers was lower. However, their sample of operating managers was only twenty percent of the total sample.

In addition, the main body of respondents in this study were predominantly from service industries in contrast to the respondents for Shields and Young (1989), Anderson (1995), Shields (1995), Foster and Swenson (1997), McGowan and Klammer (1997), Krumwiede (1998) and McGowan (1998) who studied mainly manufacturing firms. Also, this study included respondents from 30 organisations. Past research has collected data from a limited number of organisations.

There are some limitations that need to be acknowledged. Firstly, the framework is simplistic and is examined only in mature ABC sites. This focus was necessarily narrow to add meaningfully to explanations of ABC success determinants. Secondly, caution must be advised in generalising the results due to the inability of this study to randomly distribute the questionnaire to users of ABC systems. However, canvassing a larger number of sites allowed greater external validity and generalisability. Finally, cross sectional studies do not provide confirmatory evidence of causality.

Despite these limitations, the study does provide evidence about the prominence of top management support as a key determinant of ABC success in mature sites. This aligns with Bhimani and Pigott (1992) and Englund and Gerdin (2008) who suggest that support from management for the ABC system may be crucial to minimise conflict (between management, employees and unions) in ABC sites and that it helps direct management attention to operational issues thus providing some satisfaction to operational workers about their significance in the organisation. Future research could explore these issues further too fully understand the 'why' of top management support especially given that resource adequacy did not have a strong association with user perception of ABC success. Obviously, top management support is needed to ensure adequate resources and could withdraw them at any

time thus affecting success. However, top management support is needed for more than just the provision of resources. Hoozee and Bruggeman (2010) suggest that leadership style of operational managers did impact on the achievement of operational improvements.

Future research could also place particular emphasis on how organisational culture, competitive strategy, learning and incentives provide a context in which employees decide which innovation will be adopted (Shields, 1995). While the sample subjects involved in this project came from a diverse industry background, this paper did not focus attention on some organisational and individual variables. Future research could advance the knowledge of ABC success by investigating the differences in ABC implementation and success and other organisational, environmental and individual level variables. These differences may occur through such variables as competitive climate, culture or government supervision and subsidy of some service industry groups. These variables could also be investigated to understand why some managers, although having considered ABC adoption, rejected its use in their firm.

## **Appendix One**

### **Part A: Perceived Usefulness in Improving User Job Performance**

- 1 The ABC system has led to significant improvement in the quality of my work.
- 2 The ABC system has allowed me more control over work related procedures.
- 3 The ABC system enables me to accomplish more tasks more quickly.
- 4 The ABC system supports the critical aspects of my job.
- 5 5 The ABC system has lead to greater job productivity.
- 6 Using the ABC system improves my job performance.
- 7 With the implementation of ABC, I accomplish more work than I did before.
- 8 The ABC system enhances my effectiveness on the job.
- 9 The ABC system makes it easier to do my job.
- 10 Overall, I find the ABC system useful in my job.

### **Part B: Impact on Organizational Processes**

The ABC system has resulted in improvements in:

- 1 The quality of decisions
- 2 Efficiency and waste reduction
- 3 Innovation
- 4 Relationships across functions
- 5 Communications across functions
- 6 Overall focus on the goals of the entity

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