

An Analysis of the Factors Influencing the Adoption of Activity Based Costing (ABC) in the Financial Sector in Jamaica

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ABSTRACT

Financial institutions are increasingly operating in a highly competitively environment and therefore cost management has become an imperative. This paper investigates the factors influencing the adoption of activity-based costing (ABC) methodology within the financial sector in Jamaica. Qualitative analysis was done using the generalized linear logistic regression model. The results show that there are three main factors that are statistically significant in the decision to implement an ABC system, these are: companies perception of the ability of ABC to assist in cost control, the proportion of overhead to total cost and finally, the action of competitors, that is, whether a competitor adopts the ABC methodology

1. Introduction

The last two decades have seen substantial changes in the service sector. This has resulted from the emergence of competition and deregulation which has given companies greater freedom in setting prices and determining the mix of products they offer. Well-managed service companies with a good understanding of their market, customers and information technologies can become more profitable in a deregulated and competitive environment (Maiyaki, 2011).

Today's business landscape is very competitive and the financial services industry is subjected to increasing regulatory costs. Now more than any point in the last couple of decades it is vital that an organization clearly understand its cost structure to ensure that it is effectively managing those expenses so as to maintain a competitive position in the market (Pieper, 2011).

Traditional volume-based cost management system has been the subject of much criticism (McGowan, 1998). It is argued that traditional volume-based cost systems fail to produce timely and useful information, and most importantly do not respond to the needs of decision makers in the new competitive environment (Johnson and Kaplan, 1987). Therefore, in an attempt to alleviate the problems caused by the mismatch between traditional cost accounting systems and the modern business environment, a significant number of companies are implementing activity-based cost management (ABCM) systems, which trace financial and operating information to significant activities of the firm and use this information to focus efforts to achieve enterprise excellence (McGowan, 1998).

Conventional cost accounting systems, which emphasize inventory valuation, have neglected the huge investment and expenses in an organization's service functions. The conventional system cannot accurately assign the costs of non-volume-related overhead activities. Assigning overhead costs by using only volume as a basis can supply management with an incorrect picture of how costs are established (Maiyaki, 2011). Similarly, products cost can be distorted if the non-volume related overhead costs are a significant proportion of total overhead costs. The solution to this problem in service firms, as well as manufacturing firms, is to implement activity based cost management (Hussain and Gunasekaran, 2001).

It should be noted that management accounting in banking institutions was introduced considerably later in comparison with companies in other sectors. This was due, on the one hand, to external causes for example, it was not until the 1980's that competitive conditions in the banking sector fostered the development of accounting management planning and control systems. On the other hand, there were internal conditions that had to do with the nature of the banking business and the operations of these companies which differ

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from those of other sectors. This prevented the transfer of models that had basically been developed for industrial companies to the financial sector (Carenys and Sales, 2008).

On an internal level, the point has been made that the characteristic features of the products and the production process of banks hinder the application of management accounting technique for example, the intermediation function they carry out, the problematic definition of output, given that there is no difference between the nature of the raw material obtained via the financial markets or deposit taking and the final product (loans) (Carenys and Sales, 2008).

Therefore, as a consequence of the growing competition in the banking sector and the reduction of financial margins, banking institutions have had to give increasingly greater importance to the planning and control of their non-financial costs, which has opened up the debate concerning the adequacy of costs systems currently in use in these companies (Scias, 1985; Kimball, 1993; Carmona, 1994).

This study therefore aims to examine the current cost management system operating within the financial sector in Jamaica with main emphasis on the banking sector. Importantly also the study seeks to determine the level of adoption of activity based costing (ABC) within the sector and also the factors that prevent or influence the implementation of ABC by companies within the banking sector.

1.1 Hypotheses

In an attempt to answer the research objective, the following hypotheses were posed:

- H1: Individuals perceive that the benefits of ABC do not justify the cost of implementing it
- H2: Individuals perceive that there is insufficient support from top management.
- H3: Individuals perceive that most of the costs in their organizations are fixed.
- H4: Individuals perceived that the control of overhead is already adequate.
- H5: Individuals perceive that ABC systems are too complex.
- H6: Individuals perceive that ABC is limited in its ability to explain cost variability.
- H7: Individuals perceive that their competitors have not introduced ABC.
- H8: Individuals perceive that ABC is limited in its ability to assist in cost control.
- H9: Individuals perceive that there is a lack of relevant employees' skill in designing an ABC system.
- H10: Individuals perceive that they do not have the information technology software to support an ABC system.
- H11: Individuals perceive that ABC is limited in its ability to generate more accurate costs for decision making.
- H12: Individuals perceive that they are fully satisfied with their current system.
- H13: Individuals perceive that most products or services consume similar quantities of resources so there is no need to implement an ABC system.
- H14: Individuals perceive that overheads are a small portion of total cost so there is no need for an ABC system.
- H15: Individuals perceive that there is resistance to change by the accounting division.
- H16: Individuals perceive that the relatively small size of their organizations does not justify implementing an ABC system.
- H17: Individuals perceive that ABC has never been considered because most of the accounting staff do not understand the concept.

2. Literature Review

2.1 Definition of Activity-Based Costing (ABC)

ABC is a new approach to cost analysis that was first presented in a formal structure by Robert Kaplan, Robin Cooper and Thomas Johnson in 1987 (Agbejule, 2000). Activity-based costing is defined as a costing methodology that measures the cost and performance of activities, resources and cost objects. Specifically, resources are assigned to cost objects based on their use. ABC recognizes the casual relationships of cost drivers to activities (Institute of Management Accountants, 1998).

The starting point for ABC is with the companies' products, it determines the activities used in the production and delivery of those products and compute the costs of various activities (Hughes and Gjerde, 2003). The costs of the activities used in the production of a product are then assigned to the product in a

manner that approximates a casual relationship. Therefore, advocates argue that ABC systems provide more useful information for cost management purposes than traditional costing systems do (Cardos and Pete, 2011).

These differences are significant for companies with large amount of overheads, multiple products and high product diversity. ABC is also defined as a system that allows organizations to track the costs associated with activities performed to produced products or to deliver services (Maiyaki, 2011).

2.2 ABC in Service Organizations

Research studies that have been done on the application of ABC system in respect of service organization so far are scanty to some extent. The main emphasis has been on ABC in manufacturing companies (Knock, 1995; Hussain and Gunasekaran, 2001).

The global competitive environment and the advances in information and communication technology have demonstrated clearly the deficiency of conventional management accounting system in providing useful information for managerial decision making in both service and manufacturing organizations (Hussain and Gunasekaran, 2001).

The shortcomings of conventional costing system in terms of relevance, consistency, validity and accuracy have increased the need for a modern management accounting system, thus, ABC can be used as a tool for planning, control and decision making in service management (Maiyaki, 2011).

Despite the application of traditional costing methods, ABC is applicable in sophisticated and unusual service systems. Although ABC was first developed in production organizations, the favourable results achieved inspired service organizations such as banks and other financial entities to adopt the methodology and useful positive results were subsequently achieved (Sarokolaei, Ebrati, Khanghah and Ebrati, 2012).

ABC system assists in calculating the cost of units, sections and deposits of banks exactly and correctly and hence creates more efficiency and effectiveness. This system (ABC) allows financial entities to achieve an accurate view of the profitability of the sections and their different services (Sarokolaei et al., 2012). Although costing system was developed in production industries, the need for the system is greater in banking industries because the products and services of the banks are more varied and they become complicated more and more everyday (Sarokolaei et al., 2012).

A study which examined the possibility of designing cost calculation model of bank deposits using ABC method in Refah Bank, Central Branch of Tehran in which costs were divided into two groups of direct and indirect costs and were appropriated based on the cost stimulants. A two-dimensional costing was used, in the first, the costs were appropriated to the activities and then they were appropriated from activities to deposits. The results showed that a significant difference will be created in cost of different services regarding the calculated figures or the expected ones if a one-dimensional costing system is used (Arab and Naseri, 2003).

The application of ABC in the service organization can be extended to the health sector. When ABC was used along with conventional costing system in a Turkish hospital to calculate the cost of a gall bladder surgery, the results showed that cost of the surgery using ABC was significantly different from that when conventional costing system is used. The conclusion was that ABC can provide more appropriate data and can help managers in analyzing the costs and thus better decision making about budgeting and strategic programming is possible (Yereli, 2009).

2.3 ABC in Banking

The ability to identify and understand your organization's "profit zones" is critical for any business that hopes to survive and grow in today's competitive environment. Without knowing where its profit comes from, that is from which products and from which customers and why it comes from there, a business will be unable to make the fact-based decisions required to succeed. Therefore without the ability to associate all of a bank's costs, both the cost of money and the cost of business activities with the various products it provides and customers it serves, a bank's management will be flying blind when making its most critical business decisions (Hicks, Olejniezak and Curell, 2009).

Commercial banks can be described as a combination of various activities. The theory of ABC states that products and services consume activities and activities consume resources. When the efficiency of activities is enhanced, the cost of a product or service will be decreased. When implementing an ABC system, activities will be divided into two parts, value-added activities and non-value-added activities. It is helpful for managers in banks to focus on eliminating the non-value-added activities by using this classification method. Therefore reducing the unnecessary resources waste by enhancing the efficiency of activities will improve banks' competitiveness (Xinjian and Shizhong, 2009).

Lustsik (2004), made the following point:

"In banking, the information received by means of the ABC technique is essential for a number of fields:

1. Bank service cost – based on this information banks service pricing decisions can be made, also economic consequences of providing specific client fee rates can be evaluated.
2. Bank service cost components – based on this information, cost-increasing components can be identified.
3. Efficiency of bank processes – by analyzing this information, decisions can be made in respect of processes related to bank products (overlapping of processes in different structural units, process inadequacy in certain fields, etc).
4. Input for profitability calculations – product costs calculated with the ABC methodology are applied. Information on product profitability is essential for making decisions on the issue of product vitality and usefulness from the view point of the bank. The knowledge of segment profitability guides the focus to profitable client groups of the bank, enables the evaluation of the profitability of clients in the client manager's portfolio and provides necessary information to segment managers for decision making".

Banks and manufacturing companies both have labour cost, equipment and facility costs; however the composition of costs is different. The "raw material" of banks is funds, and the cost of funds is interest. Economic cycle and macroeconomic management affect the magnitude of financial credit, thus the volume of services of banks fluctuates intensely (Xinjian and Shizhong, 2009).

A bank's cost includes interest costs, claims, overheads or sustaining costs and operational costs etc. While interest costs can be assigned to the relevant products and services directly, operating costs are first grouped by functional departments and then allocated to financial business. In traditional costing, the allocation of overhead or sustaining cost is not accurate. The allocation rates are designed subjectively. Adopting the ABC system would result in this kind of cost being assigned by resource drivers and activity drivers, thus the outcome is more relevant and accurate (Xinjian and Shizhong, 2009).

The application of traditional costing system in banking assumes that indirect costs are generated by production volume whilst ignoring the effects that the diversity and complexity of operations have on indirect costs (Kimball, 1997; Raihall and Hrechak, 1994; Helimi and Hind, 1996). However, as banking organizations develop initiatives to address the needs of the new competitive environment, the burden of indirect costs on their structure increases because the costs of market research, marketing, the introduction of new products, automization of transaction etc are rising (Carenys and Sales, 2008). In addition, the number of cost drivers that have been used to attribute indirect cost to cost object is small, which makes it difficult to determine the difference in the companies' diverse services, production processes as regards their use of resources (Raihall and Hrechak, 1994). Thus it is almost impossible for companies to trace costs and this makes it difficult to develop initiatives to improve their management.

Therefore, "a full" cost system that allocates indirect cost under a few headings based on business volume may be acceptable in industries that have relatively small proportion of indirect costs and where output is reasonable homogeneous. This is not advisable in multi-product industries with heterogeneous output which are difficult to measure and with a high percentage of indirect cost (Carenys and Sales, 2008).

2.4 ABC/ABM Implementation- What Do the Figures Show?

Despite the many advantages to be derive from the adoption of ABC and activity-based management (ABM), research show that the adoption of these techniques has been low in practice (Askarany and Yazdifar, 2007). Although there has been a growing awareness of ABC and ABM over the past decade, the overall rate of implementation has been low (Cohen, Venieris and Kaimenaki, 2005).

The implementation rates of ABC and ABM were low in both the USA and Europe in the early 1990s. Results show that in 1990 only 18% of the investigated companies had implemented ABC, while 58% of the respondents were considering the possibility of implementing ABC/ ABM. Results in Canada showed that 23% of surveyed companies implemented ABC/ABM, 18% were considering adopting and 4% indicated that they would adopt in the near future (Bescos, Cauvin and Gosselin, 2002).

The adoption rates in Europe were similar. Adoption rates in France and Belgium were about 20%, in Netherlands about 12%, while in other countries it was less than 10% (Clark, Hill and Stevens, 2002). In the early 1990s the adoption rates in the UK was as low as 10%, but few years later the same survey reported more companies adopting ABC, thus the adoption rate increased to 20% (Innes, Mitchell and Sinclair, 2000). Results from studies of German companies (services, insurances, banking, retail and manufacturing) showed that only 7% of companies reported using ABC as a stand-alone system, while 24% of respondents combined ABC with other costing systems (Friedl, Hammer, Pedell and Kupper, 2009).

Subsequent studies showed that adoption rates for Australia and Asia vary between 12% and 56%. While Japan had low adoption rates there was considerable interest regarding the possibility of adopting the methodology, while in India the adoption rates for ABC was between 20% - 23% (Cohen et al., 2005).

The global perspective on the ABC/AMB is explained in a study conducted by Cardos and Pete which stated that:

“In 2005 a dedicated team of professionals, Better Management Team, with business management experience conducted an empirical study among companies all over the world to determine the state of ABC and ABM. The respondents came from various industries like manufacturing, financial services, communication, consulting, IT, health care and public sector. The main conclusion of the study was that the implementation of ABC varies by industries. Companies that implemented and were actively using ABC/ABM are represented by communication (58%), financial services (46%), followed by the public sector (29%), manufacturing (24%) and other industries (32%) (Cardos and Pete, 2011).

In addition to those companies which adopted ABC, there are companies that consider ABC as a future objective and those do not consider adopting ABC (Bescos et al., 2002; Cohen et al., 2005). The main reasons for the rejection of ABC/ABM might be satisfaction with the existing traditional costing system, lack of management support and interest, an implementation process associated with high cost, consumption of time and resources (Cardos and Pete, 2011).

3. Methodology

3.1 Sample and Data Collection Procedures

The survey universe comprised of commercial banks, merchant banks and credit unions operating in Jamaica. Questionnaires were emailed to the 7 commercial banks, 4 responded which represents a response rate of 57%. Similarly, questionnaire were emailed to the three merchant banks, 2 responded which gives a response rate of 67%. There are 41 active credit unions, however a large number of these are small organizations employing less than 15 employees, therefore questionnaires were sent to the 20 largest credit unions (where size was determined based on the number of employees), 10 responses were received which is a response rate of 50%.

These response rates are comparable to those of similar studies. For example, the BAI (Bank Administration Institute) carried out a survey to determine which accounting and management control systems were being used by North American banks. BAI sent questionnaires to the 250 largest banks in the USA, and 40 banks responded for a response rate of 16% (Carenys and Sales, 2008). Similarly, in a survey carried out in the USA on the application of management accounting between banks and savings and loans associations, the 50 largest banks and the 20 largest savings and loans associations were selected and 70 questionnaire sent, 49 responses were received which gives a response rate of 70% (Gadner and Lammers, 1988). A postal survey carried out in order to determine to what extent the activity-based costing system was being used by financial institutions in UK. Questionnaires were sent to the 60 largest financial companies in UK and the response rate was 51.6% (Innes and Mitchell, 1997).

The survey instrument was emailed to key informants employed in the selected companies (example Financial Controllers and Accounting Managers). The aim of the survey was to determine the factors

affecting the adoption/implementation of activity-based costing within selected companies in the financial sector. A questionnaire was emailed to each potential respondent. Accompanying each questionnaire was a cover letter which explained the objectives of the study and also assured participants of the confidentiality of their responses. Non-respondents to the questionnaire were sent a second email two weeks after the first and where possible telephone calls were made to encourage responses.

Participants were asked to respond to a five-point Likert scale ranging from (1) strongly agree to (5) strongly disagree to factors they perceive as major determinants in influencing their decision not to implement an ABC system. The questionnaire addressed factors such as: the perceived benefits of ABC, insufficient support from management, the complexity of the ABC system, the cost of ABC system, the size of the company, among others.

Although the instrument was not pretested for this study, items included were derived from a previous well established instrument which was designed to address the perceived benefits of ABCM implementation (McGowan, 1998). The point has been made that items on previous instrument are normally tested at the time of their first use and therefore these items are normally reliable and valid indicators in other studies (Hyman, Lamb and Bulmer, 2006). Despite not being pretested, the instrument was reviewed by senior faculty members who had expertise in the areas under examination.

3.2 Model Specification

The determinants of the implementation of ABC in the financial sector were analyzed using logistic regression. The model specification is as follows: (Antwi and Zhao, 20121): the response variable in logistic regression is normally dichotomous which implies that the response variable can take the value 1 with a probability of success p , or the value 0 with probability of failure, $(1-p)$.

To explain the logistic regression, the logistic function $f(x)$ which describes the mathematical form on which the logistic model is based is shown to be:

$$f(Z) = \frac{1}{1 + e^{-z}} \quad (1)$$

Where Z denotes the values of this function, such that $-\infty \leq z \leq +\infty$. The relationship between the predictor and response variables is not a linear function in logistic regression, thus the logistic regression function is used which is the logit transformation of p .

Therefore to get the logistic model from the logistic function the Z is written as the linear sum.

$$Z = \alpha + \sum_{i=1}^k \beta_i x_i \quad (2)$$

Where x_i are independent variables of interest and α and β_i are constant terms representing unknown parameters and k is the last term. When (1) and (2) are combined the result is:

$$f(Z) = \frac{1}{1 + e^{-\{\alpha + \sum_{i=1}^k \beta_i x_i\}}}$$

Therefore for notational convenience the probability statement is denoted as simply $p(x)$ where x is a notation for the collection of variables x_i through x_k . Hence the logistic model can be written as:

$$f(X) = \frac{1}{1 + e^{-\{\alpha + \sum_{i=1}^k \beta_i x_i\}}} \quad (3)$$

Since the above logistic model is non-linear function, the logit transformation is used to make it linear.

$$\text{Logit}(X) = \ln_e \{p(x)/ 1-p(x)\}$$

$$\text{Where } P(x) = \frac{1}{1 + e^{-\{\alpha + \sum_{i=1}^k \beta_i x_i\}}}$$

This transformation allows one to compute a number, logit $p(x)$, for a subject with independent variables given by x .

$$\text{Logit } P(x) = \alpha + \sum_{i=1}^k \beta_i x_i$$

Therefore the logit of $p(x)$ simplifies to the linear sum. The quantity $p(x)$ divided by $1-p(x)$, whose log value gives the logit, describes the odds for a company not implementing activity based costing (ABC) with independent variables specified by x .

$$\frac{P(x)}{1 - P(x)} = \text{odds for individual } x.$$

The overall aim of logistic regression is to correctly predict the category of outcome for individual cases. Therefore a model is created that includes all predictor variables that are relevant in predicting the response variable. Therefore, for this study a company's decision not to implement ABC is a function of 17 variables. The following logistic regression model was fitted to the data.

$$\text{Logit}(P(y=1)) = \beta + \sum_{i=1}^{17} \beta_i x_i$$

3.3 Explanatory Variables

3.3.1 Dependent variables

The dependent variable for the logit model takes a value of 1 for companies that adopt ABC and 0 if they do not adopt ABC.

3.3.2 Independent variables

The independent variables in the logit model are:

- X_1 = perceive benefits
- X_2 = management support
- X_3 = cost structure
- X_4 = control of overhead
- X_5 = system complexity
- X_6 = explanation of cost
- X_7 = competitors action
- X_8 = ability to control cost
- X_9 = employee skill
- X_{10} = software availability
- X_{11} = accuracy of cost
- X_{12} = satisfaction with current system
- X_{13} = percentage of overhead to total cost
- X_{14} = pattern of overhead consumed
- X_{15} = employee resistance to change
- X_{16} = size of company
- X_{17} = unfamiliarity with ABC.

4. Results

Table 1 provides the Wald statistic, p-values and odds-ratios for the predictors (variables). It is noted that variables such as competitors' action, ABC's ability to control cost

Table 1: Logistic Regression Predicting Likelihood of not Adopting Activity-Based Costing

Variables	B	S.E.	Wald	df	P-Values	Odds Ratio
Benefits of ABC	0.594	0.502	1.401	1	0.237	1.012
Management support	-0.768	0.645	1.419	1	0.234	0.464
Cost structure	1.558	0.861	3.272	1	0.070	4.749
Control of overheads	0.788	0.708	1.238	1	0.266	2.200
System complexity	1.184	0.717	2.724	1	0.099	3.267
Cost variability	-1.250	0.752	2.760	1	0.097	0.287
Competitors' action	-1.899	0.931	4.157	1	0.041*	0.150
ABC controlling cost	2.094	0.998	4.406	1	0.036*	8.120
Absence of resources	-1.356	0.820	2.738	1	0.098	0.258
Software to support ABC	-0.077	0.513	0.023	1	0.880	0.926
ABC limitation	-0.895	0.841	1.133	1	0.287	0.409
Existing costing system	0.591	0.674	0.768	1	0.381	1.805
Percentage of overhead	-1.609	0.765	4.427	1	0.035*	0.200
Resource consumption	0.533	0.532	1.003	1	0.316	1.704
Resistance to change	1.281	0.773	2.744	1	0.098	3.601
Size of company	-0.757	0.569	1.769	1	0.184	0.469
Employees' ignorance	-1.411	0.804	3.081	1	0.079	0.244

* Significant at the 5 percent level

and percentage of overhead in total cost are significant at $\alpha = 0.05$, their respective p-values are 0.041, 0.036 and 0.035. The results also show that companies whose percentage of overhead is relatively small when compared to total operating cost are 0.20 times more likely not to implement ABC (p-value = 0.035). Similarly, the results show that the odds of not adopting ABC when a competing company has not implemented it (ABC) increase by a factor of 0.150 at 95% confidence interval. Predictors such as management support, cost structure, system complexity company size and perceive benefits from ABC are not statistically significant in the decision to implement an ABC system.

Table 2
 Assessing Model Fit using Hosmer and Lemeshow Test and Log Likelihood

- 2 Log Likelihood	Hosmer and Lemeshow Test		
36.571	Chi-square	df	Sig.
	4.287	7	0.746

Table 2 provides information to assess the goodness-of-fit test. The -2 Log Likelihood statistics, along with the Hosmer and Lemeshow test determine how well the model fit the data. In the case of the -2 Log Likelihood the aim is to get a coefficient as low as possible to show a good fit between the model and the observed data. A value below 100 normally indicates a good fit, however a value below 20 implies a very good fit, thus with a value of 36.571 it implies a good fit.

The Hosmer and Lemeshow Goodness-of-Fit test the null hypothesis that there is no difference between observed and model-predicted values. The null hypothesis therefore cannot be rejected given that the level of significance is 0.746. Therefore there is sufficient evidence to indicate that the hypothesized model fits the data well.

5. Discussion

The study provides evidence of the factors that influence the decision of financial institutions in adopting the activity-based costing methodology. It can be observed that the major factors which influence the decision of companies in adopting ABC are: the perception of the ability of ABC to assist in cost control (Hypothesis 8), the perception that competitors have not introduced ABC (Hypothesis 7) and the perception that over head is a small percentage of total cost (Hypothesis 14). This result therefore leads to a failure of rejecting of the remaining hypotheses. The model indicates that the perception of ABC's ability to

control cost contribute more than any other variable in companies' decision of whether to implement the ABC methodology.

The size of the company (defined in terms of number of employees) and management support were found not to be statistically significant in the decision to implement ABC. It would be interesting to get a better understanding as to why these factors were not statistically significant. The model results provide a basis which shows that the decision taken by companies to implement or not to implement an ABC methodology is a complex one that is driven by numerous variables.

An interesting observation is the analysis of the relative importance of the company's cost structure and the perception of the complexity of an ABC system in determining if one adopts the ABC methodology. The results show that the company's cost structure has a greater odds of influencing the ABC adoption decision than perception of the complexity of an ABC system.

6. Conclusion

This study provided the basis for an understanding of the factors that influence the decision of companies within the financial sector in deciding whether or not to implement an activity-based-costing methodology. A number of predictors were examined; however the main factors which influence the companies' decision were the action of competitors, the percentage of overhead to total cost and the perception ABC's ability to assist in cost control. Despite the potential benefits to be derived from the adoption of the ABC methodology, companies continued to employ the traditional costing methodology which is known for its inherent deficiencies. If companies are able to obtain a better understanding of the ability of ABC to identify and control cost this could be a starting point for a re-emergence of interest especially in developing countries.

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