

## FACTORS INFLUENCING ACTIVITY BASED COSTING (ABC) ADOPTION IN MANUFACTURING INDUSTRY

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### Abstract

In the 1980's much criticisms were raised regarding the ability of traditional cost accounting to provide relevant, timely, and accurate information to the management. During that period, ABC has emerged as one of the management accounting tools that recognizes such concern. Since then ABC has gained its popularity and has received substantial attention from various parties including the academicians, practitioners, and industries. ABC has also been studied from various perspectives for quite some time in many countries. Literatures are enriched with studies that have argued that the adoption of ABC benefits organizations. Unfortunately, studies have also found that the level of ABC adoption is still considered low. Many organizations still use the traditional cost accounting methods in dealing with overhead costs. This study investigates the status of ABC adoption among manufacturing organizations in Malaysia, and the factors influencing its adoption. Mail survey questionnaires were distributed to manufacturing organizations throughout the country using purposive judgment sampling. The questionnaires were directed to the accountants or heads of accounts of selected manufacturing organizations. The study found that ABC adoption in Malaysia is at infancy stage, with 36% adoption rate. The factors that influence ABC adoption are decision usefulness of accounting information, organization support, and internal measures of performance.

**Key words:** Activity Based Costing, adoption, decision, organization support, and internal measures.

**JEL Classification:** M41.

### Introduction

In today's business environment, organizations encounter various challenges that require them to adapt effectively in order to remain competitive. For instance, structure of product cost in many contemporary businesses had changed substantially with production and non-production overhead costs growing in relative size and importance. Direct labor, on the other hand, had shrunk dramatically due to increased automation. Despite these changes, traditional accounting system has remained unchanged throughout the period. In traditional cost accounting system, direct labor and machine hours have persisted as major bases of production overhead absorption by products. Both of these bases relate fairly closely to production volume and their use therefore rests on the assumption that overhead incurrence is output driven. In addition, the frequent attachment of non-production overheads to output in proportion to their production cost remains a widely used unitization method. The validity of this practice is questionable, as overhead incurrence may often bear no close relationship to their production cost.

In the 1980's much criticisms were raised regarding the ability of traditional costing to provide relevant, timely and accurate information to the management. According to Innes and Mitchell (1996), there should be a gradual alteration in the nature of production overhead cost to reflect predominantly costs, which are influenced by the diversity and complexity of output rather than simply by volume of output. There were also increasing concern for the need to employ an overhead costing approach, which more adequately reflects the cause-effect relationship between products and the consumption of the resources, which have been acquired by the organization through overhead expenditure. ABC has emerged during this period, to ensure that overhead cost utilization is achieved in such manner. Since then ABC has received substantial attention from

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various parties and many parts of the world. Studies that were conducted have shown that ABC benefits organizations and businesses. However, studies have also shown that ABC adoption remains low. Organizations tend to use traditional system for the purpose of overhead costing.

Taking this knowledge into consideration, this study investigates the status of ABC adoption among manufacturing organizations in Malaysia by classifying the organizations into adopters and non-adopters. The study also looks into the various factors derived from previous studies, to determine their influence on ABC adoption.

## Research Objectives

The general objective of this study is to increase understanding on ABC adoption in manufacturing organizations in Malaysia. Specifically, the objectives are as follows:

1. To estimate the percentage of ABC adoption among manufacturing organizations in Malaysia.
2. To investigate if certain factors (Cost, decision, IT, Top Management, Non-Accounting, Training, and Performance Measurement) have influence on ABC adoption.

## Literature Review

Kwon and Zmud (1987) adopted the organizational change theory to develop the IT implementation stage model. Instead of using the three-stage model (Freeze, Unfreeze, Refreeze) as proposed by Lewin (1952), the model describes IT innovation as a sequence of six stages; (1) initiation, (2) adoption, (3) adaptation, (4) acceptance, (5) routinization, and (6) infusion. It further suggested that success in achieving each stage is influenced by various factors. These factors are grouped into the followings: (1) individual characteristics, (2) organizational factors, (3) technological factors, (4) task characteristics, (5) external environment. The researchers argued that stage differentiation is not distinct, and the significance of the above factors might vary across stages.

Studies by Krumwiede (1998) Krumwiede and Roth (1999) illustrate the adaptation of Cooper and Zmud (1990) IT Stage model to the specifics of ABC. The first study divided ABC adoption and implementation into ten stages as follows: (1) not considered, (2) considering, (3) considered then rejected, (4) approved for implementation, (5) analysis, (6) getting acceptance, (7) implemented then abandoned, (8) acceptance, (9) routine, (10) integrated. She argued that while contextual factors may indicate that ABC adoption is appealing, implementation issues are more related to the organizational factors. Her studies looked into organizational factors after ABC adoption was made.

The second study divided the stages into the followings: (1) initiation, (2) adoption, (3) analysis, (4) action, (5) Activity Based Management (ABM). Initially, the organizations that face pressure to improve their costing system will consider a change from traditional costing system to ABC. The proponents of ABC will then campaign to get approval for ABC adoption. After the management granted their approval, an ABC team will determine the scope of the system and develop a model for implementation. They will seek acceptance from other parties that will be affected by the system. At this stage, there is a general consensus that ABC system provides better information to the organization as compared to the traditional system being used. Information generated from ABC system will then began to be used. ABC is perceived as a normal part of organization's information system. Finally its usage will lead to process improvement.

A study by Shields and Young (1989) developed a comprehensive theoretical model that is applicable to ABC based on the assumption that ABC is an administrative innovation in organizations. They argue that the adoption decision and implementation are determined more by specific behavioral and organizational variables. Similarly, earlier studies have shown that implementation issues may emerge if organizations neglect the organizational factors involved in making the change in cost management systems (Agyris & Kaplan, 1994; Cooper et al., 1992; Shields, 1995). Anderson and Young (1997) have argued that certain contextual variables may affect both adoption and implementation stages of ABC while organizational factors may affect implementation stages only. Accordingly, Krumweide (1998) tested organizational factors on ABC adopters only.

Her findings showed that although the model overall predictive accuracy was 72.4%, the Likelihood Ratio Index for the logistic regression analysis is relatively low at 0.22. Based on that, she suggested that firms considering ABC adoption should give special consideration to organizational factors as well. Therefore, this study tested all groups of independent variables (external, technological, and organizational) for their influence on ABC adoption.

Anderson (1995) surveys the literature on ABC and information technology implementation and compiled a list of variables used in ABC implementation research. The variables are grouped into five categories of factors as explained by the IT implementation stage model. Anderson and Young (1999) updated the list by including five additional variables from more recent empirical studies as shown in Table 1.

Table 1

Candidate Variables for Analysis of Factors Influencing ABC Implementation

No	Variables	Sources <sup>a</sup>	Variable mapping <sup>b</sup>
	Individual Characteristics		
1	Disposition toward change	A, C, E, F, J	N/A – individual factor
2	Production process knowledge	A	N/A – individual factor
3	Role involvement	A, E, J	N/A – individual factor
4	Individual received ABC training	G	N/A – individual factor
	Organizational factors		
5	Centralization	A, D	N/A – structure
6	Functional specialization	A, B	N/A – structure
7	Formalization/job standardization	D	N/A – structure
8	Vertical differentiation	D	N/A – structure
9	Formal support in accounting function	B, C	N/A – structure
10	Support	A, B, C, F, G, H, J	TOPMGMT
11	Internal communications	A	NON-ACCTG
12	Extrinsic reward system	A, B, E, G, J	PERFORMANCE
13	ABC training investments	A, B, E, G, H	TRAIN
	Technological factors		
14	Complexity for users	A, C	N/A – Team
15	Compatibility with existing system	A, B, C, I	IT
16	Relative improvements over existing system (accuracy and timeliness)	A, C, H, J	IT
17	Relevance to managers decisions and compatibility with firm strategy	A, B, C, E, H, I, J	DECISION
	Task characteristics		
18	Uncertainty/lack of goal clarity	A, B, E, H	N/A – Team
19	Variety	A	N/A – Team
20	Worker autonomy	A	N/A – Team
21	Worker responsibility/personal risk	A	N/A – Team
22	Resource adequacy	B, C, E, J	TOP MGMT
23	Availability of ABC software	B, C	IT
	External environment		
24	Heterogeneity of demands	A, B, D, H, I, J	COST
25	Competition	A, C, H, J	COST
26	Environmental uncertainty	A, C, D, F, I, J	N/A – Economic
27	External communications/external experts	A, B	N/A – Team

<sup>a</sup> Source legend:

A: Anderson (1995), B: Shields (1995), C: Innes and Mitchell (1995), D: Gosselin (1997), E: Foster and Swenson (1997), F: Malmi (1997), G: McGowan and Klammer (1997), H: Krumweide (1998); I: Chenhall and Langfield-Smith (1998), J: Anderson and Young (1999).

<sup>b</sup> Variables treatment legend:

The designation N/A indicates that the variable is not examined in this study due to any of the followings:

- ◆ associated with intrateam processes of the ABC design team (i.e group cohesion, team leadership),
- ◆ related to individual characteristics of the respondents,
- ◆ focused on the structure of the organizations,
- ◆ linked to economic uncertainty.

The variable mapping determines the variables to be included in this study. The seven variables to be analyzed are potential for cost distortion, decision usefulness of accounting information, IT, training, non-accounting, and performance measurement.

In terms of dependent variable, ABC adoption will be used. Although previous studies suggest that it is best to look at ABC implementation in its various stages, preliminary study done shows that ABC practices in Malaysia are still at an infancy stage. The preliminary study also indicated that there are a small number of adopters in Malaysia and the concentration is at the early stages. Therefore, for the purpose of this study, the differentiation is made based on whether the organization is ABC adopter or non-adopter.

Based on the literature review, the following hypotheses were developed:

H1: There is a positive relationship between high potential of cost distortion and ABC adoption.

H2: There is a positive relationship between decision usefulness of accounting information and ABC adoption.

H3: There is a negative relationship between IT quality and ABC adoption.

H4: There is a positive relationship between top management and ABC adoption.

H5: There is a positive relationship between non-accounting ownership and ABC adoption.

H6: There is a positive relationship between training and ABC adoption.

H7: There is a positive relationship between performance measurement and ABC adoption.

## **Methodology**

### ***Sampling Design***

The population for this study is defined as manufacturing companies listed on the Kuala Lumpur Stock Exchange (KLSE) and multinational manufacturing companies operating in Malaysia. It is expected that these companies maintain sufficient cost management system to support their operations. This guideline is extremely crucial for this study since management accounting information, unlike financial accounting, is meant for internal users and is not subject to any accounting principles and procedures. A total of 1,257 companies were identified from KLSE Listings (consumer and industrial products) and Foreign Companies in Malaysia Yearbook (manufacturing industry).

### ***Data Collection***

The survey involved collection of primary data from manufacturing organizations throughout the country. This is due to the unavailability of much management accounting information in published documents. Since the study intends to capture ABC adoption from the organizations' perspective, management accountants shall act as the most appropriate representatives of their respective organizations. The questionnaires were directed to the accountants or heads of accounts of selected manufacturing organizations.

The method is not only cost effective but is also appropriate for a relatively large sample. In addition, mail questionnaires can cover a wide geographical area. Since this research includes manufacturing organizations throughout Malaysia, adopting this method is seen as not only practical but also inevitable. However, it is known that the response rate using this method is typically low.

### ***Data Analysis***

Data analysis for this study includes descriptive analysis, test of response bias, factor analysis, test of reliability, and logistic regression. The descriptive analysis is used to develop the

profile of respondents and profile of organizations. In addition, the descriptive analysis is used on ABC adopters to provide some information on their background. The analysis is also used to determine the status of ABC adoption among manufacturing organizations in Malaysia.

The test of response bias was performed on the independent variables. The purpose of this test is to assess if statistical significance of difference between two independent samples means exist. Since this study involves two group situations, t-test is used. The bases of the test are rate of response (early and late responses), and industry classification (consumer and industrial).

Factor analysis was performed on all items that form independent variables of this study. The purpose of this test is to determine the appropriate groupings of these variables for further analysis. For the purpose of this study, the cut-off point for significant loading is  $>.40$ . This is in line with Hair et al. (1998) who considered items that display factor loadings of  $.40$  and above as important. Five uni-dimensional variables and one bi-dimensional variable with a total of 40 items emerged from the factor analysis. These items have factor loadings of greater than or equal to  $.40$ . These variables assumed the following labels titles; V1 – Cost, V2 – Decision, V3 – IT, V4 – Organization Support, V5 – Training, V6A – Performance Measurement (Learning and Growth), and V6B – Performance Measurement (Internal Measures).

The first variable consists of four items that represent aspects that influence the degree of potential for cost distortion. It relates to diversity in products, support cost, processes, and volume of overhead cost. This variable contains items that describe the potential of cost distortion. It is labeled as 'Cost', (V1-percentage of variance explained is 50.92). The second variable has four items that signify the degree of decision usefulness of cost information. It is affected by the competitive environment of the business and the organization's need for cost data in its cost reduction and pricing decisions. This variable is named 'Decision', (V2-percentage of variance explained is 24.67). The third variable has five items relating to information technology. The items represent the level of quality of the organization's existing information technology system. Accordingly, this variable is labeled as 'IT', (V3-percentage of variance explained is 39.21).

The fourth variable has nine items. These items reflect the management support in terms of morale, financial, material, equipment, staff, accessibility to people and other resources. In addition, this variable also includes items relating to the sense of ownership other departments have towards ABC. Therefore this variable is named 'Organizational Support', (V4-percentage of variance explained is 81.45). The fifth variable consists of items relating to the training involved in designing, using and implementing ABC in the organization. The factor analysis shows that all nine items were grouped as one variable. This factor is labeled as 'Training', (V5-percentage of variance explained is 89.74).

The sixth variable, which originally has 4 dimensions, takes only two dimensions after the factor analysis. The first dimension of the sixth variable has six items. The items represent the indicators of the organization and its employees learning and growth elements. It consists of profitability, variance, customer concern, reskilling, satisfaction, turnover, and productivity. It is labeled as 'Learning and Growth', (V6A-percentage of variance explained is 47.08). The second dimension of the sixth variable has three items. It is labeled as 'Internal Measures'. It consists of issues regarding time, quality and costs of internal operating procedures at the organization, (V6B-percentage of variance explained is 15.69).

The factor analysis resulted in the renaming of variables and restatement of hypothesis to reflect the new formation of variables. The hypotheses were restated as follows:

H1: There is a positive relationship between high potential of cost distortion and ABC adoption.

H2: There is a positive relationship between decision usefulness of accounting information and ABC adoption.

H3: There is a negative relationship between IT quality and ABC adoption.

H4: There is a positive relationship between organization support and ABC adoption.

H5: There is a positive relationship between training and ABC adoption.

H6: H6A: There is a significant positive relationship performance measurement (learning and growth) and ABC adoption.

H6B: There is a significant positive relationship performance measurement (internal measures) and ABC adoption.

Test of reliability determines if the variables should be included (or omitted) for further analysis. A specified value of cronbach's alpha is used as a cut-off point in making the decision. For this study, cronbach's alpha of 0.7 is applied. Finally the logistic regression analysis is used to test the hypothesis. Logistic regression is suitable when the variable under study is categorical. More importantly, the findings from this analysis were able to show if the variables under study have significant influence on ABC adoption.

## Findings

This section of the study discusses the status of ABC adoption, and the influence of certain factors (potential cost distortion, decision usefulness of accounting information, IT quality, organization support, training, and performance measurement) towards ABC adoption.

### *ABC Adoption Status*

While understanding the importance of differentiating the stages of ABC implementation, this study was unable to classify the stages according to either one of the studies mentioned earlier. Instead, this study classifies ABC application into adoption and non-adoption. This is due to the infancy of ABC in Malaysian manufacturing environment. It is anticipated that in manufacturing industry in Malaysia, most organizations are non-adopters of ABC. Furthermore, among those who adopt the system, the majority is at their early stage of implementation. Therefore it is anticipated that differentiating the stages further is not statistically justified.

Logit (also called logistic regression) estimates models in which the dependent variable is a dichotomous dummy variable – the variable can take only two values, 1 and 0. These models are typically used to predict whether or not some event will occur, such as whether an organization will adopt (or not) ABC. This method uses an estimation technique called Maximum Likelihood Estimation (MLE), an advanced algorithm that calculates the coefficients that would maximize the likelihood of viewing the data distributions as seen in the data set. It is also not subject to the same degree to the classical assumptions that must be met for a reliable linear regression.

In this particular study, the sample size is 108 organizations, 39 are ABC adopters, and 69 non-adopters. Throughout the logistic regression analysis, the non-adopter is designated as 0, adopters as 1. The overall measure of how well the model fits is given by the likelihood value (-2LL or -2 log likelihood). A well fitting model will have a small value for -2LL. The minimum value for it is 0, achieved at a perfect fit that has a likelihood of 1. The -2LL value for this study is 63.669. The -2 LL, which is used to test the significance of the logistic model shown that this model is significant, rejecting the null hypothesis that none of the independents are linearly related to the log odds of the dependent. It is thus an overall model test which does not assure that every independent is significant.

Hosmer and Lemeshow (1989) developed a classification test where sample is divided into approximately ten equal classes. The number of actual and predicted events is compared in each class with the chi-square statistic. This test provides a comprehensive measure of predictive accuracy that is based on the actual prediction of dependent variable. The adequate sample size is imposed to ensure that each class has at least five observations and never less than one. In this study, the sample is divided into ten classes with between 6 to 12 observations in each. From the Hosmer and Lemeshow Goodness-of-Fit Test, the p-value of 0.443 is computed from the chi-square distribution with 8 degrees of freedom and indicates that the logistic model is a good fit. That is, if the Hosmer and Lemeshow Goodness-of-Fit test statistic is .05 or less, we reject the null hypothesis that there is no difference between the observed and predicted values of the dependent; if it is greater, as we want, we fail to reject the null hypothesis that there is no difference, implying that the model's estimates fit the data at an acceptable level. As we have seen above, this does not mean that the model explains much of the variance in the dependent, only that it does so to a significant degree.

From the Classification Table shown in Table 2 below, it can be said that for 8 cases, the model predicted the value 0 – non adopt, but the actual value (observed value) was 1 – adopt. It also shows that if the model were to predict the Y-values as 0 or 1, the model would be correct 87% times. This is a high percentage compared to the naïve model of 50%.

Table 2

Classification Table\*

Observed	Predicted		
	Adopt		Percentage Correct
	0.00	1.00	
Adopt 0.00	63	6	91.3
1.00	8	31	79.5
Overall percentage			87.0

\* The cut value is .050.

### **Factors Influencing ABC Adoption**

In order to determine which variable has significant impact on the adoption of ABC, Table 3 on Variables in the Equation is referred. From the analysis, it can be seen that three variables are statistically significant (at  $p < 0.05$  and  $p < 0.1$ ) in the relationship between the proposed variables and the ABC adoption. From Table 2, it can be said that if p value is below 0.1, the variable is significant at the 90% level. In this study, three variables V2 – Decision, V4 – Organization Support, and V6B – Internal Measures are significant. Based on this guideline, the other four variables V1 – Cost, V3 – IT, V5 - Training, and V6A – Learning and Growth are not significant.

Table 3

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
							Lower	Upper
Step 1 <sup>a</sup>								
V1	1.030	.648	2.526	1	.112	2.801	.786	9.979
V2	1.592	.761	4.376	1	.036	4.911	1.106	21.818
V3	-.408	.407	1.009	1	.315	.665	.300	1.475
V4	3.245	1.101	8.690	1	.003	25.651	2.966	221.816
V5	.704	.725	.943	1	.331	2.022	.488	8.370
V6A	-.718	.792	.822	1	.365	.488	.103	2.303
V6B	1.156	.551	4.395	1	.036	3.176	1.078	9.357
Constant	-22.478	6.438	12.191	1	.000	.000		

a. Variable(s) entered on step 1: V1, V2, V3, V4, V5, V6A, V6B.

The observed probability of 0.36 for the usefulness of cost information was significant at less than 0.10. It provides evidence that the greater the usefulness of cost information, the more likely that the organization adopts ABC. The observed probability for organization support was 0.003, which was significant at less than 0.01. It shows that the greater the organization support given, the more likely firm adopts ABC. Finally, the observed probability for internal measures of performance was 0.036, which was significant at less than 0.10. It provides evidence that the ABC adoption is higher among firms using internal measures as performance indicators. Based on this finding, the logistic regression equation is as follows:

$$\ln[\text{Prob}(Y=1) / (1-\text{Prob}(Y=1))] =$$

$$0.00 + 2.801 (X1) + 4.911 (X2) + 0.665 (X3) + 25.651 (X4) + 2.022 (X5) +$$

$$(0.112) (0.036) (0.315) (0.003) (0.331)$$

$$0.488(X6A) + 3.176 (X6B)$$

$$(0.365) (0.036)$$

where:  $(Y=1)$  = The probability of ABC adoption,  
 $X1$  = Cost,

- X2 = Decision,  
 X3 = IT,  
 X4 = Organization Support,  
 X5 = Training,  
 X6A = Performance measurement – Learning and Growth,  
 X6B = Performance Measurement – Internal Measures.

The finding suggests that Decision, Organization Support and Internal Measures have significant influence on the adoption of ABC among manufacturing organizations in Malaysia. The value in parentheses denotes the significant value of each variable. Therefore hypotheses H2, H4, and H6B are supported while hypotheses H1, H3, H5, and H6A are not supported.

## Discussion of Findings

This study provides empirical evidence that Decision, Organization Support and Internal Measures are statistically related to the adoption of ABC among manufacturing organizations in Malaysia. The findings are based on the logistic regression analysis performed on the data. The results provide support for hypotheses H2, H4, and H6B.

Usefulness of cost information for decision making was one of the three factors found to have a significant positive influence on the adoption of ABC. This finding is consistent with previous studies that test such relationship. Cooper (1988) argued that the decision usefulness of cost information is related to the cost of errors associated with it. He further explained that the degree of competition caused the changes in cost of errors faced by firms and provided several forms of cost of errors as listed below:

1. Making poor product related decisions, such as aggressively selling unprofitable products, setting prices inappropriately, and introducing products into an unprofitable niche;
2. Making poor product design decisions, such as increasing the number of unique parts in a product or reducing its direct labor content when the cost of maintaining those parts exceed the labor savings.
3. Making poor capital investment decisions based on overhead savings that do not materialize.
4. Making inaccurate budgeting decisions about the level of operating expenses required.

The importance of decision usefulness of cost information is also apparent at the ABC adoption exercise at GM and Harris Semiconductor. One of the many important conclusions drawn by Anderson (1995) is the two criteria that GM set: that the ABC system be broadly applicable to many different processes, and that ABC results in better decision making. Similarly, at Harris Semiconductor, ABC was initiated to obtain better product costs. The data was later used in other decisions such as whether to continue to make certain products, and negotiate prices with their customers.

ABC would generate product or service costing that will differ from those produced by a traditional system primarily in respect of their indirect cost content. Where the element of cost is material and where traditional methods of overhead costing do not adequately capture resource consumption then the use of ABC would improve product cost information that is produced. There is also some evidence to suggest that those implementing ABC had reported that most of the short-term benefits of ABC in the area of cost control (Innes & Mitchell, 1995). The use of ABC would generate information of relevance to cost control because overheads are made more visible through pooling by activity and their underlying cause, to the extent it is reflected in their cost driver. In addition, budgets and responsibility accounting can also be conveniently incorporated within the ABC framework (Brimson & Fraser, 1990). However, recognition should be made of the nature and variation in the system as the creation of a system designed is intended to meet the needs of the specific organization concerned. ABC should not be viewed as a complete general-purpose system that will meet all cost information needs. Therefore, it should be noted that any system will have some limitations and if not carefully designed and monitored will have the potential for dysfunctional consequences for the adopting organizations.



Organization support was another factor found to have a significant positive influence on the adoption of ABC. Organization support in this study relates to the support received from management and the non-accounting departments. This finding is consistent with many earlier studies. In a study that was guided by field observations, Cooper et al. (1992) concluded that based on their study of eight implementations, top management sponsorship was a key success determinant. Anderson (1995) found that ABC system should reside in manufacturing, not in accounting. She also found that knowledge of production process is very important in ABC success.

Performance Measurement – Internal measures was also found to have a significant positive influence on the adoption of ABC. Abu Kassim et al. (1989) study found that manufacturing organizations in Malaysia place a great emphasis on financial measures. Their findings show that sales and product quality are the most used financial and non-financial measures. In an earlier study, Yau and Rabani (1998) examined how the nature of competition and other firm related variables influence performance indicators of manufacturing firms in Malaysia. They found that emphasis on financial measures was not significantly different from non-financial measures. The level of emphasis placed on financial and non-financial measures varies with the perceived competition.

High correlation among some variables in this study may have caused the lack of significance for some of the variables in the logistic regression analysis. Gupta (1999) used the following definitions to determine the level of correlation:

1. A high level of correlation is implied by a correlation coefficient that is greater than 0.5 in absolute terms.
2. A mid level of correlation is implied if the absolute value of the coefficient is  $0.2 > 0.5$ .
3. A low level of correlation is implied if the absolute value of the coefficient is less than 0.2.

Table 4

## Correlations

		V1	V2	V3	V4	V5	V6A	V6B
V1	Pearson Correlation	1.000	.302**	-.121	.163	.189	-.006	-.109
	Sig. (2-tailed)	.	.001	.214	.092	.051	.947	.261
	N	108	108	108	108	108	108	108
V2	Pearson Correlation	.302**	1.000	.087	.236*	.223*	.205*	.043
	Sig. (2-tailed)	.001	.	.373	.014	.020	.033	.661
	N	108	108	108	108	108	108	108
V3	Pearson Correlation	-.121	.087	1.000	.365**	.304**	.405**	.229*
	Sig. (2-tailed)	.214	.373	.	.000	.001	.000	.017
	N	108	108	108	108	108	108	108
V4	Pearson Correlation	.163	.236*	.365**	1.000	.906**	.573**	.080
	Sig. (2-tailed)	.092	.014	.000	.	.000	.000	.413
	N	108	108	108	108	108	108	108
V5	Pearson Correlation	.189	.223*	.304**	.906**	1.000	.657**	.074
	Sig. (2-tailed)	.051	.020	.001	.000	.	.000	.447
	N	108	108	108	108	108	108	108
V6A	Pearson Correlation	-.006	.205*	.405**	.573**	.657**	1.000	.455**
	Sig. (2-tailed)	.947	.033	.000	.000	.000	.	.000
	N	108	108	108	108	108	108	108
V6B	Pearson Correlation	-.109	.043	.229*	.080	.074	.455**	1.000
	Sig. (2-tailed)	.261	.661	.017	.413	.447	.000	.
	N	108	108	108	108	108	108	108

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Table 4 shows that correlation coefficient for the variables is greater than zero. This implies that the variables V4 and V5, V4 and V6A, and V5 and V6A change in the same direction. The output indicates that for the above correlations, the estimates of 0.906, 0.573 and 0.657 are statistically significant at 0.01 level, or 99% degree of confidence. A mid level of correlation is seen between variables V1 and V2, V3 and V4, V3 and V5, V3 and V6A, V3 and V6B, and V6A and V6B. The respective estimates are statistically significant at 0.01 level. A mid level of correla-

tion at estimates statistically significant at 0.05 level are found in V2 and V4, V2 and V5, and V2 and V6A.

Krumweide (1998) found that a firm's potential for cost distortion is a highly significant factor in decision to adopt ABC. This study however, concludes otherwise. Data from the survey revealed that 65.7% of the organizations manufacture industrial products, 78.7% of them produce multiple products and only 26% incur overhead cost of less than 25%. This provides evidence that a high potential for cost distortion exists among these organizations. Even though the potential for cost distortion exists, research has shown that firms seldom redesign their cost systems. Normally, a cost system would last for several years because the cost to redesign a cost system is perceived to be very high. An organization would change when the net present value of the benefits from improved product cost is greater than its redesign costs (Cooper, 1988).

According to Cooper (1988), traditional cost systems tend to report distorted product costs when the products consume a variety of inputs. In addition, product diversity also reduced the accuracy of reported cost. The distortion occurs because traditional cost systems report average product cost based on limited allocation bases (direct labor and machine hours). The system was not able to capture an accurate overhead cost consume by each product. As a result, certain product will be overstated while another understated. Volume based cost systems are unable to differentiate adequately between overhead consumed by low and high volume products (Cooper, 1988). As percentage of overhead to total product increases, it becomes more important to effectively manage the overhead cost. Traditional cost system uses few volume based allocation bases. Thus it was not able to show the relationship between a product and the overhead level it consumed. ABC, in contrast provides a better insights into this relationship.

The findings from logistic regression analysis of this study showed that IT quality was not significant in ABC adoption. Krumweide (1998) made an interesting finding regarding V3 – IT. While IT was found to be not significant in her logistic regression analysis, this variable emerged as a significant variable with a positive coefficient in ordered logistic regression analysis. Her finding suggests that ABC adoption is positively associated with strong existing IT. Due to the small number of adopters, this study did not include an ordered logistic regression on the variables thus unable to conclude for or against the abovementioned finding.

In relation to V5 – Training, Krumweide (1998) found that training is related to reaching the highest stage of ABC implementation. She explains that her study reflects level of training relating to the design, implementation, and usage of ABC. However, she combined the three phases due to their high correlation with ABC success in the study by Shields (1995). In this study, most of the ABC adopters are at the initial stage of ABC implementation. Therefore, it is likely that training is not an important factor of ABC adoption among these organizations. However, a significant relationship between training and ABC adoption would probably be seen should the sample represents a different group of ABC adopters.

## Conclusion

The findings showed that most manufacturing companies in Malaysia do not adopt ABC as their overhead costing system. In addition, it is also found that among those that adopt ABC, many are still at the initial stage of implementation. However, given the production manufacturing environment that is highly capital-intensive, there is no doubt that more companies are striving for a better costing method for their overhead cost. It is hoped that with more exposure to knowledge and trend in management accounting practices, more companies will be motivated to reevaluate their current costing system and to consider adopting ABC.

In this relation, academic groups have ongoing research and discussions on issues related to costing and management accounting. Furthermore, CIMA, a professional body associated with management accounting has been actively promoting ABC through various publications and seminars by renowned speakers in the area. It is suggested that exemplary cases from Malaysia be incorporated in these efforts in order to make it more effective. It should be stressed that this cannot be done without the support from the industry. Their contribution in sharing experiences and concern is vital for further development of the ABC practices in Malaysia.

The margin of error embedded in the traditional costing system was no longer tolerable in today's business environment. It is no longer sufficient for organizations to only provide products of high quality but organizations are also required to offer competitive pricing in order to survive in the marketplace. The stiff competition in this borderless world has forced many organizations to press for more accurate information as basis for decisions. The traditional cost accounting system that relied heavily on averaging of overhead cost across various products could no longer satisfy this need. Thus it is hoped that the pressure to compete be viewed positively by the market players. Companies should strive to improve their competitiveness and one of the aspects is to improve their costing techniques to reflect this development

The ABC system has long been seen as a tool to provide the management with a more accurate product costing. However, it should be noted that ABC provided the organizations with a whole spectrum of usefulness in decision making. The information generated from ABC system can be used for planning, pricing, budgeting, and performance measurement. On the other hand, the decision to adopt ABC required the organization to invest financially by providing training, and software and hardware for the system. It also required investment in terms of man-hour and commitment from all levels. Therefore organizations need to weigh the appropriateness of the system to the cost involved in adopting and implementing it.

### **Limitations and Suggestions**

There are some limitations to this study. Although this study takes into considerations the work of previous researchers in the area, it has to admit that the empirical research on the subject in Malaysian environment is limited. Therefore this study should be viewed as an initial step toward that purpose. As more data will be available, future research should follow up on similar issues presented in this study so that an update on the development of ABC in Malaysia is well documented.

Due to the infancy stage of ABC adoption in Malaysia, this study does not differentiate the different stages of adoption process. This study grouped the organizations into either ABC adopters or ABC non-adopters. Krumweide (1998) illustrates the importance of differentiating the various stages of ABC. She found that the important differences between specific stages would have been missed if only binary dependent variables were used. It is hoped that as more companies shift to ABC, future research will be able to accommodate this concern. Researchers will then have better opportunities to refine the model of ABC adoption. In short, the existence of larger population of ABC adopters and emergence of competing theories will call for empirical studies to determine the merit of these models in explaining the ABC adoption process

In relation to the issue discussed above, the participants in the case study represent organizations at the early stage of ABC adoption. Therefore the study only reports the most up to date development related to ABC at these organizations. The study however is not able to document the whole process of change as it is currently on going affair. Future research should revisit the organizations for a more up to date development to complement this research. Existing adopter's effort towards ABC infusion or ABM (Activity Based Management) will provide a more comprehensive sequential experience of ABC adoption from the perspective of a particular organization. This is an important avenue for understanding the system.

Respondents of the survey in this study are accounting managers. They were purposely chosen to represent their organizations as they are seen as the person with understanding of the area under study and the knowledge of the accounting development in their organizations. The respondents are most likely to be informed about ABC in their organizations. There are some limitations to using primarily accounting related managers as they may have different opinions about ABC than production related employees (Anderson & Young, 1997). This group may likely exhibit ownership bias toward reporting ABC adoption (Anderson & Young, 1997). Generalizing the results of this study to the entire population in Malaysia should be done with caution.

Finally, this study focused on whether or not organizations adopt ABC, from the sole perspective of the accounting managers. It does not attempt to survey the views and opinions of other interested parties inside the organizations such as the management and the other employees. In

addition, it does measure the effectiveness of the system once it is in place. It is suggested that future researchers should consider these concerns in their research endeavor.

## References

1. Abu Kassim N.A., B. Minai, S.C. Loo. Performance Measures in Malaysia – The State of the Art // *Malaysian Management Review*, 1989. – No 24/3. – pp. 3-9.
2. Agryis C., R.S. Kaplan. Implementing New Knowledge: The Case of Activity Based Costing // *Accounting Horizons*, 1994. – pp. 83-105.
3. Anderson S.W., S.M. Young. Evaluation of ABC Systems: The Impact of Contextual and Procedural Factor // A working paper presented at University of Michigan, 1997.
4. Anderson S.W. A Framework for Assessing Cost Management System Changes: The Case of Activity Based Costing Implementation at General Motors 1986-1993 // *Journal of Management Accounting Research*, 1995. – No 7. – pp. 1-51.
5. Anderson S.W., S.M. Young. The Impact of Contextual and Process Factors on the Evaluation of ABC Systems // *Accounting, Organizations and Society*, 1999. – No 24. – pp. 525-559.
6. Cooper R. The rise of Activity-Based Costing – Part One: What is an Activity-Based Cost System? *Journal of Cost Management*, 1988. – Summer. – pp. 45-54.
7. Cooper R., R.S. Kaplan, L. Maisel, E. Morrissey, R. Oehm. *Implementing ABC Management*, 1992. – New Jersey: Institute of Management Accountants.
8. *Foreign Companies in Malaysia Yearbook*. – London: Commercial Intelligence Service, 1992.
9. Innes J., F. Mitchell. Activity Based Costing. In D. Ashton, T. Hopper, & R.W. Scapens (Eds.), *Issues In Management Accounting*, Second Edition -London: Prentice Hall, 1995. – pp 115-136.
10. Innes J., F. Mitchell. A Review of Activity Based Costing Practice. In C. Drury (Eds.), *Management Accounting Handbook* -Oxford: Butterworth Heinemann, 1996. – pp. 44-70.
11. Krumweide K.R., H.P. Roth. Implementing Information Technology Innovations: The ABC Example // *The Service Industries Journal*, 1997. – No 17/1. – pp. 190-203.
12. Krumweide K.R. The Implementation Stages of ABC and the Impact of Contextual and Organizational Factors // *Journal of Management Accounting Research*, 1998. – No. 10. – pp. 239-278.
13. Kwon T.H., R.W. Zmud. Unifying the Fragmented Models of Information Systems Implementation. In R.J. Boland, & R. Hirschheim (Eds.), *Critical Issues in Information Systems Research*. – New York, NY: John Wiley, 1987.
14. Lewin K. Group Decision and Social Change. In T.M. Newcomb, & E.L. Hartley (Eds.), *Readings in Social Psychology*. – New York: Henry Holt and Co., 1952.
15. Shields M.D., S.M. Young. A Behavioral Model for Implementing Cost Management Systems // *Journal of Cost Management*, 1989 – Winter. – pp. 17-27.
16. Shields, M.D. An Empirical Analysis of Firms' Implementation Experiences with ABC // *Journal of Management Accounting Research*, 1995. – No 7. – pp. 148-166.
17. Yau, F.S., Z.A.Robani, Linkage Between Intensity of Competition and Use of Performance Measures in Malaysian Manufacturing Firms. *Akauntan Nasional*, 1998. – February-March. – pp. 45-50.