

The Diffusion of Activity-Based Costing (ABC) in the Institutions of Higher Education (IHE): A note from Malaysia

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1. INTRODUCTION

The substantial financial resources allocated by Malaysian government for the Institution of Higher Education (IHE) aims of turning the country into a regional and international hub and centre of excellence in education (Sirat, 2006) which also leads to a strong need for restructuring of higher education systems (Lee & Healy, 2006). Malaysia was ranked the world's 11th most preferred study destination by the Institute of International Education (Lim, 2009), thus it is significant for the country to further commit towards a better and improved education system. Nelson (2008) noted that Malaysia has spent considerably more public funds, relative to total expenditure, on education than most other Southeast Asian nations, with the exception of Thailand. The Malaysian government has stressed the need for a credible private education sector (Lim, 2009).

Traditional accounting method led university management to not having accurate knowledge in the costs of the service they provided. They have traditionally focused on meeting external reporting and basic management accounting needs – an extension of the institution's general ledger (Gordon & Fisher, 2011). The cost-management accounting system cannot be designed and run to satisfy largely the information requirements of financial reporting. Aldukhil (2012) mentioned that ABC serves to focus management's attention on the costs of the key activities, leading to a better understanding of what causes such costs and what changes are necessary to reduce cost. However, application of ABC in universities has concentrated primarily on activities of support departments such as libraries, computer support, payroll and procurement and not on all aspect of university operations (Gordon & Fisher, 2011; Maelah *et al.*, 2011).

The objectives of this study are to examine whether the ABC as an innovation can be diffused in the IHE. It also intends to investigate the relationship and influence of the individual selected contextual variables as well as the contribution of those variables toward explaining the diffusion of ABC as an innovation in IHE.

2. LITERATURE REVIEW

2.1 Activity-based costing (ABC) : Benefits and reasons for adopting ABC

The benefits of ABC adoption can be recognised from the reasons this system is adopted (Sartorius et al., 2007). Sartorius et al., (2007) reviewed the literature on the reasons for adopting ABC in developed countries (i.e. the USA, UK, Canada, Greece, Ireland and Australia). The adoption of ABC has been identified for the following purposes: (i) cost accounting, (ii) cost management, (iii) performance measurement, (iv) decision making, (v) general management, and (vi) the fostering of better relationships (Harrison & Killough, 2006; Sartorius et al., 2007). Researchers found ABC benefits include better decision making (Chen, 2011; Lotfi & Mansourabad, 2012), better profitability measures, process improvement, better cost estimation and the cost of unused capacity (Lotfi & Mansourabad, 2012) and better information planning (Mansur et al., 2012).

Jackson and Lapsley, (2003) looked at management accounting innovations in the public sector and indicated that the local authorities and government agencies were heavily involved with innovative techniques in performance measurement. In the IHE, as to date there is no proper tool that really measures the accuracy of the cost in running the courses offered in the education industry. A research done in Islamic Azad University by Ali (2012) found that ABC system is more rewarding in determining the training courses compared to traditional costing. ABC system is also seen to be flexible with specific characteristics and enable the management to develop a cost accounting system (Manuel, 2011), able to focus on a specific faculty (Ismail, 2010) and support services (Krishnan 2006) in IHE.

A study done by Amir et al. (2012) on a public university in Malaysia highlighted that ABC is able to improve the information visibility which will enable the university management to understand the link between costs and activities and able to identify activities that are value added and non-value added. Thus, having accurate costing information will help the management to make more informed decisions.

2.2 Diffusion Theory and ABC

Diffusion is the process through which new ideas, beliefs, knowledge, programs, technologies or practices are communicated over time among the members of a social system (Rogers, 2003). The core of the diffusion theory by Rogers (2003) is that the factors explaining the different rate of adoption of innovation are the perceived characteristics of an innovation. He categorised the innovation into five characteristics, namely (i) Relative advantage, (ii) Compatibility, (iii) Complexity, (iv) Trialability, and (v) Observability. This study however, will only adopt three characteristics, relative advantage, compatibility and complexity.

With regard to the ABC, the literature recorded that the ABC was diffused gradually in many other countries such as Australia (Askarany, 2009), Finland (Malmi, 1999), Jordan (Nassar, et. al, 2011), Malaysia (Maelah & Ibrahim, 2007) and UK (Innes and Mitchel, 1995). In a survey done by Malmi (1999) among the software industrial employees, consultants and academics in Finland, it is found that the diffusion of ABC innovation was highly efficient choice perspective whereby the organizations are free to adopt and are certain of their goals in assessment of the new innovation. However, in a survey of 200 manufacturing companies in Australia, Askarany (2009) indicated that the diffusion of ABC is associated strongly with the technological changes in the organisation. A study done by (Nassar et. al, 2011) found that the industrial sector diffused ABC in their organisation due to the innovation efficiency and also the shortcomings of the existing costing system.

In Malaysia, many researchers have done studies on the adoption and perceived usefulness of ABC in IHE (Amir et al., 2012; Hashim, 2011) but there is a lack of research on the diffusion of ABC as a management tool in IHE as this paper is trying to investigate.

2.3 Contextual variables of the diffusion ABC in IHE

One of the objectives of the study is to investigate the relationship between the diffusion of ABC and 1) Environmental factors (represented by Cost Distortion and Satisfaction with Current costing system); 2) Organisational characteristics (represented by Size); 3) Technology (represented by IT).

Environmental factors

- **Potential for Cost Distortion:** it was reflected in the level of product and/or process diversity and the level of overhead costs relative to total costs (Cooper, 1988; Warwick, Reeve, & Feltrin, 1997). This factor is associated with how likely the ABC will produce cost information that is significantly different from those generated by a traditional costing system (Ahamadzadeh, Etemadi & Pifeh, 2011; Lotfi & Mansourabad, 2012). Therefore, organisations including colleges and universities which offer multiple products and/or services are expected to perceive the diffusion of ABC as SMA innovation and as being more useful than the traditional costing system. It is expected that the higher potential for cost distortion may also lead to the higher possibility of diffusing ABC in IHE.
- **Satisfaction with the Current costing system:** This variable has been tested in several settings with the assumption that when the current costing system contributes to the cost distortion and may cause misleading of cost information in decision-making, a more sophisticated costing method may be more appealing. Several researchers tested this assumption in several settings, for example manufacturing (Krumwiede, 1998), hospitals (Pizzini, 2006), university (Hashim, 2012), and public sector (Anand et. al, 2005). All of them concluded that satisfaction with the current cost system does influence the diffusion of ABC information. As such, it is expected that in the IHE setting, this variable has a significant relationship with the diffusion of ABC in IHE.

Organisational Characteristics

- **Size :** This study used the number of students as an indicator of size as per study done by several researchers (e.g. Jarraret. al (2007) and Hashim (2012)). Size has been found to have a positive relationship with the adoption of ABC system (Askarany et al., 2012; Fadzil & Rababah, 2012). However, Askarany and Smith (2008) indicated that the establishment of size as one of the important factors that has a positive relationship with the diffusion of ABC has only been done in a manufacturing environment.

Information Technology: Krumwiede (1998) found that IT is a critical factor to using ABC extensively. Thus in the IHE environment, IT is identified as one significant opportunity to create competitive advantage and allow organisations to differentiate their services (Lin, 2000). The application of IT in a university system will have the effect on the complexity of the cost structures when it is used for administration purposes. Different demands of resources must be considered in both pricing and decision-making. ABC requires are liable source of data provided by other information systems. The adoption of IT in the IHE administration support system and as a management tool is expected to change the nature of how work is done. All the discussions indicated that IT as one significant factors in the diffusion of ABC.

3. Theoretical framework and hypotheses development

3.1 Theoretical framework Different perceptions of among campus cluster

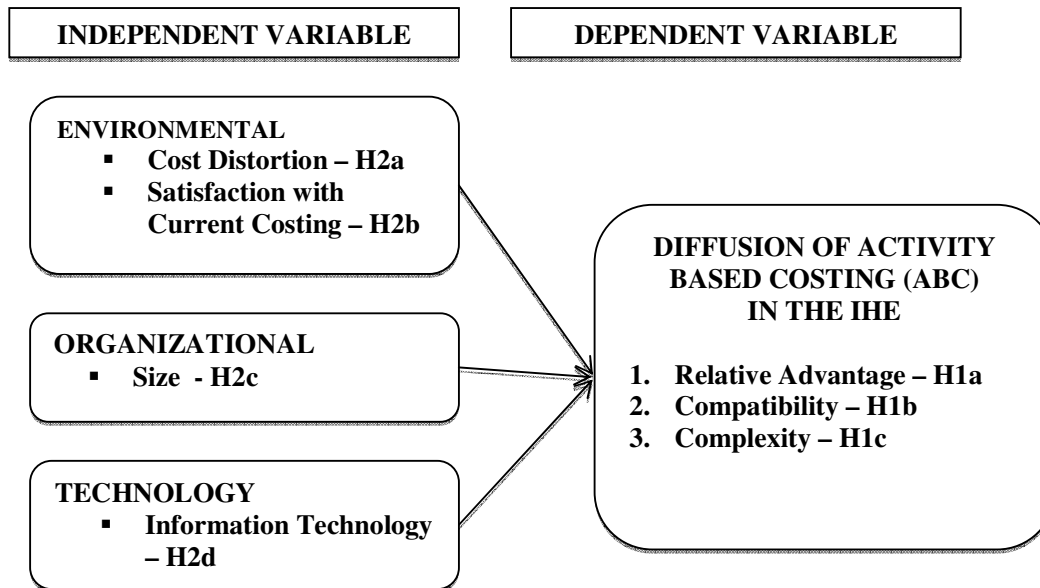


Figure 3.1 Theoretical framework

Figure 3.1 showed the research framework for this study. It will examine; i) the diffusing ABC as an innovation in the IHE based on the three perceived innovation characteristics by Rogers (2003) and ii) to investigate the relationship between the contextual variables and the diffusion towards ABC as an innovation in the organisation. The assumption of positive perception of ABC diffusion among IHE leads to the following hypothesis:

H1: ABC can be implemented in the IHE

H1a: ABC implementation has a relative advantage in IHE

H1b: ABC implementation is compatible with the existing system in IHE.

H1c: ABC implementation is more complex compared to the current costing system.

3.2 Environmental factors and the diffusion of ABC

This study also intends to investigate the relationship between the diffusion of ABC as an innovation in the organisation and 1) Environmental factors (represented by Cost Distortion and Satisfaction with Current costing system); 2) Organisational characteristics (represented by Size); 3) Technology (represented by IT), as noted by the following hypotheses:

H2a: There is a significant relationship between cost distortion and the diffusion of ABC in IHE.

H2b: There is a significant relationship between the Satisfaction with Current Costing System and the diffusion of ABC in IHE.

H2c: There is a significant relationship between size of organisation and the diffusion of ABC in IHE.

H2d: There is a significant relationship between IT application and the diffusion of ABC in IHE.

Other than that, this study also investigated how much the contextual factors contribute to the diffusion of ABC in this sector and as such the following hypotheses were tested.

H3a: The selected contextual factors can explain the diffusion of ABC as SMA innovation in the IHE.

$$PU = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + e$$

3.3 Research Methodology

This study is the quantitative in nature with the survey using questionnaires as its instrumentation.

- **Questionnaires and design**

The survey is developed based on the perceptions of respondents from two universities in Malaysia. The questions focused on the importance of potential cost distortion, degree of satisfaction with the current costing system, the size of the organisation and support system in IT as well as the diffusion characteristics.

The survey questions in the form of closed-ended questions based on a five-point Likert scale. The questionnaire is divided into three parts, namely (i) The general information, (ii) The perception of the respondents towards the diffusion of ABC, and (iii) The contextual variables.

- **Pilot Test:** The questionnaire was pilot tested prior to the actual study. A pilot test was conducted on the sample of 20 individuals identified through contacts prior to distribution of the survey instrument to the selected personnel. The respondents of the pilot study were not included in the sample of the present study.

- **Population and sampling**

The target population for the present study is the administrative staff of the academic that are involved with the budgeting and policy of the organization as well as the head of the academic department. The total population from both institutions is 392; 263 and 129 from Public and Private university, respectively.

This study utilized a stratified sampling method where a sample of members from each stratum can be drawn using either a simple random sampling or a systematic sampling procedure (Sekaran, 2003). The sampling process involved the selection of administrative staff with some basic accounting information of the institution who are in the best position to provide the information required. The respondents were expected to have the required knowledge, i.e., that they have gone through the experiences and processes related to budget preparation for the institution.

Table 3.2 : Population and sampling

	Institution of Higher Education	Population	Sampling
1	Private College	129	98
2	Public University	263	160
	Total	392	258

4 Results and Discussions

4.1 Descriptive analysis

Out of 258 questionnaires that sent out, there were 53.8% were returned and useable. That was consisted of 98 Private university and 41 questionnaires from public university. Table 4.1 shows the percentage of the respondents.

Table 4.1: Response Rate

	Type of IHE	Respondents	Percent
	Private	41	29.5
	Public	98	70.5
Total		139	100.0

- **Data Analysis**

The data is analyzed using the Statistical Package for the Social Science (SPSS) computer program for windows Version 18. The analysis of the data is performed in two stages: 1) to check the normality and reliability of the data collected; and 2) statistical procedure; independent t- test, correlation analysis and regression analysis.

The normality test is performed to identify the normality of data using Kolmogorov-Smirnov statistics. As can be seen from Table 4.2 shows, the data are found not to be normally distributed. The Kolmogorov-Smirnov is used because the population is less than 2000 (Sekaran, 2003). Furthermore, using the graphical approach, all the data is shown as normally distributed. Thus for the present study purposes, to certain extent the data can be assumed to be of minimal violation to the assumption of normality.

Table 4.2 : Tests of Normality^b

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Cost Distortion	.351	139	.000	.767	139	.000
Satisfaction with Current Costing System	.377	139	.000	.738	139	.000
Information_Technology	.255	139	.000	.860	139	.000
Relative Advantage	.205	139	.000	.840	139	.000
Compatibility	.281	139	.000	.831	139	.000
Complexity	.330	139	.000	.814	139	.000

a. Lilliefors Significance Correction

Another test is the reliability test to test the consistency and stability of the data. The results shown in Table 4.3 suggest that the internal consistency is considered acceptable.

Table 4.3 : Reliability Statistic

Research Construct	Number of items	Cronbach's
Satisfaction with current costing	5	0.752
Potential of Cost Distortion	6	0.612
IT	4	0.738
Total	15	0.687

4.2 Diffusion of ABC in IHE in Malaysia.

The findings on the implementation for the present study are presented in the following section.

- ABC and Relative Advantage diffusion characteristic

Table 4.4 : Independent T Test for Relative Advantage

		Levene's Test for Equality of Variances					t-test for Equality of Means			
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Relative Advantage	Equal variances assumed	4.282	.040	6.617	137	.000	1.22311	.18484	.85760	1.58862
	Equal variances not assumed			7.317	103.904	.000	1.22311	.16717	.89161	1.55461

Table 4.4 showed that the Levene's test shows statistically significant value of lower than 0.05 (with a value of 0.04). As such, it is assumed that the two variances are significantly different and it is assumed that the variances are relatively not equal. This lead to the usage of t-value, df and two-tail significance for equal variances estimates to determine whether different perceptions exist. The two-tail significance for Relative Advantage indicates that $p < 0.05$ ($p < 0.000$) and therefore, the null hypothesis should be rejected. Thus it is concluded that the respondents have perceived the ABC has a Relative Advantage as compared to the existing costing system. This indirectly points out the positive indicator that ABC system can be easily diffused in the universities under study.

- *ABC and Compatibility diffusion characteristic*

Table 4.5: Independent T Test for Compatibility

		Levene's Test for Equality of Variances		t-test for Equality of Means		95% Confidence Interval of the Difference				
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Compatibility	Equal variances assumed	.010	.921	-6.676	137	.000	-.79772	.11949	-1.0340	-.5614
	Equal variances not assumed			-7.036	91.995	.000	-.79772	.11338	-1.0229	-.5725

From the table 4.5, it is found that the probability greater than 0.05. As such it is assumed that the population variances are relatively equal. This lead to the usage of t-value, df and two-tail significance for equal variances estimates. The two-tail significance for compatibility indicates that $p < 0.05$ and it is concluded that the respondents have positive perception on the compatibility of ABC. As such, it can be concluded that the respondents perceived that ABC is compatible with the current costing system and therefore can be easily diffused in the universities under study.

- *ABC and Complexity diffusion characteristic*

Table 4.6 : Independent T Test for Complexity

		Levene's Test for Equality of Variances		t-test for Equality of Means		95% Confidence Interval of the Difference				
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Complexity	Equal variances assumed	14.136	.000	-7.184	137	.000	-.78513	.10929	-1.00125	-.56900
	Equal variances not assumed			-6.222	59.901	.000	-.78513	.12619	-1.03756	-.53270

With regards to the complexity, the result from Table 4.6 (a p value of less than 0.000), lead to the usage of t-value, df and two-tail significance for equal variances estimates. The two-tail significance indicates that $p < 0.05$ and therefore it is concluded that the respondents did not perceived ABC as complex compared to the current costing system.

4.3 The Relationship between the Contextual Factors and ABC

Table 4.7 : Correlation of Cost Distortion and Satisfaction with Current Costing System

		Diffusion ABC	Cost Distortion	Satisfaction Current Costing System
Diffusion ABC	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	139		
Cost_Distortion	Pearson Correlation	.571**	1	
	Sig. (2-tailed)	.000		
	N	139	139	
Satisfaction of Current Costing System	Pearson Correlation	.465**	.103	1
	Sig. (2-tailed)	.000	.230	
	N	139	139	139

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

Table 4.7 showed the results of the relationship between the contextual factors and ABC. For the cost distortion, since the p value shows reading is less than 0.05, there is a significant relationship between cost distortion and the diffusion of ABC in IHE. This finding is similar with Chongruksut and Brooks (2005) and Fadzil and Rababah (2012) who found that a firm's potential for cost distortion is a highly significant factor in decision to adopt ABC.

The same pattern of finding also found with the second factor, satisfaction with the current costing system. Since the p value is also less than 0.005, it can be concluded that there is a significant relationship between the satisfaction with the current costing system and the diffusion of ABC in IHE. This finding is consistent with several researchers that have tested this assumption in several settings, for example manufacturing (Krumwiede, 1998), hospitals (Pizzini, 2006), university (Duron, 2001; Lin, 2000) and

restaurants (Kostakis, 2011). All of them concluded that satisfaction with the current costing system does indeed influence the diffusion of ABC information.

- **Organizational characteristic and diffusion of ABC**

The size of the organisation was represented by the number of full time equivalent students in the campus. The result of the correlation between the size and the diffusion of ABC can be seen in Table 4.8. Since the p value is less than 0.005, then it could be concluded that size has significant relationship with diffusion of ABC.

Table 4.8: Chi Square Test Statistics

	Size	Diffusion ABC
Chi-Square	18.712 ^a	64.597 ^b
Df	1	3
Asymp. Sig.	.000	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 69.5.

b. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 34.8.

This finding is consistent with the research carried out by Askarany et al., (2010) which found that larger firms are more likely to adopt ABC. Another study done by Askarany and Smith (2008) further indicated that the size of the business has direct association with the diffusion of manufacturing innovations and diffusion of ABC in the organisation. As such, even in a non-profit service orientation like IHE, the size of organisation still plays a significant role to the possibility of successful implementation of strategic management accounting tool like ABC.

4.4 Information Technology and diffusion of ABC.

The final hypothesis that tests the second objective of the present study is to determine the relationship between IT applications and the diffusion of ABC in the IHE.

Table 4.9: Correlation of IT

		Diffusion ABC	Information Technology
Diffusion ABC	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	139	
Information Technology	Pearson Correlation	.067	1
	Sig. (2-tailed)	.432	
	N	139	139

Table 4.9 showed that the p value is larger than 0.05 ($p=0.432$). As such, it can be concluded that the IT management tool has no significant relationship with the diffusion of ABC in the IHE.

This finding is consistent with the research done in manufacturing companies in Malaysia by Maelah and Ibrahim (2007) which discovered that IT does not have any significant effect on the adoption of ABC in the organisation.

4.5 The contextual factors and the diffusion of ABC as SMA innovation.

The multiple regression analysis was conducted to predict the percentage of the contribution of the three contextual factors, namely (i) the environmental factors, (ii) the organisational factors and (iii) the IT factors.

Table 4.10 : ANOVA^b

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	65.410	3	21.803	48.477	.000 ^a
	Residual	60.719	135	.450		
	Total	126.129	138			

a. Predictors: (Constant), Size, Environment Factor, Information Technology

b. Dependent Variable: Diffusion ABC

Table 4.11 : Regression Table

Model	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.720 ^a	.519	.508	.67065

a. Predictors: (Constant), Size, Environment Factor, Information Technology

Table 4.10 showed that, since the significance level is less than 0.05, which suggests that there is statistical difference among the three contextual variables. Furthermore, Table 4.11 indicated that the selected variables contributed 51.9 percent in explaining the diffusion of ABC in IHE, whereas 48.1 percent will be explained by other factors.

5 Conclusion, limitations and direction for future studies

• Conclusions

A total of seven hypotheses were tested and the findings may indicate several conclusions. First, it can be concluded that ABC can be diffused in the IHE. Out of five elements, all three elements (namely relative advantage, compatibility and complexity) as noted by Rogers (2003) were found in the IHE environment. These findings can be considered as a positive sign for IHE especially in Malaysian IHE because as the present study is an explanatory in nature, respondent perceived positive the ABC as being more relative advantage, can be compatible and more complex as compared to the existing costing method.

Second, the diffusion of ABC in IHE has significant relationships with both selected environmental factors, namely i) cost distortion, and ii) dissatisfaction with current costing system, These results are consistent with other researchers such as Fadzil and Rababah (2012) and Kostakis (2011). The organisational factor, size was also found to have significant relationship with the ABC diffusion in the IHEs under study. However, the implication of IT application was found as not

providing significant relationship towards the diffusion of ABC in IHE. This finding is somehow similar with the research done by Maelah and Ibrahim (2007) for manufacturing companies in Malaysia. Third, the selected independent variables from the present study contributed 51.9% towards the diffusion of the ABC system in IHE in Malaysia. This finding provides important information to the institutions under study due to the significance of selected variables to explain some factors to ensure the successful implementation in IHE in Malaysia.

The present study can be of benefits to the policy makers, such as Ministry of Higher Education and the Institutions of Higher Education (IHE). For the Ministry of Higher Education, the IHEs need to be prepared with a better costing system to face globalization and to handle all the challenges including providing management with an accurate and comprehensive costing system. ABC allows IHE to obtain information necessary in making or reaching an optimal decision making in planning and budgeting.

• Limitations and directions for Future Research

The variables tested in the present study are limited only to the three contextual which may not fully explain the diffusion of the system. Another two elements proposed by Roger (2003), (namely: trialability, and observe ability) were not yet tested. Thus, for future research, all five perceived elements of an innovation (as proposed by Roger, 2003) should be tested.

Another limitation is the limited sample size which is to only one public and one private higher education institution. This may not represent the whole environment of IHE in Malaysia. Other than that, the survey used in the present study was based on questionnaires. Indirectly the questionnaires limit the explanatory information because the answers in the questionnaires are structured. This restricts the respondents from giving their opinion and further information. It is suggested that for future research, combined methods should be applied whereby questionnaires should be followed with interviews.

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