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Direct & indirect effects of top management support on ABC implementation success: Evidence from ISO 9000 certified companies in Thailand

Phaithun Intakhan*

Faculty of Management Science, Lampang Rajabhat University, Thailand

Abstract

The purposes of this research were: 1) to examine the direct and indirect effects of top management support (TMS) on ABC system training (AST), non-accounting ownership (NAO), links to performance evaluation (LPE) and ABC implementation success (AIS); 2) to explore the influence of LPE on NAO; and 3) to investigate the effect of AST on NAO. Data were collected from 95 accounting manager of ISO 9000 Certified Companies in Thailand which implemented activity based costing by using PLS-SEM as the instrument to test hypothesizes. The results showed that TMS had positive direct and indirect effect on AIS with more indirect effect. Therefore, in the implementation process the administrators should support the ABC project through AST, LPE, and NAO by commanding and motivating more than directly acting. The result also insisted that NAO had a high positive direct effect on AIS. Consequently, top managers have to build up involvement through LPE and AST. Moreover, AST and LPE also had a positive effect on AIS. In conclusion, this research contributed the benefit and suggested the future research direction.

Peer-review under responsibility of the School of Accountancy, College of Business, Universiti Utara Malaysia.

Keywords: Top management support; ABC system training; non-accounting ownership; link to performance evaluation; ABC implementation success; ISO 9000

* Corresponding author.
E-mail address: superkop_p@hotmail.com

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1. Introduction

Activity based costing (ABC) is the accounting concept to estimate the cost of products and service which depend on the level of using resources of product and service. That means any product and service using more resources will have higher cost than the one using less resources by allocating the manufacturing overhead cost into "activity". Then, product and service was allocated from overhead cost of "activity" by "cost driver")Cooper & Kaplan, 1992(. Data and information from ABC system is very useful to the decision making of the managers)Malmi, 1997) especially, getting the number of the right product cost leads to set the appropriate price, reduce the unnecessary expenses, Quality improvement, Cycle-time improvement, and profitability)Maiga & Jacobs, 2008(. Prior academic researchers studied ABC system in variety of aspects such as cost driver, adoption, implementation, the success of ABC system measurement, and factors influencing ABC success. These two factors are technical factor, and organization and behavioral factor which Shield (1995) said that organization and behavioral factor had more influence than technical factor. Therefore, technical factor should be focused, and follow by organization and behavioral factor in order to build the sustainable ABC success.

Shield (1955) studied behavioral and organization factor and found 5 variables which influenced the success of ABC system. Those variables were top management support, ABC system training, link to performance evaluation, adequate training, and link to quality initiatives which top management support had the highest effect and was very agreeable to the prior researches such as Byrne (2011); Chongruksat and Brook (2005); Major and Hopper (2005); Baird et al. (2007); and Anderson and Young (1999); Cotton et al. (2003). Besides, there were another group of repeated research studied those variables on the success of ABC system)Innes et al., 2000; Krumwiede, 1998; McGowan & Klammer, 1997(. The majority results were found that every variable had statistical significantly positive effect on ABC implementation in each stage. However, those variables have not been studied in the concept of causal and effect among them before. In the context of Thailand, ABC Adoption and implementation success were studied and found that non accounting ownership was another factor which influenced the success of ABC system (Choungruksut & Brook, 2005). Therefore, the characteristic of Thai society is a High power distance)Hofstede, 1983). So that, if accountants are the owner of ABC project, they might be afraid of losing the important data such as controlling, performance evaluation from sharing data which directly affect the success of ABC system)Murakul & Wu, 2001).

As mention early, top management support (TMS) was the highest influence on ABC implementation success. In this paper TMS refers to the visible support for ABC system to be able to use efficiently and effectively such as material, equipment and software including the emphasis on information from ABC system for decision making (Madji & Sulaiman, 2008). This variable is very important to build ABC implementation success, especially in the countries with high power distance such as Thailand and Malaysia (Hofstede, 1983). Due to the top manager is the last decision maker to carry out activity. So to implement policy, format and method of producing activity depend on decision making of the managers who represent the authority of executive position and affect on the success level in employment. In addition, TMS is able to link effectiveness and efficiency of ABC system training, to give an involvement policy from other employees, to link ABC information to performance evaluation system which distributes positive effect directly on ABC implementation success. Moreover, Cohen et al. (2005) claimed that lack of ongoing management support is the issue cause ABC system project to be abandoned and failure but no evident respond how the level of top management supports in each stage of ABC project.

However, no empirical evidence study the relationship among behavioral and organization factor on ABC implementation success by direct and indirect effects. Hence, this paper focuses on the answers to the research questions; 1) How does TMS affect directly on ABC implementation success? 2) How does TMS affect indirectly on ABC implementation success (AIS) through ABC system training (AST), non accounting ownership (NAO), and link to performance evaluation (LPE)? 3) How does TMS affect on AST, NAO, and LPE? 4) How do AST, NAO, and LPE affect on ABC implementation success? 5) How do AST and LPE affect on NAO? Data were collected from 95 accounting managers of the firms with ISO certified company and implementation ABC. Therefore, the objectives of this research are 1) to examine the direct and indirect effects of TMS on AST, LPE, NAO and ABC implementation success, 2) to investigate the effects of LPE on NAO, and 3) to examine the influence of AST on NAO.

To clearly understand TMS, this research outstandingly attempts to increase theoretical contribution that is preliminary work revision direct and indirect effects among TMS, AST, LPE, NAO, and AIS. Moreover, this

research adds significant finding of behavioral and organization factor on ABC implementation success literature in the context of Asian countries, epically Thailand which has less empirical study. In addition, the number of ISO certified companies in Thailand is also increasing steadily; from 1835 in 2012 to 2351 in 2013 or increasing about 30 percents. This result can help firms with ISO 9000 around the world especially in Thailand which decide to adopt or implement ABC project or firms which are applying ABC system. The procedure of this research is to present theoretical background and hypotheses development, methodology, results of hypotheses testing, discussion and the conclusion with suggestion and future research direction.

2. **Theoretical background**

2.1 Development in resource based view theory

This research used Resource Based View of the Firms (RBV) to support the conceptual model. RBV (Barney, 1991) mentioned that firm with competitive advantage should focus on creating resources instead of creating cost reduction. Here, Resources are assets, capabilities, organization process, identity or attribute of business, information, knowledge which organization is able to control and to utilize fully. Strategic resources which cause advantage in the competition should include valuable resources, rare resources, cannot be imitated, and non-substitutable. From the conceptual model, it is obviously seen that TMS, AST, LPE, and NAO are the organization processes which are particularities and cause tranquil ABC system which lead to right information that meets the needs of managers. It causes accurate decision making in each activity which brings about to good performance continuously. Thus, the conceptual model shows in figure 1.

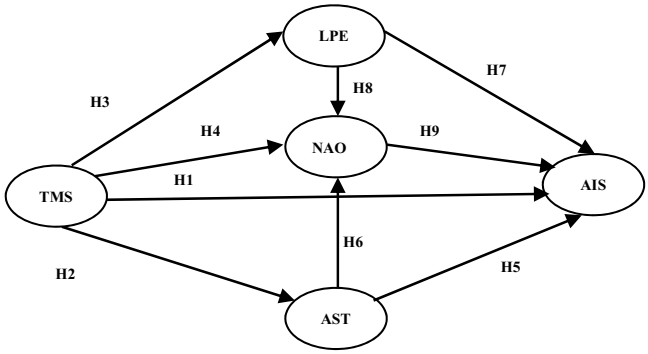

Fig. 1. Conceptual framework showing direct and indirect effects of top management support on ABC implementation success

2.2 Top management support

The role of top managers consist of determine vision and policy, decision making, solve problem, and drive organization to grow and survive. Besides, the important role is to motivate all employees to involve in the application of modern management systems in the organization. Support from the administration means level of importance, to support both material and anything else that is needed to drive the ABC system to achieve the goal. If managers focus on involvement and participation, it will lead to the level of ABC implementation success (Hoozée & Bruggeman, 2010). In addition, lack of top management support is the critical factor to failure ABC project (Byrne, 2011). Moreover, clearly targeted determinant and concise objective reduce resistance from local managers that is the main factor to delay ABC project (Malmi, 1997). The first support is visible that means manager maintain material, equipment and all resources which necessitate to implement ABC system such as software and staffs (Majid & Sulaiman, 2008). Furthermore, another important maintain from managers is to focus and commitment on data and information from ABC system. It affects direct signal to all employees who related

ABC project to remark the important task and affects the willingness to work. In summary, top managers should support ABC project in various aspects such as resources, communication that all related workers to have commitment, set clear and concise goal and objective of ABC implementation because it will be successful finally.

TMS causes related employees to perceive clearly is the linking to performance evaluation due to the performance measurement is all staffs have to be interested in and commit to evaluation method or to work with indicator in order to have good performance that leads to high benefit which consists of finance such as bonus and non finance such as acceptant from managers or the ability is praised from managers. If managers support ABC system by determining goal and objective of ABC system and linking to performance evaluation, driving and checking in order to ensure that system and method achieve the goals set.

To be acknowledged that training is the important process to help workers gain knowledge, skill, share experience, and be able to adopt to do job effectively and efficiently. When all employees have knowledge and skill as mentioned early they can reduce time for work. Hence, training is needed for adoption the new management system in the organization such as ABC, TQM, and BSC)Burkert & Lueg, 2013(. However, training will occur and have benefit or not, it depends on top management commitment. Managers can focus on policy, regulation, frequency of training, also appropriate pattern for each stage of ABC system. Therefore, adequate and appropriate training with stage of ABC system occur from top management support the most.

As stated above top manager is the man who determines vision, mission, policy, regularity, system, and direction of staffs operation in order to drive it to succeed and survival. Therefore, building ownership for all employees about ABC system comes from top management policy. If manager sets clear and concise policies and methods for structure participation with ABC project, he can build recognition of the good regulation and implementation all about the rule. Thai society with high power distance so that the level of power command is very strong which leads to the degree of performance of all employees. Moreover, TMS direct effects local managers who play the role of messenger to get the information from top manager to practice and communicate to another department without accounting in order to involvement in ABC project (Anderson 1995; Anderson & Young, 1999; Englung & Gadin, 2008). In summary, if top manager give clear and concise policy with non accounting ownership it is direct influence to increasing high ownership of other department. As mention above, this leads to hypotheses 1 – 4 are.

H1: Top management support had a positive effect toward ABC implementation success

H2: Top management support had a positive effect toward ABC system training

H3: Top management support had a positive effect toward non-accounting s ownership

H4: Top management support had a positive effect toward link to performance evaluation

2.3 ABC system training

ABC system training (AST) refers to the degree of appropriate and adequate training on ABC systems used in order to deliver knowledge, skills, good attitudes, objectives, benefits and usefulness to employees who are related to the implementation of the ABC system (Foster & Swenson, 1997; Malmi, 1997). AST is needed for ABC adaptation and implementation at all stages. This is to reduce restrictions on innovative management systems, such as ABC (Krumwiede, 1998). For the design process, training is important because it can help staff, especially designers, understand the process and composition of all parts of the ABC system, for example, the resources and equipment used to produce ABC system. For the implementation stage, training is needed because it provides knowledge and skills on how to work with ABC. This can involve training on how to use special software provided by external consultants. For the use stage, training is required because it helps workers select and present information to managers and so allows them to make better decisions and to reduce mistakes (Anderson and Young, 2002, Majid and Sulaiman, 2008).

Moreover, ABC system training help firm to develop positive attitudes toward ABC adaptation and implementation. This is because the training transfers knowledge and experiences in an easy to understand manner. Some firms favor in-house training whereas others employ external consultants to train in the use of ABC software, which is easy to use and understand, saves time, and can build positive attitude among staff in the implementation of ABC. In addition, ABC training may lead to the exchange of knowledge between employees (Englund & Gerdin, 2008). This can increase involvement and participation and so help staffs to solve problems, cooperatively find solutions and speed up implementation of ABC systems. In addition, Shields (1995) and

Englund and Gerdin (2008) presented a training process which was able to create a level of non-accounting ownership because it gave information on the needs of ABC applications and the design and patterns of use which led to agreement, understanding, and increasing levels of non-accounting ownership. This leads to H5 and H6.

H5: ABC system training has a positive effect on ABC implementation success.

H6: ABC system training has a positive effect on non-accounting ownership.

2.4 Links to performance evaluation

Links to performance evaluation refers to the level of use of information from ABC systems when performing evaluation (Shields, 1995; Foster & Swenson, 1997). Normally, payroll and wage systems are designed to motivate employees' commitment to tasks. Performance and evaluation consist of two steps: setting work standards and evaluation. Evaluation depends on indicators such as time and cost reduction and product increase. Prior research pointed to a link to performance evaluation being affected by ABC implementation success (Baird et al., 2007). This is because employees realize the importance of incentives and evaluation. This has an effect on the desire to work to reach objective and so influences performance. However, links to performance evaluation should be made across the entire organization because this enhances the level of involvement, participation, importance, and awareness for all employees who involve in the ABC system and this affects non-accounting ownership.

As mentioned earlier, if firms link data and information from ABC systems to performance evaluation, this will affect the behavior of all employees in the organization because they will focus on what is being evaluated. This will lead to an increased commitment to the ABC project and help contribute to a sense of ownership, involvement, and participation as well as to non-accounting ownership. Moreover, if employees focus on and commit to the ABC system, this will affect positively the performance and implementation of the project. This leads to hypotheses 7 and 8.

H7: Link to performance evaluation had a positive effect toward ABC implementation success.

H8: Link to performance evaluation had a positive effect toward non accountings ownership.

2.5 Non-accounting ownership

Non-accounting ownership refers to the degree of involvement and participation of non-accounting departments such as engineering, production, and marketing in the implementation of ABC systems (Chongruksut & Brook, 2005). The degree of involvement and participation depends on management policies and the extent to which they see the importance of such a personnel system within the organization. Links to performance evaluation affects non-accounting ownership because workers pay more attention to what they are being evaluated on and they try to meet goals or standards set in order to gain promotion, pay rises or other compensation.

Implementation of an ABC system is a company-wide project, not one which belongs only to accountants so the success of the implementation depends on the involvement of all employees. In cases where accountants do own the project, this may lead to less shared ownership, less involvement, and lower levels of implementation success. Past research shows that a significant factor causing delays in ABC projects is a lack of participation and involvement of stakeholders, such as factory and production managers (Malmi, 1997). Moreover, if firms are determined that non-accounting manager should share ideas with ABC project before implementation; this will affect success (Madji & Sulaiman, 2008). Cotton et al. (2003) showed that accountants' involvement in the design stage may not affect ABC implementation success. Hence, as mentioned above, ABC projects are company-wide projects (not accountant-only) due to the needs for system data, involvement, and the commitment from employees. This increases the degree of success and leads to hypothesis 9.

H9: Non-accounting ownership had a positive effect on ABC implementation success.

3. Research design

3.1 Data collection

The researcher collected data from a database of Thai industrial standard institutes provided by the Ministry of Industry. This consisted of 2351 firms with ISO 9000 (http://app.tisi.go.th/syscer/9000_t.html, accessed September 1, 2012). The population covers 64 industrial types (for example, metal products and plastic products). Simple random sampling was used to select 900 firms. The respondents were 181 companies. 7 documents were not completed so 174 were used in this study. The effective response rate was approximately 19.33% which met the criteria of Smith (2003), who says that a response rate for accounting research less 25% is normal and still useful for testing. Of this number, 95 firms had implemented ABC and this constitutes the final sample size. To verify non-response bias, the first and second waves of data were compared as recommended by Armstrong and Overton (1997). The results showed no significant difference so we conclude that there is no non-response bias in this study.

3.3 *Measurements*

The variables were selected and adopted from prior researches. All question items were in English. To avoid problems that may arise from translation, the research questions for this research were translated from English to Thai and then translated back to English by two independent translators)Brislin, 1997). This is to ensure content validity and consistency with prior researches.

This research measures TMS by four items. This is in order to evaluate the level of support from top managers in terms of material, equipment, morale, and motivation as well as commitment to ABC system. This is adopted from Krumwiede (1998) and Baird et al. (2007).

The NAO variable measures the degree of involvement and participation of non-accounting departments. Variables include level of involvement, level of commitment, and level of data are shared by accountants. These questions are adapted from Cagwin and Bouwman (2002) and Chongruksut and Brook (2005).

LPE is measured by four items, which are adopted from Anderson and Young (1999), and Chongruksut and Brook (2005). These evaluate the degree of linkage between the ABC system and performance evaluation, which influences the intentions and commitments of employees.

The AST variable is measured by four items which are adapted from Shields (1995), Cagwin and Bouwman (2002), and Chongruksut and Brook (2005). Those measurements capture the degree of ABC system training, which directly affects knowledge, understanding, and the objectives of ABC adoption. It includes, for example, the level of training at all stages, design, implementation and the use and benefits of training.

AIS is measured by five items adopted from Anderson and Young (1999). All items capture the level of overall satisfaction with the ABC system. This includes the level of agreement that use of the ABC system outweighs its cost or that it is a useful tool to help control costs.

3.4 Method

Measurement is via a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The statistics used include descriptive statistics, namely mean, standard deviation, percentage, and inferential statistics, namely structural equation model (SEM) by PLS-SEM, which has been utilized by other researchers in the context of managerial accounting research, for example Hall (2008), Hartmann and Slapnicar (2012) and Burkert and Lueg (2013). In this paper the researcher uses PLS-SEM for two reasons. 1) the small sample size (95 cases) and 2) the principle objective of this research is to drive ABC implementation success, not to confirm a theory and so selection PLS-SEM is more appropriate than CB-SEM (Hair et. al., 2011).

4. Results

The characteristics of firms with ISO 9000 are shown in Table 1. These companies are in various industries: metal producers (19.54%), wholesale/retail trade (17.24%), and electrical machinery (13.79%). The majority of

companies have operated for more than 15 years (52.30%), the number of staff is not over 300 (47.70%), and there are 95 firms implementing ABC projects (54.60%).

Table 1. Sample characteristics.

		Proportion (no.) N = 174
Industry	number	%
Metal product	34	19.54
Wholesale/retail trade	30	17.24
Electrical machinery	24	13.79
Transport and supporting activities	21	12.07
Plastic products	14	8.05
Other chemical products	12	6.90
Cement/concrete	10	5.75
Basic chemicals	8	4.60
Computer and related activities	8	4.60
Construction	7	4.02
Other	6	3.44
Years company has been established		
1 to 5 years	15	8.62
5 to 10 years	21	12.07
11 – 15 years	47	27.01
Over 15 years	91	52.30
Number of full-time employees		
1 to 300	83	47.70
300 to 600	51	29.31
601 to 900	21	12.07
Over 900	19	10.92
ABC adoption and implementation		
No plan to adopt	42	24.14
Intention to adopt	37	21.26
Implemented	95	54.60

The results of confirmatory factor analysis show that all 20 items are appropriate to each construct due to the factor loading scores having a value from 0.763 to 0.925. The scores above 0.70 are acceptable and thus all items are statistically significant, as per Hair et al. (2001). Table 2 details mean, standard deviation, as well as Cronbach's alpha score; the mean of each variable was between 3.729 and 3.862. LPE variable had the highest mean, followed by AST, NAO, TMS, and AIS respectively. Cronbach's alpha score ranged from 0.880 to 0.931, above the suggested threshold of 0.70 (Nunally & Bernstein, 1994).

Table 2. Descriptive statistics and factor analyses

Construct/item	**Loading**	***t*-stat**	**Mean**	**S.D.**	**Min**	**Max**
Top management support (TMS) $\alpha=$ 0.931			3.746	0.720		
Upper management has provided time and commitment to the ABC implementation effort	0.896	48.996	3.768	0.792	1	5
This company's top managers have provided adequate resources for ABC practice	0.905	43.338	3.779	0.732	2	5
Top management effectively communicated its support for ABC system.	0.916	47.856	3.716	0.807	1	5
Top management has clear and concise objectives of ABC system and share to both designers and users.	0.922	55.786	3.716	0.834	2	5
Non accounting ownership (NAO) $\alpha=$ 0.900			3.766	0.696		
The non accounting (such as production/ marketing groups and so on) are committed to use ABC information	0.925	55.131	3.811	0.789	2	5
The implementation team was cross-functional	0.916	51.221	3.674	0.778	2	5
The accountants have shared their ownership of information with non-accountants	0.897	35.429	3.811	0.719	2	5
Link to performance evaluation (LPE) $\alpha=$ 0.880			3.862	0.685		
In this ABC model, high performance is recognized and rewarded	0.904	40.284	3.900	0.765	2	5

ABC data have been used for performance evaluation	0.763	15.448	3.979	0.772	2	5
Compensation systems in the company are designed to motive employees to implement ABC	0.873	29.642	3.768	0.831	1	5
In this ABC model, financial rewards are tied directly to performance	0.891	38.224	3.716	0.821	1	5
ABC system training (AST) α= 0.918			3.824	0.616		
Adequate training was provided for designing ABC	0.883	32.187	3.726	0.721	2	5
Adequate training was provided for implementing ABC	0.899	39.375	3.863	0.694	2	5
Adequate training was provided for using ABC	0.907	50.719	3.800	0.693	2	5
Education from ABC training (such as software training) was useful and can apply to ABC system.	0.895	43.989	3.895	0.644	2	5
ABC implementation Success (AIS) α= 0.892			3.729	0.603		
In general ABC is a good thing for this company.	0.834	25.994	3.895	0.707	2	5
Despite the implementation challenges, I am convinced that ABC is the right tool for helping us manage cost in the company.	0.859	29.592	3.674	0.750	2	5
Overall, the benefits of ABC data outweigh the costs of installing a new system.	0.820	17.494	3.674	0.736	2	5
Supporting ABC is the right thing to do is this company	0.822	25.513	3.695	0.730	2	5
If I were asked to decide whether this company should continue implementing ABC, I would vote to continue	0.845	28.334	3.705	0.682	2	5

Table 3 found that the composite reliability score of all constructs ranged from 0.909 to 0.951, above the recommended threshold of 0.70 (Nunnally & Bersnstein, 1994) so we can conclude that it is reliable. To ensure validity of the measurement model, convergent validity and discriminant validity (which are related to the Average Variance Extraction score (AVE)) should be above 0.50 because indicators or items explain more than half of the variance. The results of PLS-SEM in Table 3 show AVE scores of 0.699 to 0.833, indicating that all items had convergent validity. To establish discriminant validity, the researcher used correlation among indicators within the same variables. This had a higher score than correlation between indicators with different variables and this indicates that each construct is able to fit measurement for the content and so are valid)Hair, et al., 2011). The correlation score of TMS is 0.910, which is higher than other scores in the same block, such as the scores 0.692, 0.751, 0.493, and 0.720 so the indicators of TMS fit the measure of their own and are valid too. In conclusion, all variables, through the specified criteria, are acceptable.

Table 3. Quality of structure and measurement models

Construct	CR	AVE	R^2	Cross construct correlation				
				TMS	AST	NAO	LPE	AIS
Top management support	0.951	0.828	-	**0.910**				
ABC system training	0.942	0.803	0.479	0.692	**0.896**			
Non-accounting ownership	0.937	0.833	0.682	0.751	0.758	**0.913**		
Links to performance evaluation	0.919	0.739	0.243	0.493	0.410	0.483	**0.860**	
ABC implementation success	0.921	0.699	0.675	0.720	0.719	0.763	0.528	**0.836**

CR = composite reliability, AVE = average variance extraction

4.1 Results of hypothesis testing

From the structural equation model analysis conducted with Smart-PLS techniques, as per Figure 2, it was revealed that TMS, AST, NAO, and LPE had direct and indirect effects on AIS. TMS had direct effects on AST at a coefficient path value equal to 0.692 and with R^2 value equal to 0.479. TMS had a direct effect on LPE with a coefficient path value equal to 0.493 and with R^2 equal to 0.243. AST had direct effects on NAO with coefficient path value equal to 0.442. TMS had direct effect on NAO with a coefficient path value equal to 0.392. Variables TMS, AST, and LPE predict NAO equal to 68.2 percents. NAO had direct effects on AIS with coefficient path value equal to 0.333. AST had direct effects on AIS with coefficient path value equal to 0.251. TMS had direct effects on AIS with coefficient path value equal to 0.219. LPE had direct effects on AIS with coefficient path value equal to 0.156 and LPE had direct effects on NAO with coefficient path value equal to 0.108. In addition, variables TMS, AST, NAO, and LPE predict AIS equal to 67.5 percents. The results of the hypothesis testing (Table 2) show that the value of t-stat ≥ 1.96, indicating a statistical significance of .05 and a value of t-stat ≥ 2.58 indicates a statistical significance level of .01, from which it is concluded that all hypotheses were supported.

As regards hypothesis 1, TMS had positive effects on AIS with standardized path coefficient value for TMS to AIS being significant (0.218, p<.05) and hypothesis 1 is thus supported. Hypotheses 2 to 4 stated that TMS had positive influence on AST, LPE, and NAO with standardized path coefficient value for TMS to AST, NAO, and LPE being significant (0.692, p<.01; 0.493, p<.01; 0.392, p<.01) so hypotheses 2, 3, and 4 are supported. Hypothesis 5 and 6 stated that AST had a positive influence on AIS and NAO with standardized path coefficient value for AST to AIS and NAO being significant (0.251, p<.05; 0.442, p<.01). Therefore, hypotheses 5 and 6 are supported. Hypothesis 7 stated that NAO had a positive impact on AIS with standardized path coefficient value for NAO to AIS being significant (0.333, p<.01) so hypothesis 7 is supported. Finally, hypotheses 8 and 9 stated that LPE had positive effects on NAO and AIS with standardized path coefficient value for LPE to NAO and AIS being significant (0.108, p<.05; 0.156, p<.05). Hence, hypotheses 8 and 9 are supported. Based on these results, TMS can be seen as having a direct effect in building ABC implementation success and having positive indirect effects through other constructs, including NAO, LPE, and NAO.

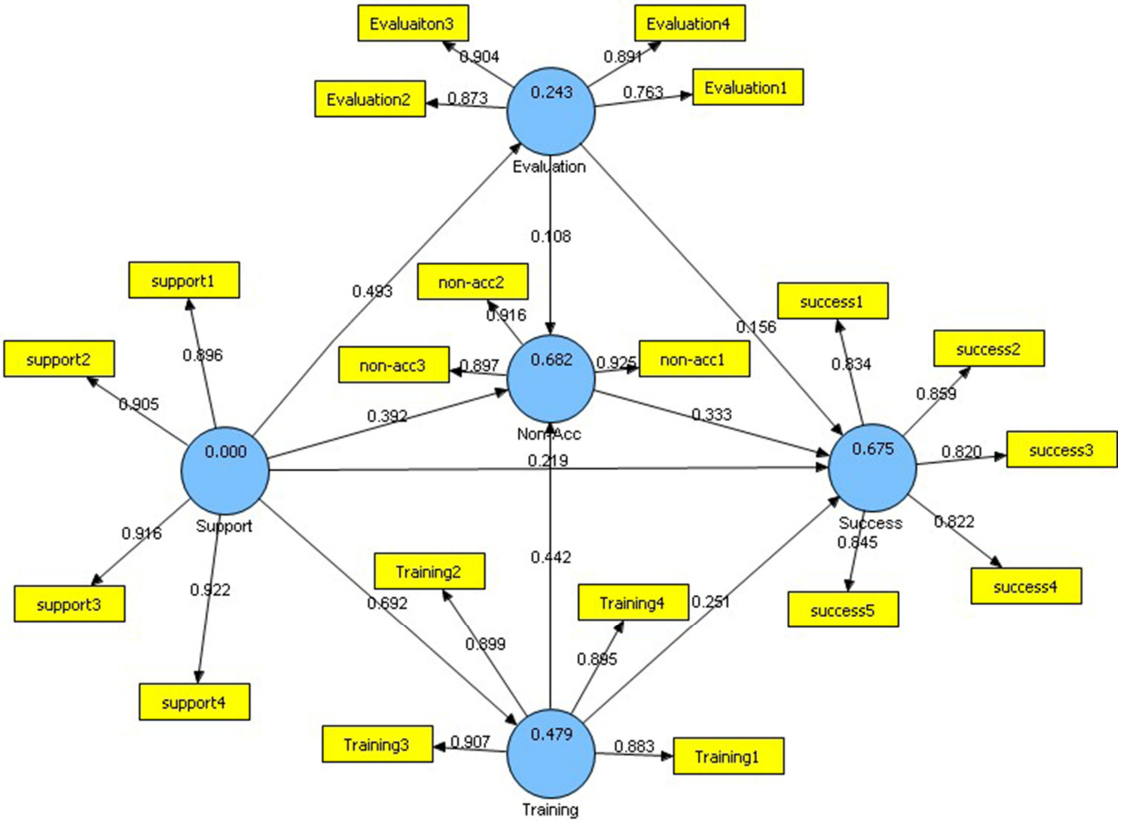

Fig. 2. Analysis of structure equation model with PLS-SEM

Table 5 shows the results of hypothesis testing of PLS-SEM by analysis of direct, indirect and total effects. TMS had the greatest total effect on NAO, with a value equal to 0.751. Direct effects were equal to 0.392 and indirect effects 0.359 through the AST variable (0.692*0.442) and the LPE variable (0.493*0.108). TMS had total effects on AIS with a value equal to 0.720. Direct effects were 0.219 and indirect effects were equal to 0.501 through the AST variable (0.692*0.251), the NAO variable (0.392*0.333), the LPE variable (0.493*0.156) and the LPE and NAO variables (0.493*0.108*0.333), and the AST and NAO variables (0.692*0.442*0.333). The remaining had the following correlations.

Table 4 Outcome of hypothesis testing

Research hypothesis	Coef.	*t*-stat	Conclusion
H1: Top management support had a positive effect on ABC implementation success TMS → AIS	0.218	2.151	Supported
H2: Top management support had a positive effect on ABC system training TMS → AST	0.692	12.257	Supported
H3: Top management support had a positive effect on links to performance evaluation TMS → LPE	0.493	6.360	Supported
H4: Top management support had a positive effect on non-accounting ownership TMS → NAO	0.392	4.012	Supported
H5: ABC system training had a positive effect on ABC implementation success AST → AIS	0.251	2.445	Supported
H6: ABC system training had a positive effect on non-accounting ownership AST → NAO	0.442	4.776	Supported
H7: Non-accounting ownership had a positive effect on ABC implementation success NAO → AIS	0.333	3.895	Supported
H8: Links to performance evaluation had a positive effect on non-accounting ownership LPE → NAO	0.108	2.114	Supported
H9: Links to performance evaluation had a positive effect on ABC implementation success LPE → AIS	0.156	2.329	Supported

Note: Remark: t-stat ≥ 1.96 indicates statistical significance at 0.5, ≥ 2.58 indicated statistical significance at 0.1

Table 5 Outcomes of direct, indirect and total effects analysis

Antecedent	R^2	Effects	Dependent Variable			
			AST	NAO	LPE	AIS
Top management support	-	DE	0.692	0.392	0.493	0.219
		IE	N/A	0.359	N/A	0.501
		TE	0.692	0.751	0.493	0.720
ABC system training	0.479	DE	N/A	0.442	N/A	0.251
		IE	N/A	N/A	N/A	0.148
		TE	N/A	0.442	N/A	0.399
Non accounting ownership	0.581	DE	N/A	N/A	N/A	0.333
		IE	N/A	N/A	N/A	N/A
		TE	N/A	N/A	N/A	0.333
Links to performance evaluation	0.243	DE	N/A	0.108	N/A	0.156
		IE	N/A	N/A	N/A	0.036
		TE	N/A	0.108	N/A	0.192
ABC implementation success	0.675	DE	N/A	N/A	N/A	N/A
		IE	N/A	N/A	N/A	N/A
		TE	N/A	N/A	N/A	N/A

Note: TE = Total Effect, DE = Direct Effect, IE = Indirect Effect, N/A = Not applicable R^2 = Sum Square Regression % Sum Square Total of each block (Antecedent / Dependent Variable). The value of 0.190 – 0.330 = Weak, of 0.331 -0.671 = Moderate and of 0.671 – Higher = Substantial.

5. Discussion and conclusion

ABC is an accounting technique that helps managers collect information and this explains why many organizations adopt this technique. However, the ABC technique requires large quantities of resources, including money, equipment, and personnel. Adopted ABC companies ought to focus on behavioral and organization factors which past research has shown to have an influence on its success. This research thus had three main objectives 1) to examine the direct and indirect effects of TMS on ABC system training, non-accounting ownership, links to

performance evaluation and ABC implementation success, 2) to investigate the effects of ABC system training on non-accounting ownership, and 3) to study the influence of links to performance evaluation on non-accounting ownership. This paper adopted the Resource Based View (RBV) as background for the conceptual model. Questionnaires were used to collect data from companies with ISO 9000 certification and the key participants were 95 accounting managers.

The results show that TMS had direct effects on ABC implementation success due to top managers playing a leading role in making companies meet their objectives. Managers direct and motivate employees to meet policy and regulations and therefore, if top managers support the ABC project with material, equipment and a commitment to use information from the ABC system, this will influence ABC implementation success. This is confirmed by Shields (1995), Foster and Swenson (1997), Anderson and Young (1999) and Byrne (2011), who stated that TMS is a critical determinant of ABC success. TMS has indirect effects on AIS through the AST, LPE, and NAO variables and this was greater than the direct effects. Top managers should therefore focus on and commit to their role as managers in the ABC project in terms of planning, controlling, checking, evaluating, and making decisions with regards to training, performance evaluation, and determining policy, more than through direct action. This result is consistent with Thai society, which is thought to show a high power distance. If managers play a greater role, this may reduce the involvement of other employees or raise objections which may cause failure of the ABC system. This is in the line of Baird et al. (2007), who suggested that the degree of top management support differentiates each stage of the ABC system. This finding is significant for ABC implementation success in the context of ISO 9000 certified companies in Thailand. ABC projects need the upper management to take action at the adoption stage. At the acceptance and routinization stages, managers should reduce their role in order to give opportunities to all employees to share ideas, take more ownership, and become more involvement in the project. However, top managers should increase their involvement again when the project is at the infusion stage because this stage uses information to improve the bottom line statement and build competitive advantage. Therefore, top managers make decisions to cut non-added activity and use ABC information for planning, allocating, and controlling all business functions.

TMS had positive direct effects on AST, LPE, and NAO due to managers having authority and being the last person to make decisions related to AST, linking outcomes of ABC performance to evaluation, and determining policies regarding employees' involvement. Top managers determine policy and regulation through their decisions and endorsements and this is similar to Masquefa (2008), who said that the process of adaptation correlates with performance evaluation, especially in new management systems. In addition, Malmi (1997) showed that lack of experience with ABC systems was the main cause of their failure. However, transfer of experiences occurs with ABC system training and this can solve the problem by involving external consultants, who have more experience and it is the job of top managers to facilitate this. If top managers determine clear and concise objectives for the ABC project, this will affect employees' engagement, involvement and participation and so increase the degree of ABC implementation success.

AST had positive effects on AIS because training not only helps employees understand the ABC system but also provides knowledge and skills to staff. Moreover, adequate training is the main determinant that helps manager decision to implement ABC (Nassar et al., 2013). An important aspect of training on ABC is its variety, such as that from software training provided by external experts. Shields (1995) and Krumwide (1998) argue that ABC system training increases the degree of ABC implementation due to its being able to establish understanding of the objectives of designers and users, reduce restrictions on adoption of the new system as well as establishing positive attitudes in trainees. In addition, AST had a positive influence on creating non-accounting ownership because training provides data and information about the reasons for adaptation, design, and the ways to use the system and this is an important tool in helping employees learn to become involved in an ABC project (Englund & Gerdin, 2008).

LPE had a positive influence on AIS because performance evaluation is important in shaping behavior and the workforce's attitude (Argyris & Kaplan, 1994) and employees are more likely to commit to that which they are evaluated on for their salary and bonuses (Langfield-Smith et al., 1998). Links between ABC implementation success and performance evaluation renders awareness, motivation, and desire to succeed with the ABC system and this affects the level of ABC implementation success. This is consistent with Shields (1995), Foster and

Swenson (1997), and Baird et al. (2007) who claimed that if firms link data and information from ABC directly to performance evaluation system, this will cause employees to focus on ABC data which raises the degree of ABC implementation success. Furthermore, LPE had positive direct effects on NAO because if firms use this system throughout the entire organization, all employees will see the importance of the ABC system to the company's operation, not only in terms of providing information but also increasing its competitive advantage. Performance of the organization will therefore be better, work more stable and productivity will increase. This will affect the level of cooperation and the level of participation with the ABC system.

NAO had positive influences on AIS activity based on costing as an accounting innovation. Nevertheless, adoption and implementation depend on the involvement and participation of many departments, both at managerial and operational levels. Participation helped employees understand the objectives of ABC and increased acceptance of it, which led to increased commitment and project success. This is in line with Chongruksut and Brook (2005) and Hoozée and Bruggeman (2010) who stated that important factors in smooth ABC implementation include building up non-accounting ownership and the participation of all the workforce in the design process, especially at the operational or lower levels. Moreover, McGowan and Klammer (1997) argued that to increase involvement of all employees, an increase in the level of staff satisfaction is needed. This may be accomplished by providing the right knowledge and correct procedures, hence the ABC system.

These results are beneficial to firms that are deciding to adopt or implement the ABC system because they will help manager to understand the role of top management support. In particular, the role of TMS in the ABC system means that in the early stage of implementation, managers should focus on and commit to the project. Top managers should reduce their roles and use management processes such as planning, commanding, motivating, evaluating, and decision making. Moreover, this research shows that non-accounting ownership had an effect on AIS so managers need to build up involvement and develop the participation of all employees to ensure ABC project success. The Process to build up cooperation may link ABC information and success to performance evaluation system. In addition, it can create training process by indicating clear purpose for employee to realize the benefit of organization which will receive and lead to the acceptance and involvement at the end.

Based on the results of this study, the researcher recommends future research as follows. First, the results indicate that TMS had direct and indirect effects on AIS. The indirect effects were greater than the direct effects because this study concentrated on the implementation stage. Therefore, future research should look at how each stage of implementation is affected by the level of TMS. Second, NAO had the greatest total effect on AST and thus future research should focus on how to build involvement and participation in the ABC system. Third, the sample for this study was ISO 9000 certified companies in Thailand which had an application rate higher than 50 percents. Future research should study procedures and practices which combine ISO 9000 and ABC systems in order to use resources more efficiently. Fourth, this research focuses on behavioral and organizational factors. Future research could look at all antecedents and consequences of implementing ABC systems by using the two important antecedent factors technical factor and behavioral and organizational factor or financial and non-financial factors in order to understand the ABC system clearly.

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