



# ABC success: evidence from ISO 9000 certified companies in Thailand

ISO 9000  
certified  
companies in  
Thailand

287

Phaithun Intakhan

*Faculty of Management Science, Lampang Rajabhat University,  
Lampang, Thailand*

## Abstract

**Purpose** – The purpose of this paper is to examine the success of activity-based costing (ABC) implementation by confirmatory factor analysis of ISO 9000 certified companies in Thailand.

**Design/methodology/approach** – A structured questionnaire was used to collect data from key participants, accountant managers in ISO 9000 certified companies.

**Findings** – The study confirmed the six constructs for the sample of 102 key participants. The results indicated that ABC implementation success in the context of ISO 9000 certified companies in Thailand consists of upper-management support, ABC system training, non-accounting ownership, links to quality initiative, adequate resources, and links to performance evaluation.

**Originality/value** – The findings have significant implications for ISO 9000 certified companies which intend to adopt or implement ABC. Past findings on ABC implementation success have a small-sample size so they are of limited usefulness. This research has a larger sample size and more carefully chosen participants and so the generalizations are more acceptable.

**Keywords** Thailand, ABC implementation success, ISO 9000

**Paper type** Research paper

## 1. Introduction

Information quality is important when conducting business, not only domestically but also globally. Accounting information helps managers make sound decisions, such as setting prices, measure performance, manage costs, and model costs and process improvements (Majid and Sulaiman, 2008; Smit *et al.*, 2008). However, traditional costing is not timely, and may be inaccurate or too detailed, and this information overload may be harmful to decision making (Schick *et al.*, 1990; Smit *et al.*, 2008). The traditional accounting approach often uses a single or departmental base, allocating cost to objects or products, for example through labor hours, machine hours, and production units employed (Majid and Sulaiman, 2008) and it is therefore not appropriate for firms which have many products or services and these firms require a new costing method in order to allocate costs and monitor cost effectiveness (Foong and Teruki, 2009).

Activity-based costing (hereafter ABC) is an innovative accounting method to allocate overheads and costs with a higher degree of accuracy and to assign costs to products and services according to the activities and resources consumed (Smit *et al.*, 2008). ABC uses cost-drivers to allocate the costs of products and services (Banker *et al.*, 2008). ABC not only improves the accuracy of product- and service-costing but also helps managers understand how resources are used through financial performance, such as return on investment and bottom line statements (Cagwin and Bouwman, 2002). Prior research on ABC has focussed on various aspects, including, for example the success of ABC



---

(Anderson and Young, 1999; Foster and Swenson, 1997; Roberts and Silvester, 1996; Shields, 1995), ABC implementation (Gosselin, 1997; Krumwiede, 1998; Majid and Sulaiman, 2008; McGowan and Klammer, 1997; Chongruksut and Brooks, 2005), and the benefits and consequences of ABC (Ittner *et al.*, 2002; Kennedy and Affleck-Graves, 2001; Swenson, 1995; Cagwin and Bouwman, 2002; Maiga and Jacobs, 2008). In this paper, we focus on ABC implementation success and factors influencing this. Past research identified two main factors affecting ABC success, namely technical and contextual, and behavioral and organizational variables. However, this paper focusses on contextual, behavioral and organizational variables because these are more strongly associated with ABC success than are technical variables (Shields, 1995). We use five significant constructs of the Shields (1995) model, namely top management support (TMS), ABC system training (AST), links to performance evaluation (LPE), links to quality initiatives (LIQ) and the adequacy of resources, along with one suggestion from Chongruksut and Brooks (2005), non-accounting ownership (NAO), to analyze ABC implementation success in the context of ISO 9000 certified companies in Thailand.

ABC implementation success refers to the degree to which management uses ABC information for decision making in order to improve financial performance (Foster and Swenson, 1997). This paper measures the success of ABC by support for, and the convenience and benefits of, the ABC system (Anderson, 1995; Chongruksut and Brooks, 2005). The research used confirmatory factor analysis (CFA) in order to investigate the six behavioral and organizational constructs on ABC implementation success. This research collected data from ISO 9000 companies in Thailand because ISO 9000 and ABC support continuous improvement efforts in quality and productivity (Brimson and Antos, 2004; Larson and Kerr, 2007). Therefore, firms with ISO 9000 should apply ABC. In addition, there are many benefits accruing from ISO 9000 registration. These include, for example, giving customers confidence in the quality of the products and services, helping written management systems control effectively the business process life-cycle, ensuring that management can meet the needs of customers and reduce losses in operational quality and maintain cost savings. In Thailand, businesses that are ISO certified tend to have their customer base abroad, such as in the EU and USA, which emphasize quality systems. Thus, if businesses adopt ABC and so make accurate cost analysis, this can help to specify constraints and cut unnecessary costs. Businesses that are ISO certified should therefore use the ABC system because this involves a similar process. This is in agreement with Sayle (2005), who noted that ABC is a technique that enhances the work process and is in accord with ISO 9000. Furthermore, the research of Larson and Kerr (2007) recommended that ISO certification and ABC can work together by separating functional departments. ABC is typically implemented by accounting and finance sections and ISO is usually implemented by the quality group. In addition, sales and marketing is an important function linking data with finance, accounting, and manufacturing systems. Besides, the number of ISO 9000 companies is also expected to increase steadily; in Thailand, numbers have increased from 1,835 in 2012 to 2,351 in 2013. This research is thus useful for companies entering the ISO system and adopting the ABC. Here, the key research question is to confirm the six constructs (top-management support, NAO, adequate resources (ADE), LPE, AST, and LIQs), and whether these match the models of Shields (1995) and Chongruksut and Brooks (2005) in the context of companies that are ISO 9000 certified and which apply ABC.

This research makes several important contributions. It is the first known examination of ABC implementation success in the context of ISO 9000 companies. Second, it focusses only on behavioral and organizational variables which are strongly

associated with ABC success. Finally, there is very little prior research on the success of ABC implementation in Thailand. This study is structured as follows. The relevant literature on all six constructs is reviewed. Next, the research methods used to test the CFA are discussed and lastly come the results, a discussion on the findings and the conclusion.

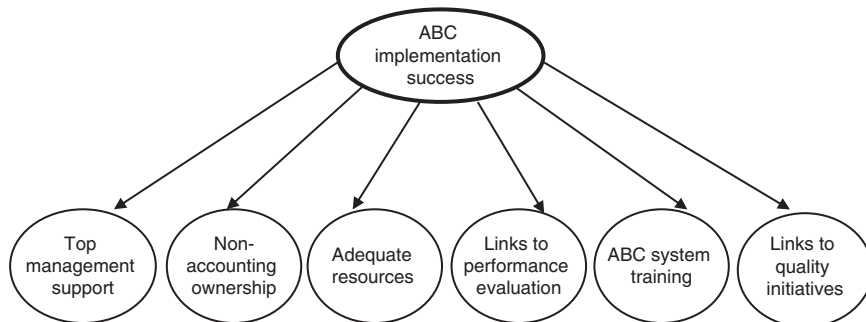
**2. Literature review**

In this study, TMS, NAO, adequacy of resources, links to performance measurements, AST, and LIQs are related to the success of ABC implementation in ISO 9000 certified companies in Thailand. To investigate the stability of the relationship between evaluations of ABC implementation success and these factors, a conceptual model is presented involving the CFA of ABC success of ISO certified companies in Thailand, as shown in Figure 1.

This model is combined with two academic sources: Shields (1995), who was the first to explore contextual, organizational, and behavioral factors associated with ABC success, and Chongruksut and Brooks (2005), who studied ABC adoption and success in Thailand. They ranked five factors affecting ABC implementation success, including TMS and commitment, clear and concise objectives, and non-accounting commitment and ownership. This paper investigates the clarity of the objectives of upper-management because, given the nature of Thai society, the effectiveness of these objectives, and the degree to which they are met depends on management (Morakul and Wu, 2001) and hence, we use the concept of NAO to measure ABC implementation success.

*2.1 Why ABC implementation success is important for companies that emphasize on quality*

ISO 9000 is a basic principle of quality management systems consisting of five processes: process mapping, documentation, performance, audit, and corrective action (Larson and Kerr, 2007). A quality system is a set of management activities by which company efficiency is improved through factors such as quality improvement and cost reduction. ISO 9000 can help firms establish the agenda required for effective and efficient quality assurance and quality management systems (Bhuiyan and Alam, 2005). The benefits accruing to ISO qualification for companies may be separated into internal and external. The internal benefits are that employees gain a better understanding of work processes and responsibilities as well an awareness of quality-improvement culture through teamwork, management support and participation, and better optimization of resources (McDonald *et al.*, 2003; Chin *et al.*, 2000; Santos and Escanciano, 2002). The external benefits are improved market and company reputation, higher perceived quality, cost reduction, and customer service improvement (Larson and Kerr, 2002;



**Figure 1.**  
Conceptual model of ABC  
implementation success  
of ISO 9000 certified  
companies in Thailand

---

Brack, 1999; Bhuiyan and Alam, 2005). ABC ties overhead cost and direct costs to specific products, services or customers by activity, and also highlights the activities of the companies as well as using cost drivers as an important instrument to allocate costs. Firms with ABC implementation success are more likely to have accurate product and service costs, cost control improvements, and to eliminate waste by providing unnecessary non-added activities. Hence, ABC information can support managers when establishing cost reduction programs and can also help firms manage activities focussed on decreasing costs and increasing quality. Costs can be decreased by reducing unnecessary expenditure, and reducing the time taken to produce products and services. Quality can also be increased by more efficient planning of production activities and material handling, quicker delivery, and reducing waste. In addition, prior research shows that the many steps involved in successful ISO 9000 registration are also required to implement ABC, including items such as ABC implementation of linking activities to objects, when the results will be used in the process of ISO 9000 evaluation (Larson and Kerr, 2002). Moreover, ABC and ISO are similar in the way that they focus on documentation and managing activities. In conclusion, successful ABC implementation not only gives information on costs and processes but also assists firms in emphasizing quality.

### *2.2 ABC in Thailand*

There has been limited research focussing on ABC success in Thai organizations. However, Chongruksut and Brooks (2005) surveyed 292 listed companies in the Bangkok region regarding issues associated with ABC adoption and implementation. They found that 14 (35.65 percent) of the firms had adopted ABC and that the rate of ABC adoption in Thailand was relatively high compared to other Asian countries. Organizations with a larger range of products and with a higher intensity of capital equipment were more likely to adopt ABC. Moreover, the researchers explained that upper-management support and the clarity of the objectives of the ABC implementation among ABC designers and users were the most important factors determining the success of ABC implementation. In addition, Tupmongkol (2008) showed that nine main factors including TMS, computer systems, education and training, the ABC team, the objectives of ABC implementation, the ABC implementation process, the benefits of ABC implementation, problems with ABC implementation, and the level of progress of ABC implementation influenced the success of ABC. Morakul and Wu (2001), who studied the relationship between culture and ABC implementation, found that the key factor determining the failure of ABC was the high-power distance in Thai society, which led to accountants being afraid of losing their power. The above studies focussed on company adoption and implementation but had the limitation of small sample sizes. This study extends the work in these areas, particularly with regard to the success of ISO 9000 certified firms in Thailand because ISO 9000 supports continuous improvement efforts in quality and productivity so that firms with ISO 9000 should apply ABC and this leads to the research having a larger sample size.

### *2.3 Measurement of ABC implementation success*

Ways of assessing ABC implementation success can be divided into two categories; first, the overall success level and second, the attainment of a particular stage of implementation. The main purpose of measuring overall success is that the meaning of success was problematic and past literature was not clear about this meant. Several authors have used this idea, including Shields (1995), who measured overall success

through two questions: first, "Overall, how successful do you believe the ABC initiative in your firm has been?" second, "Whether financial benefits had or had not resulted from ABC?" Anderson and Young (1999) measured the overall success of the ABC system, but substituting for "overall value of ABC," "perceived accuracy of ABC data," and "perceived use of ABC data." Chongruksut and Brooks (2005) asking participants to rate perceptions of the success of implementation of ABC in their firms and divided in to five level; "very poor," "poor," "average," "good," and "very good." To measure particular stages of implementation, Anderson (1995) said that successful measurement of implementation of ABC was a multidimensional composite measure. Foster and Swenson (1997) measured the success of the ABC dimensions by using a variety of tools consisting of measurements based on the use of ABCM information in decision making, measurements based on decisions taken with ABCM information, measurements based on the dollar improvements resulting from ABCM and measurements based on management evaluation on the overall success of ABCM. Moreover, Gosselin (1997) has identified three levels of ABC including AA "to identify the activity," ACA "to identify the costs of each activity," and ABC "to trace costs of products and services." Research measuring the success of ABC prefer multidimensional measures. For example, Baird *et al.* (2004) used Gosselin's (1997) and Byrne's (2011) success model to measure the success of ABC implementation. This was divided into user attitude, technical characteristics, perceived usefulness in improving user job performance, and organizational process.

In Thailand, research involving ABC is relatively rare because Thailand is a developing country and the rate of adaptation of modern accounting management techniques is limited. Chongruksut and Brooks (2005) found only 14 companies that had implemented the ABC system, and the research of Tupmongkol (2008) and Morakul and Wu (2001) were limited to case studies. To ensure the appropriate population group, this research measures the success of the costing system activity by asking participants to rate perceptions of the success of implementation of ABC in their firms, which is similar to Chongruksut and Brooks (2005). This was divided into five levels: "very poor," "poor," "average," "good," and "very good." Totally, 13 companies answered "very good," 32 "good" and 57 "average."

#### 2.4 TMS

This refers to the degree of visible support from senior or top managers for ABC (Anderson and Young, 1999). Prior research mentioned that this is a significant factor affecting the success of ABC implementation (Anderson and Young, 1999; Chongruksut and Brooks, 2005). This support is important when using information from ABC systems to communicate with non-accounting staff in order to promote and support ABC (Shields, 1995). In addition, Majid and Sulaiman (2008) stated that a steering committee should oversee ABC implementation and should comprise top-level management in order to ensure that the staff committee was on the right track. Moreover, senior management should invest in and drive forward ABC projects by providing training and technology. Morakul and Wu (2001) indicated that Thai society had a high-power-distance culture so top managers in Thai companies are those who have power to take action and make final decisions in the firm and therefore they play an important role in monitoring ABC project success.

#### 2.5 LPE

According to past research, LPE are important in determining the success of ABC implementation (Shields and Young, 1989; McGowan and Klammer, 1997; Cagwin and Bouwman, 2002). This factor refers to the degree to which firms increase compensation

---

such as bonuses, promotions, and other financial rewards in relation to the quality of the ABC system. Performance measures consist of setting targets and comparing outcomes with goals and these may be simple or complex indicators, such as the economy, efficiency, or effectiveness (Amir, 2011). These affect job outcomes and organization performance. To link ABC to performance evaluation, Majid and Sulaiman (2008) argued for comparison with actual costs resulting from ABC and internal information, such as last year's numbers, target costs set and external information, such as competitors' costs. When firms link ABC systems and performance measurement through compensation, bonuses and other company benefits, the workforce tends to feel that ABC is important and this builds motivation and leads to ABC success (Shields and McEwen, 1996).

### 2.6 AST

AST refers to the degree of training for designing, implementing and using ABC (Cagwin and Bouwman, 2002). Training is necessary when adopting new systems, such as ABC and it is not only to educate staff on the reasons to adopt ABC, but also to reduce resistance to it (Shields, 1995). For design-state training, it is necessary to help employees understand the technical aspects of ABC, such as its design and the necessity of providing adequate computing resources (Anderson *et al.*, 2002). Implementation-state training is also important because training improves the skill levels of employees in, for example, the use of software written by external consultants (Majid and Sulaiman, 2008). With regard to state training, this is essential because training helps staff select information to present to senior managers to assist in decision making. Past research confirms that training is important for ABC success. For example, Krumwiede (1998) found a highly significant relationship between ABC training programs and levels of success in implementing ABC and Shields (1995) stated that the training program affects the level of satisfaction with ABC, which is one method to measure ABC success.

### 2.7 NAO

ABC is really a whole-firm project, not an accounting project; when ABC is owned by accountants, this increases the risk of failure and so NAO refers to the degree of commitment of groups or individuals (such as design engineers and operations staff) who are not accountants but who are involved in the ABC model (Chongruksut and Brooks, 2005). Morakul and Wu (2001) showed that Thai society involves a high-power distance so if only the accounting department are responsible for an ABC project, they may be afraid to lose the power which they hold through control of information important to other departments. ABC projects should therefore involve the entire company and require the participation of all parts of the organization. Cooper *et al.* (1992) stated that the main factor causing ABC delay is accountants being in sole control of an ABC project. Moreover, Maelah and Ibraim (2006) indicated that when non-accountants participate in the early stages of ABC implementation, the project is more successful. NAO includes the commitment of people and groups in the company who are not accountants to using ABC information and this has consequences for senior management support, training and the linkage of ABC to performance measurement. This induces employees to acknowledge and implement better the ABC system.

### 2.8 ADE

An ABC project requires plentiful resources, including, for example an ABC team, software, hardware, time, and people (Majid and Sulaiman, 2008) so ADEs refers to the

---

material and people needed to complete an ABC project successfully. Resources are needed for all states of ABC. For example, the implementation state requires adequate funds in addition to understanding, knowledge, and skills. Prior research shows that this influences the success of ABC. Majid and Sulaiman (2008) argued that sourcing suitable ABC software affected ABC success, as did hiring external consultants with the purpose of training employee to use ABC software. Moreover, Krumwiede (1998) and Innes *et al.* (2000) indicated that system design, adoption, and implementation are all time consuming. In addition, firms with sufficient internal resources can reduce levels of resistance to ABC systems (Shields, 1995).

### 2.9 LIQ

LIQ refers to the level of a company's commitment to improving the quality of all parts of an organization by using ABC information and other speed-initiative techniques. The ABC system is a tool providing more accurate and relevant information for company decision making. It is also thought of as a process management tool that is available to support continuous improvement efforts in quality (Larson and Kerr, 2007). Many researchers have argued that if companies can more closely integrate ABC systems and competitive strategy, this would increase the chances of success in developing ABC. Shields (1995) stated that companies could combine ABC with quality initiatives such as just-in-time, TQM, and other speed initiatives so that higher degrees of ABC success could be reached. Similarly, Shields and McEwen (1996) found that firm links between ABC success and quality initiatives is more likely to lead to ABC success. Likewise, Maiga and Jacobs (2008) linked ABC to cost, quality, and cycle-time improvements. The results showed that ABC has a significant positive association with quality improvements. In addition, Innes *et al.* (2000) stated that the success of ABC is related to quality management policies. In summary, ABC systems can help process management in the company when ABC is combined with quality initiative, especially just-in-time, TQM, and six-sigma.

## 3. Research method

### 3.1 ISO 9000 certified companies in Thailand

ISO 9000 is managed by the International Organization for Standardization, an international federation with members in over 130 countries (Larson and Kerr, 2007). It focusses on quality management and assurance and assists firms in successfully documenting quality systems and in their implantation and maintenance. ISO 9000 companies tend to be more profitable than non-ISO 9000 firms so many companies pursue this in order to control and reduce costs (Goodman, 1998). In Thailand, 1,835 companies in 64 industrial categories have so far adopted ISO 9000. The largest of the categories are metal products, wholesale and retail, tools and electrical equipment, transportation and support activities, and plastic products ([http://app.tisi.go.th/syscer/9000\\_t.html](http://app.tisi.go.th/syscer/9000_t.html), accessed September 1, 2012).

The characteristics of the companies in this study are shown in Table I. The organizations in the sample are found in various industrial categories: metal products, wholesale and retail trade, electrical machinery, transport and related activities, plastic products, other chemical products, cement and concrete, basic chemicals, computer and related activities, construction, maintenance and repair of motor vehicles, rubber products, and motor vehicles and transport equipment. All have been in operation for more than 15 years, employ fewer than 300 staff and have successfully implemented ABC. Non-response bias is always a concern in survey

	Porportion (no.) $n = 181$
<i>Industry</i>	
Metal product	38
Wholesale/retail trade	32
Electrical machinery	25
Transport and supporting activities	21
Plastic product	14
Other chemical products	12
Cement/concrete	10
Basic chemicals	8
Computer and related activities	8
Construction	7
Other	6
<i>Years company has been established</i>	
One to five years	15
Five to ten years	21
11-15 years	50
Over 15 years	95
<i>Number of full-time employees</i>	
1-300	90
300-600	51
601-900	21
Over 900	19
<i>ABC adoption and implementation</i>	
No plan to adoption	42
Intention to adoption	37
Implementation	102

**Table I.**  
Sample characteristics

research so to examine the likelihood of this, a comparison of mean scores between early and late respondents (first two weeks against second two weeks) on major constructs (i.e. TMS and NAO) was conducted by *t*-test. This revealed no significant differences and so we conclude that non-response bias is not a problem in this study (Armstrong and Overton, 1977).

### 3.2 Sample selection and data collection procedure

In this study, 900 companies with ISO 9000 were selected using probability sampling (simple random method). The key participants in this study were accounting managers. All items in the questionnaire were adopted from earlier research but all the originals were in English so to improve accuracy, these were translated into Thai and then two independent bilingual individuals back-translated. To confirm the measurement instrument and to guarantee the suitability of the survey administration methods, pre-tests of the questionnaire were conducted with 30 accountant managers. From the comments and findings obtained from this pre-test, a few modifications were made to clarify the language and the sequencing of several items was altered. Data were collected by using a mail survey. 900 questionnaires were sent to key participants for completion. Within eight weeks of mailing the questionnaires, 181 firms had replied 102 which had adopted ABC and this gave a 20.1 percent response rate. According to Smith (2003), such a response rate (i.e. <25 percent) is now common in accounting research and this rate is also considered adequate for statistical examination and the making of inferences.



### 3.3 Measure

Measurement of the variables was governed by their utility in prior academic research. A combined measure of “TMS” was used in the research. Shields (1995) and Baird *et al.* (2007) hypothesized active support, effective communication of ABC in the company, and time and commitment of ABC as factors. Chongruksut and Brooks (2005) theorized that clear and shared objectives in ABC were important.

NAO were measured with a three-item scale consisting of items developed by Cagwin and Bouwman (2002) and Chongruksut and Brooks (2005). The items reflect cross-functional, non-accounting users of ABC information, and the sharing of ABC information between accountants and non-accountants.

ADEs was measured with a three-item scale consisting of items developed by Shields (1995) and adapted by Anderson and Young (1999). The items are adequate staff, information, and equipment and materials.

A four-item measure has been used for performance evaluation. High-performance ABC is recognized through rewards (financial or otherwise) and compensation designed to motivate staff to work toward ABC implementation, which were derived from the LPE. This measurement was developed by Anderson and Young (1999) and Chongruksut and Brooks (2005). Higher LPE scores suggest more firms link ABC to performance evaluation.

AST was measured with a four-item scale, including items developed by Shields (1995), Cagwin and Bouwman (2002), and Chongruksut and Brooks (2005). The items reflect factors such as training provided for design, implementation, and use of ABC and the trainings effectiveness.

A two-item scale, “combine ABC with quality initiative” and “firm commitment to quality improvement,” was developed by Cagwin and Bouwman (2002), and Chongruksut and Brooks (2005). To assess the degree to which the “LIQ” has been achieved, its relation to process improvement and how far utilization of information will increase.

### 3.4 Methods

From the 181 the companies which responded, the researchers selected 102 which had adopted ABC system to analyze data. The items used for constructs were rated on five-point Likert scales, ranging from 1 (strongly disagree) to 5 (strongly agree). CFA was used to examine how well the 20 items of ABC success fitted the six constructs and is appropriate to the population. Maximum likelihood estimation was used to estimate model parameters. To assess the fit of the six constructs to these data, we chose eight indicators namely  $\chi^2$ , CMIN/df, adjusted goodness of fit index (AGFI), incremental fit index (IFI), comparative fit index (CFI), normed-fit index (NFI), root mean residual (RMR), and root mean square error of approximation (RMSEA) to determine model fit: CMIN/df < 3,  $\chi^2$   $p$  > 0.05, RMSEA below 0.05, and RMSR below 0.05 (Diamantopoulos and Siguaw, 2000), AGFI above 0.80, CFI, IFI, and NFI above 0.90 (Bryne, 2001).

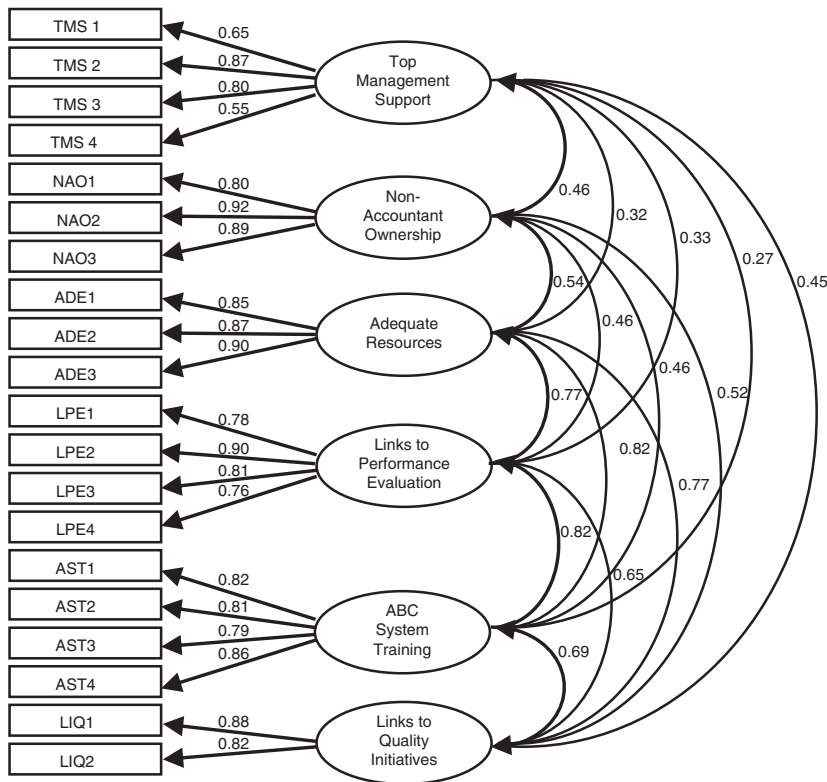
## 4. Results

The measurement properties of scale used in this study were evaluated by checking internal consistency, reliability, and discriminant validity. The item and construct descriptive statistics are shown in Table II. The internal reliability of construct items was tested by Cronbach's coefficient () which ranged from 0.833 to 0.912. All values were above the minimum acceptable level of 0.70, as recommended by Nunnally and Bernstein (1994). The standard factor loadings for all items were high and statistically significant ( $p < 0.05$ ) and shown in Figure 2. These ranged from 0.55 to 0.87 for the

Constructs and items included	Factor loading	Cronbach's $\alpha$	CR	AVE
<i>Top management support (TMS)</i>		0.833	0.797	0.504
Upper management has provided time and commitment to the ABC implementation effort	0.65			
This company's top managers have provided active support for ABC practice	0.87			
Top management effectively communicated its support for ABC system.	0.80			
Top management has clear and concise objectives of ABC system and share to both designers and users	0.55			
<i>Non accounting ownership (NAO)</i>		0.903	0.748	0.499
The non accounting (such as production/marketing groups and so on) are committed to use ABC information	0.80			
The implementation team was cross-functional	0.92			
The accountants have shared their ownership of information with non-accountants	0.90			
<i>Adequate resource (ADE)</i>	0.85	0.912	0.824	0.500
The people who developed the ABC model had access to the people from whom they needed to get information				
The ABC development project was adequately staffed to insure completion of the task in the time allotted	0.87			
The people who developed the ABC model had the equipment and materials needed to do their job	0.90			
<i>Link to performance evaluation (LPE)</i>		0.886	0.798	0.498
In this ABC model, high performance is recognized and rewarded	0.78			
ABC data have been used for performance evaluation	0.90			
Compensation systems in the company are designed to motive employees to implement ABC	0.81			
In this ABC model, financial rewards are tied directly to performance	0.76			
<i>ABC system training (AST)</i>		0.889	0.798	0.497
Adequate training was provided for designing ABC	0.82			
Adequate training was provided for implementing ABC	0.81			
Adequate training was provided for using ABC	0.79			
Education from ABC training (such as software training) was useful and can apply to ABC system.	0.86			
<i>Link to quality initiative (LIQ)</i>		0.826	0.788	0.501
Firm combined ABC system with quality initiative (such as Just in time, TQM)	0.88			
Firm commits to quality improvement through involvement and visibility in quality activities	0.82			

**Table II.**  
Items and construct descriptive statistics

TMS construct, from 0.80 to 0.89 for the NAO construct, from 0.85 to 0.90 for the ADE construct, from 0.76 to 0.90 for the LPE construct, from 0.79 to 0.86 for AST, and from 0.82 to 0.88 for LIQs. This indicates that the items are acceptable measures of their respective construct. Composite reliability (CR) and average variance extracted (AVE) were used to verify construct reliability. Values of the CR ranged from 0.748 to 0.824, which are above the 0.60 threshold suggested by Bagozzi and Yi (2001). The AVE values ranged from 0.497 to 0.504. Although the AVE of NAO, LPE and AST are 0.499, 0.498, and 0.497, respectively, on average, the overall mean of the AVE is 0.500, which shows that



Notes:  $p$ -value=0.265, CMIN/df=1.017, AGFI=0.83, CFI=0.99, NFI=0.90, IFI=0.99, RMR=0.026, and RMSEA=0.026

**Figure 2.**  
CFA of ABC  
implementation success  
of ISO 9000 certified  
companies in Thailand

normally more than half of the variance is captured by the six constructs of this study (Thoumrungroje and Racela, 2013). In summary, the construct reliability was acceptable. These results are presented in Table II, which shows item and construct reliability, scale item scores and aggregated score for each latent construct.

To assess discriminant validity, correlations among the constructs were investigated. As shown in Table III, all correlations are below the  $r = 0.85$  cut-off suggested by Brown

Construct	Mean	SD	TMS	NAO	ADE	LPE	AST	LIQ
TMS	4.22	0.52	–					
NAO	3.82	0.73	0.383**	–				
ADE	3.80	0.64	0.303**	0.489**	–			
LPE	3.59	0.73	0.250*	0.403**	0.661**	–		
AST	3.82	0.61	0.237*	0.418**	0.749**	0.707**	–	
LIQ	3.81	0.66	0.386**	0.422**	0.676**	0.564**	0.610**	–

Notes: TMS, top management support; NAO, non-accounting ownership; ADE, adequate resource; LPE, link to performance evaluation; AST, ABC system training; LIQ, link to quality initiative. \*\*  $p < 0.01$ ; \*  $p < 0.05$

**Table III.**  
Construct  
correlation matrix

(2006) and therefore the discriminant validity is established. Moreover, Table III shows significant positive correlation among all variables (TMS, NAO, ADEs, LPE, AST, and LIQs).

To verify common biases that may occur from data collected from single sources or self-reported measures, Harman's one factor test was performed. All the items of the TMS, NAO, ADE, LPE, AST, and LIQ constructs were entered into the exploratory factor analysis. The results showed that no single factor appeared from the analysis and no common factor accounts for the majority of variance in these variables, as the largest factor explains only 33.2 percent of the total variance and hence common method bias does not seem to be a problem in this paper.

The model examined here included six latent constructs, on which 20 observed variables were hypothesized to load. This is shown in Figure 2. According to the empirically supported Shields (1995) and Chongruksut and Brooks (2005) models, underlying the ABC success are six separate yet correlated factors. The six factors of TMS, NAO, ADEs, LPE, AST, and LIQs were correlated and all error terms were uncorrelated. The results of the CFA indicated the model fits the six constructs for the 102 participants. The  $\chi^2$  value of 0.265 is above the suggested threshold level of 0.05 (Diamantopoulos and Siguawil, 2000). Similarly, the CMIN/df of 1.017 indicated an acceptable model fit. The observed RMR and RMSEA of 0.026 and the AGFI is 0.83 suggested a good fit of these data to the model, as did the CFI of 0.993, the NFI of 0.903, and the IFI of 0.993. These values are above the recommended threshold level of 0.90. In summary, the overall fit supported the model. Based on the results of the CFA, the success of ABC implementation in the context of ISO 9000 certified companies in Thailand is accounted for by the six constructs (TMS, links to performance measures, ADEs, AST, LIQs, and NAO). This model confirms the research of Shields (1995) and Chongruksut and Brooks (2005) and is useful for companies with a focus on quality, such as ISO 9000 certified companies that have decided to use the ABC system.

## 5. Discussion and conclusion

The purpose of this study is to examine the success of ABC implementation by CFA of ISO 9000 certified companies in Thailand. The work contributes to the body of work investigating contextual and behavioral factors influencing ABC implementation success. The researcher collected data from a survey of accountant managers from 102 firms with ISO 9000 certified status in Thailand and the results of CFA confirmed the model fitted for the six constructs; behavioral and organizational constructs (TMS, AST, NAO, LIQs, ADEs, and LPE) affect the success of ABC for ISO 9000 certified companies in Thailand.

TMS is the most important factor in building success in ABC implementation and this is consistent with Chongruksut and Brooks (2005), who ranked factors influencing ABC implementation success in Thailand. They asserted that TMS is critical for ABC implementation success. Hence, for firms adopting, implementing, and using ABC, management teams must have clear objectives and a commitment to ABC information dissemination in order to achieve ABC implementation success. Based on the factor loading of TMS, senior management should focus on providing visible support for ABC initiatives, such as exercising its authority in support of ABC. Management should also communicate its support for ABC systems and highlight its objectives. Prior research has found that national culture had a relationship with ABC as shown by Hofstede (1976), who divided national culture into five dimensions (power distance, individualism, uncertainty avoidance, masculinity, and Confucian dynamism). In addition,

---

Brewer (1998) showed that national cultures with a high power distance had higher level of success than countries with low power distance, which is consistent with this research; Thailand has the former type of culture. The level of command and the power of the management are also somewhat prominent so if an ABC project originates with a top-level manager, the chance of success is high because subordinates in a high power distance culture will be comfortable with the “top-down” approach. However, contentious issues may arise about the level of support from the administration, although the ABC project management may fully support subordinates committed to using costing systems as a means of achieving their goals. That said, top-down commands can cause subordinates discomfort and therefore the support of senior management should be at an appropriate level. That is, the executive should have a role in the initiation and adoption stage, and for the rest, including adaptation, acceptance, routinization, and the infusion stage, management should play the role of providing opportunities for personal and team operations to function as defined.

AST is an important determinant in reducing resistance to the ABC team and in improving knowledge of ABC among employees. If ABC staff are knowledgeable, a higher degree of ABC success is likely, and this is consistent with Shields (1995), Krumwiede (1998), and Majid and Sulaiman (2008) who stated that training is a key factor in enhancing ABC success. ABC training can build strong teams and this is associated with the perceived significance of the task and development of the ABC model (Anderson *et al.*, 2002). Training in ABC systems consists of readings, lectures, on the job training, and learning from others how ABC works (Chongruksut and Brooks, 2005). Based on the factor loading of AST, firms with ABC implementation provide not only adequate training for the design, implementation, and use states of ABC, but also training which is useful and appropriate. Nevertheless, the cause of high training in ISO 9000 companies in Thailand may be that Thai society is a high uncertainty avoidance culture, and employees may want more training to reduce perceived threats.

NAO represents the level of participation with the ABC project of groups and individuals in the company. As mentioned earlier, ABC is not only a project for accountants; it also requires the cooperation of all staff. The results of this research are consistent with Maelah and Ibraim (2006), who stated that when non-accountants participate in the early stages of ABC implementation, ABC projects are more successful. According to factor loading of NAO, firms decided to adopt and implement ABC. ABC staff should work cross-functionally and accountants should share the ownership of information with non-accountants. In addition, training and meetings should occur among ABC staff to help achieve the sharing of information between ABC employees.

LIQs shows organizational emphasis on quality, which is important to companies' competitive advantage. If businesses integrate ABC systems with quality initiatives, such as TQM, just-in-time and other speed initiatives, the success of ABC is more likely. This is similar to Shields (1995), Krumwiede (1998), and Baird *et al.* (2007) who stated that LIQs are important for management tools, such as the ABC system. If ABC information supports quality initiatives, the usefulness of ABC will be clear and therefore it will contribute to ABC success. Moreover, when quality initiatives have been adopted, work processes are improved so if firms also launch an ABC project, it is more likely to succeed. In summary, firms which have quality initiatives should adopt ABC.

ADEs for the ABC system are essential because this can build employee satisfaction, which leads to commitment, attendance, and success. Moreover, internal

resources reduces restrictions on workers when the company initializes an ABC project. Shields (1995), Baird *et al.* (2007), and Chongruksut and Brooks (2005) stated that ADEs encompass the time and commitment of management, accountants, and operating employees. In addition, Majid and Sulaiman (2008) argued that personal education, specifically in the use of ABC software, external consultants, and training should be considered. According to the factor loading of ADE, companies which adopt the ABC model should provide equipment, material, staff, and information in order to gain the ensure ABC implementation success.

LPE represents the degree of the company's commitment to the ABC system, which is measured by their use of ABC data in decision making. This is a result of staff conduct, which is related to how their performance is evaluated and rewarded and this increases the probability of ABC success. Shields (1995) and Anderson and Young (1999) stated that evaluation and compensation link directly to information from ABC systems, which increases the probability of activity management success. Based on factor loading, companies aiming to adopt ABC should design and link ABC information to the evaluation and compensation of all workers.

The CFA discussed in this paper demonstrates the fit of the six-factor explanation of the ABC implementation success. In terms of content and construct validity, reconfirmation of the five factors of Shield's (1995) model and the one recommendation of Chongruksut and Brooks (2005) correspond with each of the six components of the ABC implementation success discussed here. The factors in the ABC implementation success interrelate, again reflecting the theoretical association among the related components of ABC implementation success. Hence, the robust six factor structures of the ABC implementation success shows that each of the components constitutes viable independent subscales. The present study relied solely on self-reported measures and therefore a particularly salient area for future examination would be to investigate ABC success through mixed methods such as in-depth interviews. Additionally, much research, including this paper, has found that TMS is the most influential factor in ABC implementation and thus future research ought to continue this line of inquiry, both directly and indirectly. Future research should also investigate the relationship between all six variables in order to understand their role in successful ABC implementation.

### References

- Amir, A.M. (2011), "The indirect effects of PMS design on Malaysian service firms' characteristics and performance", *Asian Review of Accounting*, Vol. 19 No. 1, pp. 31-49.
- Anderson, S. (1995), "A framework for assessing cost management system changes: the case of activity based costing implementation at General Motors", *Journal of Management Accounting Research*, Vol. 7, pp 1-51.
- Anderson, S.W. and Young, S.M. (1999), "The impact of contextual and process factors on the evaluation of activity-based costing systems", *Accounting, Organizations and Society*, Vol. 24, pp. 525-559.
- Anderson, S.W., Hesford, J.W. and Young, S.M. (2002), "Factors influencing the performance of activity based costing teams: a field study of ABC model development time in the automobile industry", *Accounting, Organizations and Society*, Vol. 27 No. 3, pp. 195-211.
- Armstrong, J.S. and Overton, T.S. (1997), "Estimating non-response bias in mail surveys", *Journal of Marketing Research*, Vol. 14, pp. 396-402.
- Bagozzi, R.P. and Yi, Y. (2001), "On the evaluation of structural equation models", *Journal of the Academy of Marketing Science*, Vol. 16, pp. 74-97.

- 
- Baird, K.M., Harrison, G.L. and Reeve, R.C. (2004), "Adoption of activity management practices: a note on the extent of adoption and the influence of organizational and culture factors", *Management Accounting Research*, Vol. 15 No. 4, pp. 383-399.
- Baird, K., Harrison, G. and Reeve, R. (2007), "Success of activity management practices: the influence of organization and cultural factors", *Accounting and Finance*, Vol. 47 No. 1, pp. 47-67.
- Banker, R.D., Bardhan, I.R. and Chen, T.Y. (2008), "The role of manufacturing practices in mediating the impact of activity-based costing on plant performance", *Accounting, Organizations and Society*, Vol. 33, pp. 1-19.
- Bhuiyan, N. and Alam, N. (2005), "An investigation into issues related to the latest version of ISO 9000", *Total Quality Management*, Vol. 16 No. 2, pp. 199-213.
- Brack, K. (1999), "Qualified gains", *Industrial Distribution*, Vol. 88 No. 1, pp. 52-54.
- Brewer, P.C. (1998), "National culture and activity-based costing systems: a note", *Management Accounting Research*, Vol. 9 No. 2, pp. 241-260.
- Brimson, J. and Antos, J. (2004), "Predictive accounting", *Journal of Corporate Accounting and Finance*, Vol. 15 No. 3, pp. 61-69.
- Brown, T.A. (2006), *Confirmatory Factor Analysis of Applied Research*, Guilford Press, New York, NY.
- Bryne, B.M. (2001), *Structural Equation Modeling with AMOS*, Lawrence Erlbaum Associates, Mahwah, NJ.
- Byrne, S. (2011), "What determines ABC success in mature sites?", *Journal of Accounting & Organizational Change*, Vol. 7, pp. 259-277.
- Cagwin, D. and Bouwman, M.J. (2002), "The association between activity-based costing and improvement in financial performance", *Management Accounting Research*, Vol. 13, pp. 1-39.
- Chin, K.W., Poon, G.K.K. and Pun, K.F. (2000), "The critical maintenance issues of the ISO 9000 system: Hong Kong manufacturing industries' perspective", *Work Study*, Vol. 49 No. 3, pp. 89-96.
- Chongruksut, W. and Brooks, A. (2005), "The adoption and implementation of activity-based costing in Thailand", *Asian Review of Accounting*, Vol. 13 No. 2, pp. 1-17.
- Cooper, R., Kaplan, R.S., Maisel, L.S., Morrissey, E. and Oehm, R.M. (1992), *Implementing Activity-Based Cost Management: Moving from Analysis to Action*, Institute of Management Accountants, Montvale, NJ.
- Diamantopoulos, A. and Siguaw, J.A. (2000), *Introduction LISREL: A Guide for the Uninitiated*, Sage Publication, London.
- Foong, S.F. and Teruki, N.A. (2009), "Cost-system functionality and the performance of the Malaysian palm oil industry", *Asian Review of Accounting*, Vol. 17 No. 3, pp. 212-225.
- Foster, G. and Swenson, D.W. (1997), "Measuring the success of activity-based cost management and its determinants", *Journal of Management Accounting Research*, Vol. 9, pp. 109-142.
- Goodman, D. (1998), "Earning the ISO 9000 seal of approval", *World Trade*, Vol. 11 No. 9, pp. 46-49.
- Gosselin, M. (1997), "The effect of strategy and organizational structure on the adoption and implementation of activity-based costing", *Accounting, Organizations and Society*, Vol. 22 No. 2, pp. 105-122.
- Hofstede, G.J. (1976), "Nationality and espoused values of managers", *Journal of Applied Psychology*, Vol. 61, pp. 148-155.
- Innes, J., Mitchell, F. and Sinclair, D. (2000), "Activity-based costing in the UK's largest companies: a comparison of 1994 and 1999 survey results", *Management Accounting Research*, Vol. 11, pp. 349-362.

- Ittner, C.D., Lanen, W.N. and Larcker, D.F. (2002), "The association between activity-based costing and manufacturing performance", *Journal of Accounting Research*, Vol. 40 No. 3, pp. 711-726.
- Kennedy, T. and Affleck-Graves, J. (2001), "The impact of activity-based costing techniques on firm performance", *Journal of Management Accounting Research*, Vol. 13, pp. 19-39.
- Krumwiede, K.R. (1998), "The implementation stages of activity-based costing and the impact of contextual and organizational factors", *Journal of Management Accounting Research*, Vol. 10, pp. 239-277.
- Larson, P.D. and Kerr, S.G. (2002), "ISO and ABC: complements or competitors?", *The International Journal of Logistics Management*, Vol. 13 No. 2, pp 91-100.
- Larson, P.D. and Kerr, S.G. (2007), "Integration of process management tools to support TQM implementation: ISO 9000 and activity-based costing", *Total Quality Management*, Vol. 18, pp. 201-207.
- McDonald, M., Mors, T. and Phillips, A. (2003), "Management system integration: can it be done?", *Quality Progress*, Vol. 36 No. 1, pp. 67-74.
- McGowan, A.S. and Klammer, T.P. (1997), "Satisfaction with activity based costing management implementation", *Journal of Management Accounting Research*, Vol. 9, pp. 217-237.
- Maelah, R. and Ibrahim, D.N. (2006), "Activity-based costing (ABC): Adoption among manufacturing organizations – the case of Malaysia", *International Journal of Business and Society*, Vol. 7 No. 1, pp. 70-101.
- Maiga, A.S. and Jacobs, F.A. (2008), "Extent of ABC use and its consequences", *Contemporary Accounting Research*, Vol. 25 No. 2, pp. 566-593.
- Majid, J.A. and Sulaiman, M. (2008), "Implementation of activity based costing in Malaysia: a case study of two companies", *Asian Review of Accounting*, Vol. 16 No. 1, pp. 39-55.
- Morakul, S. and Wu, F.H. (2001), "Cultural influences on the ABC implementation in Thailand's environment", *Journal of Managerial Psychology*, Vol. 16 No. 2, pp. 142-156.
- Nunnally, J.C. and Bernstein, I.H. (1994), *Psychometric Theory*, McGraw-Hill, New York, NY.
- Roberts, M.W. and Silvester, K.J. (1996), "Why ABC failed and how it may yet succeed", *The Journal of Cost Management*, Winter, pp. 23-35.
- Santos, L. and Escanciano, C. (2002), "Benefits of ISO 9000:1994 system", *International Journal of Quality & Reliability Management*, Vol. 19 No. 3, pp. 321-344.
- Sayle, A.J. (2005), "Opportunities are everywhere", *Quality Progress*, Vol. 38 No. 4, pp. 33-38.
- Schick, A.G., Gorden, L.A. and Haka, S. (1990), "Information overload: a temporal approach", *Accounting Organizations and Society*, Vol. 15, pp. 199-220.
- Shields, M.D. (1995), "An empirical analysis of firms' implementation experiences with activity-based costing", *Journal of Management Accounting Research*, Vol. 7, pp. 148-166.
- Shields, M.D. and Young, S.M. (1989), "A behavioural model for implementing cost management systems", *Journal of Cost Management*, Vol. 3, pp 17-27.
- Shields, M.D. and McEwen, M.A. (1996), "Implementing activity-based costing systems successfully", *Cost Management*, Vol. 9 No. 4, pp. 15-22.
- Smith, M. (2003), *Research Methods in Accounting*, Sage, London.
- Smit, M., Abdullah, Z. and Abdul-Razak, R. (2008), "The diffusion of technological and management accounting innovation: Malaysian evidence", *Asian Review of Accounting*, Vol. 16 No. 3, pp. 197-218.
- Swenson, D. (1995), "The benefits of activity-based cost management to the manufacturing industry", *Journal of Management Accounting Research*, Vol. 7, Fall, pp. 167-180.



Thoumrungroje, A. and Racela, O. (2013), "The contingent role of customer orientation and entrepreneurial orientation on product innovation and performance", *Journal of Strategic Marketing*, Vol. 21 No. 2, pp. 140-159.

Tupmongkol, T. (2008), "An empirical study of the factors of the activity-based costing (ABC) implementation in Thailand: four case studies in Thai state enterprises (TSEs)", unpublished Doctoral, Northumbria University, Newcastle upon Tyne.

#### Further reading

Abdul Majid, J. and Sulaiman, M. (2008), "Implementation of activity based costing in Malaysia", *Asian Review of Accounting*, Vol. 16 No. 1, pp. 39-54.

Leticia, S. and Escanciano, C. (2002), "Benefits of the ISO 9000:1994 system: some considerations to reinforce competitive advantage", *International Journal of Quality & Reliability Management*, Vol. 19 No. 3, pp. 321-344.

Thai Industrial Standard Institute (2012), "List of certified companies in Thailand: ISO 9000", available at: <http://app.tisi.go.th/syscer/9000.html> (accessed September 1, 2012).