

Impacts of Activity-Based Costing on Organizational Performance: Evidence from Thailand

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Abstract

Purpose –To extend the limited yet conflicting results of prior studies, this paper hypothesizes and statistically tests alternative, structurally different models of likely positive impacts of activity-based costing (ABC) on organizational performance. It also tests moderating effects of business type and business size.

Design/methodology/approach – To test the models' abilities to explain the data, this comparative study uses: survey data from 191 Thai firms, measures validated in the study, and structural equation modelling (SEM).

Findings – Extensive use of ABC for cost analysis, cost strategy and cost evaluation directly improves operational performance; it also indirectly improves financial performance through improving operational performance. The results are similar for manufacturing and non-manufacturing firms and for large firms and small-medium enterprises (SMEs).

Research limitations/implications – Future studies could test the alternative models in other geographical and industrial contexts and could widen the range of control variables.

Practical implications – Monitoring of the effects of ABC use on operational performance is crucial to achieving positive financial outcomes. The cross-functional nature of ABC is apparent; for it to be effective managers must ensure cooperation from departments and employees involved in the design and implementation of ABC systems.

Originality/value – This research arbitrates prior inconsistent findings by adopting an original approach of testing structurally different models in a single comparative study, using measures validated in the study. It provides new evidence that extends knowledge about impacts of ABC on organizational performance. Further, it demonstrates its applicability in the context of developing economies.

Keywords: activity-based costing (ABC), performance improvement, operational performance, financial performance, Thailand, structural equation modelling (SEM)

Research Paper

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1. Introduction

As part of the theory of cost accounting and an aspect of management accounting, activity-based costing (ABC) could improve organizational performance because it provides information fundamental to managing organizational resources, managing costs, improving organizational processes, adding value and enabling strategic decision making (Langfield-Smith *et al.*, 2018). However, the current state of our understanding of impacts of ABC on performance is insufficient (Gosselin, 2007). Moreover, the results of extant empirical studies on ABC impacts are conflicting; while some researchers show significant positive relationships between ABC and various aspects of organizational performance (Kennedy and Affleck-Graves, 2001; Maiga, 2014), others indicate no association with financial performance (Ittner *et al.*, 2002; Diavastis *et al.*, 2016). Such conflicting results make it difficult for researchers and practitioners alike to understand the significance of ABC in enhancing business performance and to consider ABC as a means of performance improvement. It is not surprising, therefore, that several scholars (Maiga and Jacobs, 2008; Elhamma, 2015) have been calling for more empirical work in this area.

This comparative study attempts therefore to respond to such calls and to arbitrate findings of earlier inconsistent work by adopting an original approach of testing three rival models of direct/indirect impacts of the extent of ABC use on organizational performance using: the same sample data (from managers of 191 Thai firms), the same measures of ABC and

organizational performance, and the same analytical methods. The three hypothesized models are analyzed and compared to establish their validity and ability to explain the data and to ascertain whether the results significantly differ between manufacturing and non-manufacturing firms, and between large firms and SMEs.

The study makes several advancements on prior ABC-performance research and thus generates original significant contributions to this field. Firstly, the models hypothesized in this study synthesize and group the diverse prior results on positive links between ABC and organizational performance. The models are original in terms of their focus and specifications. They depict impacts of a latent construct of *the extent of ABC use on operational performance* (OPP) and *financial performance* (FP) (see Figure 1). Previous studies typically examined impacts of *ABC adoption*, using a dichotomous scale of ABC adopter v. ABC non-adopter (Hardan and Shatnawi, 2013; Banker *et al*, 2008), or a continuum of ABC adoption levels with one indicator only (Jankala and Silvola, 2012). Furthermore, the few studies that examined impacts of the extent of ABC use did so as part of more complex, conceptually different models. Among them, Cagwin and Bouwman (2002) conceptualized *the extent of ABC use* as a formative rather than reflective construct and examined its impact, together with simultaneous impact of other variables included in the model, on financial performance only (i.e. they did not examine the mediating effects of operational performance, nor did they address the validity of the latent constructs). In another research examining the impact of the extent of ABC use, Maiga and Jacobs (2008) studied mediating impacts of separate latent constructs of cost, quality, and cycle time (as well as relationships among these constructs) on profitability rather than the mediating impact of a higher order construct of operational performance. To our knowledge, no previous study examined impacts on, or through, *operational performance* conceptualized as a

latent construct, as we do in this study. Therefore, our model specifications (measurement and structural models) are new, developed and validated specifically for the purpose of the study (see Sections 3.1, 4.1). Given that very few prior studies applied the reflective latent construct approach to examining the impacts of ABC on organizational performance, little is known about the factorial structure of the ABC and performance constructs. Therefore, this study also contributes by testing empirically the dimensionality of the study constructs.

Other advancement on prior ABC-performance research that this study offers is that it uses *the same* newly developed and validated measurement models to test the varied structural relationships contained in the three rival models of impacts of ABC on organizational performance. This improves comparability of study results, especially that the same sample data are used to test these models. Additionally, unlike prior studies that mostly used correlation and regression analysis to identify associations or impacts of ABC on organizational performance, in this study the validity of the alternative models is tested using *the same* analytical method: structural equation modelling (SEM). Whilst SEM has rarely been used in ABC-performance research, it has not been used before to simultaneously examine comparative abilities of the rival models to explain the data and to test for significant differences across various groups of interest (business type, and business size); this is a further contribution, especially in view a paucity of research in management accounting using SEM (Smith and Langfield-Smith, 2004). From a practical viewpoint, the study offers guidance for managers on interventions that could enhance organizational performance.

The subsequent sections of this paper discuss literature on ABC and organizational performance, research hypotheses, research methodology, research findings, the study's original contribution, implications for practice, limitations of the study and directions for future research.

2. Literature review and hypothesized models of the extent of ABC use and organizational performance

2.1 Activity-based costing and organizational performance improvement: theory

ABC began with highly applied research undertaken by Cooper and Kaplan (1992) in some leading US companies. ABC was proposed as an alternative to traditional costing methods on the basis that it captures the economics of operational processes more efficiently than traditional systems (Drury, 2015). Indeed, ABC addresses the shortcomings of traditional costing by identifying cost drivers, which allows an organization to gain better quality information in order to understand the behavior of an activity and specify the root causes of overhead costs (Tseng and Chien, 2007). It provides a detailed mechanism that assists managers in understanding how the organization's activities affect costs so during ABC analysis organizations gain a deeper understanding of their business processes, cost behaviors, and cost structures and are thus better enabled to manage costs, the extent of value-added and structure their strategic responses (Mansor *et al.*, 2012).

Examining activities and activity costs more closely helps organizations identify non-value-adding activities, which provides opportunities for cost reduction and cost management by removing some or all of them to enable more efficient use of capacity and time (Kaplan and Anderson, 2007). Thus, ABC can be used along the whole value chain to support greater efficiency and performance improvement. Having greater insight into the accuracy of costs can lead to more appropriate pricing decisions, possibly revealing loss-making products and those

which are most profitable. This can lead to refinement of a product portfolio by adjusting the product mix to enhance financial performance (Drury and Tayles, 2006).

The ABC literature highlights potential aspects of operational advantages too, such as improved process effectiveness (Cagwin and Ortiz, 2005), lower costs (Anderson and Young, 1999), and improved quality (Ittner, 1999; Gupta and Galloway, 2003; Bescos and Charaf, 2013). However, it is not automatic that improvement in operational performance will lead to improvement in financial performance, but it is plausible that such a relationship may occur. For example, a company which seeks to respond rapidly and flexibly to customer enquiries (a differentiator) may deliberately operate with some spare capacity to facilitate this. As a result, whilst their measures of delivery reliability/response time may be very good, their measures of capacity utilization/process efficiency may be relatively poor, compared say, to a cost leader. However, this trade-off would be a judgement of the management regarding an appropriate balance and in a market economy it would presumably be guided by short-term or long-term profit-related advice.

The ABC literature suggests that organizations that extensively use ABC for various purposes (e.g. product costing, product design, pricing decisions, outsourcing decisions, budgeting, performance measurement) may benefit from ABC implementation (Swenson, 1995; Cagwin and Bouwman, 2002; Drury and Tayles, 2005). Maiga and Jacobs (2008: p 539-540), concluded that “one would expect the benefits received from an innovation, such as ABC, to depend on the extent to which it becomes incorporated into an organizational sub-system”. It follows therefore that the extent of use and the purposes of that use could variously affect management decisions and hence performance in the application of the technique. Thus, it is

possible that using ABC for more purposes and to a greater extent would result in improving organizational performance.

2.2 ABC and organizational performance: results of prior studies and hypothesized models

While theoretically ABC could contribute to improving organizational performance, results of empirical studies on impacts of ABC on various aspects of organizational performance are inconclusive and thus provide a basis for identifying groups of similar prior research findings.

Several researchers found direct positive relationships between ABC and operational performance. Ittner *et al.* (2002) reported that ABC had a positive association with quality levels and cycle time improvements in US manufacturing companies. Furthermore, Maiga and Jacobs (2008) revealed that the extent of ABC use in various functional areas of US manufacturing plants was significantly related to cost reduction, quality improvement and improvement of various aspects of cycle-time, including delivery reliability. Additionally, Banker *et al.* (2008) found an impact of ABC on cost reduction. Similarly, Maiga (2014) found that ABC adoption was related to manufacturing plant performance, particularly quality and cost reduction. A positive impact of ABC on several aspects of operational performance (e.g. on-time delivery, product quality) was also found by Miryazdi and Jusoh (2015) in a study of Iranian manufacturing firms.

Despite an early assertion that ABC was designed to improve financial performance (Cooper and Kaplan, 1992), empirical evidence of the impact of ABC on financial performance is ambiguous. While results of some empirical studies show direct positive relationships between ABC and financial performance, others provide opposite evidence. For example, Kennedy and

Affleck-Graves (2001) revealed that organizations that adopted ABC accomplish higher abnormal returns, by approximately 27 percent. Jankala and Silvola (2012) indicated that the extent of ABC use was positively related to sales growth over the two following years in small Finnish firms. Hardan and Shatnawi (2013) reported association between ABC use and profitability related to service businesses in a study of Telecoms companies while Maiga (2014) found that ABC adoption in manufacturing plants was related to financial performance improvement. Meanwhile, another group of empirical research results revealed that there is no association between ABC and financial performance. Ittner *et al.* (2002) and Cagwin and Ortiz (2005) found no significant associations between ABC and return on assets (ROA). Cagwin and Bouwman (2002) and Jankala and Silvola (2012) found no positive direct association between the extent of ABC use and return on investment (ROI). Maiga and Jacobs (2008) revealed that the extent of ABC in various functional areas had no significant positive relationship with profitability. Pokorna (2016) reported that adoption of ABC does not improve ROA relative to firms without ABC.

Few researchers investigated simultaneous direct and indirect effects of ABC on organizational performance. Among them, Banker *et al.* (2008) reported that there was an indirect association between ABC and ROA. Maiga and Jacobs (2008) suggested that operational performance may mediate the relationship between the extent of ABC use and profitability. Consequently, it is possible that ABC may affect financial performance through operational performance.

Based on the empirical evidence discussed in this section and based on the theory and practice of ABC discussed in Section 2.1, three alternative models that could explain the positive effects of ABC on organizational performance are hypothesized (see Figure 1):

H1: The extent of ABC use positively impacts financial performance directly and indirectly through operational performance (Model 1).

H2: The extent of ABC use positively impacts financial performance indirectly through operational performance (Model 2).

H3: The extent of ABC use positively impacts operational performance (Model 3).

---Insert Figure 1 about here---

Literature indicates that several factors could moderate the impact of the extent of ABC use on organizational performance. Cagwin and Bouwman (2002) noted that the effects of ABC use could differ between manufacturing and non-manufacturing firms given that the system was originally designed for manufacturing firms. Furthermore, given that cost of adopting and implementing ABC in large organizations could be lower relative to small organizations (Needy *et al.*, 2003) and that larger firms may be able to develop more sophisticated ABC systems (Al-Omiri and Drury, 2007), the size of a business may be moderating the impacts of ABC on organizational performance. Consequently, in this study we also examine these moderating effects and test the following hypotheses:

H4: The impacts of the extent of ABC use on organizational performance significantly differ depending on business type.

H5: The impacts of the extent of ABC use on organizational performance significantly differ depending on business size.

While much of the ABC-performance research has been undertaken in developed economies, less is known about impacts of ABC in developing economies such as the location of this research, Thailand. An early paper based on a survey of Thai companies by Chongrutsuk and Brooks (2005) examined levels of ABC adoption rather than its impacts and revealed that adoption was quite low though intention to adopt was quite high. The authors speculated that the firms' interest in ABC was "to increase their efficiency of operation and profitability" (p. 7) in the wake of the Asian economic crisis. More recently, Nimtrakoon and Tayles (2015) revealed adoption of ABC by 96 companies from the Stock Exchange of Thailand and shown that Thai firms reported greater benefit from the use of ABC to make judgements about the costs and benefits of their differentiation strategy. Additionally, Intakhan (2014) explored antecedents to perceived successful implementation of ABC implementation in 102 Thai ISO 9001-certified companies. The work explored the contextual, organizational and behavioral variables including top management support, ABC system training, non-accounting ownership, links to quality initiatives, adequacy of resources and links to performance evaluation; the first four factors were identified above as the strongest drivers of ABC success. Intakhan (2014) asked respondents to what extent the implementation was a success, ranging from very poor to very good. Success here being the respondents' perception of "the degree to which management uses ABC information ... in order to improve financial performance" (p 288). There was no attempt to relate this to specific outcomes, i.e. financial or non-financial performance improvement. Our

work is therefore complementary to Intakhan (2014) but different from it. In fact, we found no published research in Thailand examining the impact of ABC on organizational performance.

3. Research design and methods

3.1 Variables and research instrument

Consistent with the ABC literature (discussed in section 2.1) suggesting that organizations that extensively use ABC for various purposes may benefit from ABC implementation, in this study *the extent of ABC use* (ABC) is operationalized as the degree to which ABC was used for various purposes. Having reviewed prior research on ABC use (Swenson, 1995; Krumwiede, 1998; Innes *et al.*, 2000; Cagwin and Bouwman, 2002; Cotton *et al.*, 2003; Maiga and Jacobs, 2008), Cagwin and Bouwman's (2002), nine indicators of the extent of ABC use were selected because they adequately represent the variety of purposes for which ABC can be used. Respondents were requested to indicate the extent of ABC use in their organisation for each of the nine purposes on a seven point scale from 1 (strongly disagree) to 7 (strongly agree) (see Appendix).

Organizational performance (OP), defined as the outcomes of an organization's action, is measured in this study by seven indicators manifesting both financial performance (FP) and operational performance (OPP). This approach addresses the limitations of a single indicator measure (Rogers and Wright, 1998). The selected indicators represent items used to measure OP in prior ABC-performance studies (Ittner *et al.*, 2002; Cagwin and Ortiz, 2005; Banker *et al.*, 2008; Maiga and Jacobs, 2008; Jankala and Silvola, 2012). Respondents were asked to indicate

on a scale from 1 (strongly disagree) to 7 (strongly agree) their agreement or disagreement with statements about their OP *since* adopting ABC (see Appendix).

A draft questionnaire in English was sent for comments to both English and Thai academics. It was then translated to Thai and back-translated to English to ensure understandability and reliability. The Thai version of the questionnaire was used in a pilot study involving structured interviews with two chief executive officers, a quality manager, and an accountant. A glossary of key terms used in the questionnaire was supplied with the questionnaire. An abbreviated copy of the research questionnaire is included in the Appendix.

Following data collection, the factorial structures of the latent constructs (the extent of ABC use; organizational performance) were established and validated using exploratory and confirmatory factor analyses. The results of these tests are presented in Section 4.1.

3.2 Sample and data

This research is set in Thailand, which is regarded as an upper-middle income developing country and as an emerging economy because of its relatively high economic growth rate (World Bank, 2018). Managers of all companies (3,105) registered with the Thai Industrial Standards Institute were sent the questionnaire. There were 619 replies of which 18 were incomplete. Among the 601 usable responses obtained between December 2014 and February 2015, there were 191 organizations that adopted ABC and the ABC-adopters formed the study sample. The key characteristics of the study sample (N=191) are;

- 152 (80%) firms represent the manufacturing sector; 39 firms (20%) represent the non-manufacturing sector.

- Based on Thai classification of firm sizes (The Revenue Department, 2019), there are 46 (24%) large firms (above 200 employees), 134 (70%) medium sized firms (50-200 employees), and 11 (6%) small firms (less than 50 employees).
- The firms' experience of ABC use ranges from 3 to 10 years; it therefore exceeds the threshold of 2-3 years for the ABC-related performance effects to occur (Kennedy and Affleck-Graves, 2001; Maiga and Jacobs, 2008).
- On average, the extent of using ABC in the 191 firms exceeds the scale's mean value of 4 for all purposes of ABC use (see Table 2).

Results of Levene's test show that there are no statistically significant differences ($P > .05$) in the mean scores between early and late respondents. Thus non-response bias is not a problem in this study. Results of post hoc Harman's single factor test indicate that common method bias (CMB) is not an issue in this study as the factor explains 35% of the variance in case of Models 1 and 2 and 39% of the variance in case of Model 3. Results of CFA further show that CMB is not an issue because the confirmatory factor analysis (CFA) models with all items loading on their theoretical constructs fit the data well (for Model 1 and 2 the fit indices are: $\chi^2(67, N=191) = 99.772$; $P = .006$; $\chi^2/df = 1.489$; $RMSEA = .051$; $RMR = .059$; $GFI = .932$; $NFI = .916$; similarly, for Model 3: $\chi^2(48, N=191) = 77.806$; $P = .004$; $\chi^2/df = 1.621$; $RMSEA = .057$; $RMR = .061$; $GFI = .938$; $NFI = .919$). Meanwhile CFA models where all items measure only one factor do not fit the data well (for Model 1 and 2 the fit indices are: $\chi^2(77, N=191) = 428.801$; $P = .000$; $\chi^2/df = 5.569$; $RMSEA = .155$; $RMR = .127$; $GFI = .723$; $NFI = .641$; for Model 3, the fit indices are: $\chi^2 = 321.445$, $DF = 54$, $N = 191$); $P = .000$; $\chi^2/df = 5.953$; $RMSEA = .155$; $RMR = .130$; $GFI = .764$; $NFI = .664$).

3.3 Data analysis methods

The study applied exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to test the dimensional (factorial) structure of the latent constructs. Structural equation modelling (SEM) with maximum likelihood estimation was subsequently employed to test the study hypotheses. SEM was chosen because it enables simultaneous estimation of all parameters in a model, including the relationships between latent constructs and their measured variables as well as the structural relationships among the latent variables in a model (Byrne, 2010). Furthermore, SEM is superior to regression in testing mediation (Byrne, 2010; Iacobucci, Saldanha, and Deng, 2007).

To test H1 - H3 in SEM, we evaluated the adequacy of the three hypothesized models using absolute, incremental and parsimony goodness of fit measures. Furthermore, we compared explanatory power and path coefficients of the models that fit the data well. To test H4 and H5, we used multi-group analysis in SEM.

All conditions for employing EFA, CFA, and SEM were met. There were no outliers for the scaled questions. There were no errors in data entry or missing values. All relationships were linear and multicollinearity was not an issue as the values of R^2 ranged from .047 to .695 (see Table 1).

---Insert Table 1 about here---

4. Findings

4.1 Dimensionality and validity of study constructs

EFA and CFA results provide evidence that the independent latent variable, *the extent of ABC use*, is multidimensional (see Table 2). It is composed of three first-order factors that represent purposes for which ABC is used: cost analysis (CA), cost strategy (CS), and cost evaluation (CE). One of the nine indicators of the extent of ABC use that was originally included in the study (off-line analytical tool) has been removed from further analysis because it failed to load satisfactorily on any of the factors in EFA. The three-dimensional first-order structure of the *extent of ABC use* identified in EFA was subsequently confirmed in CFA, as evidenced by the model fit statistics: ($\chi^2= 24.19$; $P=.11$; $\chi^2/df=1.42$; $RMSEA=.05$; $RMR=.05$; $GFI=.97$; $AGFI=.94$; $CFI=.99$; $NFI=.96$; $TLI=.98$). The CFA factor loadings for the eight items representing the extent of ABC use range from .68 to .90 so they converge on each latent construct. Furthermore, the results of CFA provide evidence of convergent validity because all factor loadings are higher than .50, the average variance extracted (AVE) is greater than .50 for the three ABC factors and the construct reliability values exceed .60. Additionally, the AVE values for CA, CS and CE constructs exceed their average shared variance and their maximum shared variance thus providing evidence of discriminant validity (see Table 2).

--- Insert Table 2 about here ---

Regarding the dependent latent variable, *organizational performance (OP)*, EFA and CFA results provide evidence that it is a two-dimensional construct composed of operational performance (OPP) and financial performance (FP) (see Table 2). One of the seven indicators of OP that was originally included in the study (process efficiency) has been removed from further analysis because it failed to load satisfactorily on either of the factors in EFA. The two-dimensional first-order structure of OP identified in EFA was subsequently confirmed in CFA, as evidenced by the model fit statistics: ($\chi^2= 14.14$; $P=.08$; $\chi^2/df=1.77$; RMSEA=.06; RMR=.04; GFI=.98; AGFI=.94; CFI=.98; NFI=.98; TLI=.97). The CFA factor loadings for the six items representing organizational performance range from .50 to .89 so they converge on each latent construct. Furthermore, the results of CFA provide evidence of convergent validity because the AVE is greater than .50 for the two organizational performance factors and the construct reliability values exceed .60. Additionally, the AVE values for operational performance and financial performance constructs exceed their average shared variance and their maximum shared variance thus providing evidence of discriminant validity (see Table 2).

4.2 Comparative abilities of the models to explain the data

Regarding the three models' abilities to explain the data, the results presented in Table 3 show that all hypothesized models of impacts of the extent of ABC use on OP provide an adequate fit to the data. Specifically, the values of normed chi square (χ^2/df) are below the recommended cut-off level of 2.00 for all models (Tabachnick and Fidell, 2007). Additionally, RMSEA values for these models are lower than the recommended cut-off level of .07 (Steiger, 2007). Similarly, the GFI values exceed the acceptable level of .90 (Hair *et al.*, 2010) thus demonstrating that the hypothesized models fit the data well in terms of replicating the observed covariance matrix

(Hooper *et al.*, 2008). Furthermore, the NFI values for all models are higher than the recommended acceptable minimum of .90 (Bentler and Bonnet, 1980) thus indicating that all models have adequate fit relative to the null model that assumes no covariance between the observed variables (Hooper *et al.*, 2008).

---Insert Table 3 about here---

While the results presented in Table 3 provide evidence that model fit indices for all hypothesized models provide an adequate fit to the data, one of the three models (Model 1) is theoretically inconsistent because it contains a negative insignificant path from CE to FP and insignificant paths from cost analysis CA and cost strategy CS to FP (see Table 4). Therefore Model 1 as a whole does not explain organizational performance improvement (see Figure 2). In contrast, Model 2 and Model 3 are theoretically consistent as they contain only positive significant paths from all dimensions of the extent of ABC use to the various dimensions of organizational performance (see Table 4 and Figure 2).

---Insert Table 4 about here---

A comparison of goodness of fit indices for the theoretically consistent models shows that Model 2 fits the data slightly better than Model 3 as measured by the relative chi square and RMSEA while Model 3 fits the data slightly better than Model 2 as measured by GFI and NFI (see Table 3). The differences are very small and based on the absolute and incremental fit indices both models fit the data to a similar extent in terms of their ability to reproduce the observed data and in terms of their fit relative to the null model (Hooper *et al.*, 2008). Overall, it is not possible to decide on preference of one model over another based on direct comparison of absolute and incremental model fit indices for Model 2 and Model 3. However, predictive fit indices that assess model fit in hypothetical replication samples and address the issue of parsimony (Byrne, 2010), indicate a slight superiority of Model 3 over Model 2 as these values are slightly lower for Model 3 (see Table 3).

---Insert Figure 2 about here---

Although based on predictive fit indices Model 3 may have the greatest potential for replication, data in Table 4 indicate that Model 2 explains a greater proportion of variance in operational performance than Model 3 (41% and 37% respectively). Additionally, Model 2 demonstrates slightly stronger effects of the extent of ABC use on OPP except for CE that demonstrates a slightly stronger impact on operational performance in Model 3 (see Table 4).

Whereas both Model 2 and Model 3 demonstrate significant positive direct effects of the extent of ABC use on OPP, data in Table 4 for Model 2 shows that when influenced by the

extent of ABC use, OPP also impacts financial performance. Specifically, in Model 2 OPP has a very high, positive and significant ($\beta=.80, P<.01$) impact on financial performance. Additionally, OPP explains 64% of the variance in FP. The indirect impacts of the three dimensions of the extent of ABC use on financial performance through OPP are also positive and significant. The total impacts of the extent of ABC use on OP that combines the direct impacts of ABC on OPP and the indirect impacts of ABC on FP through OPP are also positive and significant for all dimensions of the extent of ABC use. Specifically, cost analysis has the highest total impact on FP through operational performance ($\beta = .51, P <.01$) followed by cost strategy ($\beta = .50, P <.01$) and cost evaluation ($\beta = .39, P <.05$).

4.3 Moderating effects.

Multi-group analysis (MGA) in SEM was used to test whether the results significantly differ between manufacturing and non-manufacturing firms (H4), and between large firms and SMEs (H5).

---Insert Table 5 about here---

Table 5 shows that for all hypothesized Models 1-3, the configural model represents a good fit across both the manufacturing and non-manufacturing firms (H4) and across large firms and SMEs (H5). As for the measurement models, the $\Delta\chi^2$ values between Model A and the unconstrained model are not significant ($P>.05$). This means that factor loadings of the study constructs (CA, CS, CE, OPP, FP) are similar for the sub-samples. As for the structural models,

the $\Delta\chi^2$ values between Model B and the unconstrained model are not significant ($P > .05$) for the three models. Thus the results of the MGA show that path coefficients for the three hypothesized models do not significantly differ between manufacturing and non-manufacturing firms (H4) and between large firms and SMEs (H5).

5. Discussion

The results of this comparative study show, for the first time, that among the three hypothesized models, Model 2 and Model 3 meet the validity criteria of providing an adequate fit to the data and that they are theoretically consistent. Furthermore, the results show that while Model 1 provides an adequate fit to the data, it is theoretically inconsistent because it contains some negative and/or insignificant paths from all dimensions of the extent of ABC use to financial performance. The results indicate therefore that extensive use of ABC may directly improve operational performance (Model 3, H3), which is consistent with the results of several prior studies including Ittner *et al.* (2002), Banker *et al.* (2008), and Maiga (2014). Furthermore, the results also show that the extent of ABC use may improve financial performance indirectly through improving operational performance (Model 2, H2). This is an important finding because prior empirical evidence supporting Model 2 is very limited as discussed in Section 2.2. Additionally, the results show that within the model of direct and indirect effects of the extent of ABC use on financial performance (Model 1, H1), ABC may not directly improve financial performance. This finding corroborates the results of several prior studies that showed no association between ABC and financial performance (Cagwin and Ortiz, 2005; Maiga and Jacobs, 2008) but it contradicts findings of other empirical studies that showed direct positive

relationships between ABC and FP (Kennedy and Affleck-Graves, 2001; Hardan and Shantnawi, 2013).

Thus, the evidence provided in this study does not support Model 1 and the associated H1. Meanwhile, the results do indicate that H2 and H3 may hold true. Furthermore, the results suggest that for H4 and H5 the null hypotheses hold true as in this study the impacts of the extent of ABC use on organizational performance do not significantly differ between manufacturing and non-manufacturing firms, and between large firms and SMEs.

In terms of preference of the two adequate and theoretically consistent models identified (Models 2 and 3), both models explain the data well and can be recommended as models for improving organizational performance. The minor differences in the results of statistical tests concerning the two models may however be important in choosing one model over another in specific circumstances. For example, relative to Model 2, Model 3 may have the greatest potential for replication. However, relative to Model 3, Model 2 may have a greater explanatory power and stronger total effects. Thus in business practice Model 3 may be of greater use, especially that it is more parsimonious and thus requires developing simpler performance monitoring systems. However, Model 2 may be more useful in explaining the overall positive impacts of the extent of ABC use on both operational and financial performance. Model 2 may therefore be particularly useful in future research and in explaining the reasons for adopting ABC in business practice including an accounting/finance justification.

6. Conclusion

The empirical analysis shows that extensive use of ABC contributes to improving operational performance. Furthermore, it indirectly improves financial performance through improving

operational performance. However, importantly, the evidence provided does not support the view that extensive use of ABC positively impacts financial performance *directly or indirectly* through operational performance. These findings are similar across manufacturing and non-manufacturing firms and across large firms and SMEs.

6.1 Contribution

This original comparative quantitative study makes significant contributions in several respects.

Little was known about measuring ABC in terms of a latent construct, and the dimensionality of the *extent of ABC use* construct. The results address this gap and provide statistical evidence confirming the factorial structure of the *extent of ABC use*. The three dimensions are shown to accurately capture this construct.

The results also extend our knowledge about impacts of ABC on organizational performance, given insufficient empirical work in this area (Maiga and Jacobs, 2008; Elhamma, 2015), and conflicting findings from prior studies examining the impact of ABC on organizational performance. The study synthesizes the previous research findings in this area and places these in alternative models that are statistically tested. The hypothesized models are original in terms of their specifications. The measurement models use indicators of *the extent of ABC use* validated in this study. The hypothesized models vary with regard to the structural relationships among the variables, and thus with regard to the likely direct and indirect impacts of ABC on operational and financial performance.

A particular feature is the use of the same data, the same (statistically validated) constructs and the same analytical methods (SEM) in the tests of the three alternative models, which increases comparability of study results and enables closer examination of the models' comparative abilities to explain the data. By adopting this approach it was possible to demonstrate important similarities and differences between the alternative models in various business contexts. These are important findings, given paucity of consistent empirical evidence in these areas. Indeed, the results arbitrate the findings of earlier inconsistent work and provide new evidence that addresses an important gap in the knowledge about the role of ABC in improving organizational performance. This is especially so in the context of developing economies where ABC is still maturing and where we have very limited prior research insight.

6.2 Implications for practice

The research indicates that extensive use of activity-based costing improves operational performance and subsequently financial performance. This has several implications for managerial practice. In organizations that currently do not use activity-based costing, managers could consider ABC adoption and its extensive use as a managerial intervention aimed at improving organizational performance. This is particularly relevant to ASEAN countries that are increasing sophistication of their operations and could therefore consider extensive adoption of ABC to enhance their performance. In organizations that have adopted ABC, managers must ensure widespread use of ABC for cost analysis, cost strategy, and cost evaluation. The cross-functional nature of ABC is apparent; for it to be effective managers must ensure cooperation from departments and employees involved in the design and implementation of ABC systems.

Monitoring of the effects of ABC on operational performance (quality, delivery reliability, process effectiveness, and cost reduction) is crucial to achieving positive financial performance. Thus it is important that managers review their approaches to ABC implementation.

6.3 Limitations and directions for future research

The survey used perceptual measures to assess the impact of the extent of ABC use on financial performance, one of the dependent variables. In future research, measuring financial performance by using actual published (objective) financial data would be helpful and complementary to the results shown here. It is unlikely that objective measures of operational performance would be available for a largescale survey such as this.

Our sample consisted of firms that used ABC for 3 years or more. Given that the threshold for ABC-related performance gains to occur is 2 – 3 years (Kennedy and Affleck-Graves, 2001; Maiga and Jacobs, 2008), and that our sample did not have firms with experience of using ABC for less than 3 years, we could not control for the number of years of ABC use in this study. Future studies with diverse samples in terms of the number of years of using ABC could control for the length of ABC use.

The effect of ABC on organizational performance was examined in isolation (the *ceteris paribus* assumption). Further research may consider, and seek to control for, other factors that might impact organizational performance such as inflation, government policy, and other organizational initiatives and practices. Indeed, more work is also needed to examine the combined effects of ABC and other organizational initiatives on organizational performance.

The study was conducted in the context of a developing country where findings on the impacts of profit improvement techniques are sparse. In future international comparative studies, say across nations of the Asean Economic Community (AEC), will help to understand the importance of cultural and institutional factors that may apply to the adoption and extent of use of this accounting technique.

Finally, a quantitative approach was employed in this study. Further research may, as a step towards advancing in-depth understanding, be undertaken by conducting case studies or interviews or by using mixed methods approaches. Future studies could consider the use of longitudinal data, as it would be valuable over time to demonstrate a continued causal relationship between the extent of ABC use and organizational performance.

Notwithstanding the above limitations, the contribution to theory and practice of our examination of these different hypothetical models of impacts of ABC on organizational performance advances our understanding of this important phenomenon of management accounting and its increasing adoption in a developing economy.

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