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Investigating the Empirical Effect of ABC Stages on the Performance of Companies

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Abstract

The major aim of this study is to extend Zhang and Isa's (2011) study by investigating the moderating effect of the stages of ABC application on the firms' performance. This study selects 106 Chinese manufacturing companies and employs multiple regression technique and structural equation modelling. It examines whether successful application of the ABC directly affects the firm's performance, and tests whether the stages of ABC application could produce a moderating effect on the firms' performance. Results indicate that successful application of ABC, significantly affects achievement of the costs and quality, while sales volume is only marginally affected by ABC application, and there is an insignificant effect of the relationship between ABC application and achievement of the targets pertaining to productivity, services, and profits. Moreover, this study reports that stages of ABC application would improve the strength of the relationship between ABC application success and firms' performance. The findings emphasize the importance of cost, quality, and stages of ABC implementation issues for management, especially for the intention of the performance evaluation.

Keywords

ABC application success, Business performance, Productivity, Stages of the ABC application, Structural Equation Modelling (SEM).

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Introduction

Activity-based costing (ABC) was promoted by Cooper (1987), Cooper and Kaplan (1998), among others, to eliminate the deficiencies of the out-dated volume-based costing systems and provide more accurate information regarding a firm's cost of production, profitability, and management decision-making by focusing on the cost of each activity (Namazi, 2016a; 2106b). Subsequently, some studies (Shields, 1995; Ittner et al., 2002; Zhang et al., 2015; Pokorna, 2016; Kim, 2017) by concentrating on the various characteristics of ABC, have found that its implementation could provide ample benefits to various users.

As a result, a number of researchers have been motivated to conduct studies to examine the impact of ABC application on companies' financial performance such as obtaining superior Return On Investment (ROI), increasing shareholders' value (Kennedy & Affleck-Graves, 2001; Cagwin et al., 2002; Al-Hroot et al., 2015), and manufacturing performance such as decreasing manufacturing costs, reducing manufacturing process, and improvement in quality (Swenson, 1995; Banker et al., 2008; Sajid et al., 2015; Jafarnejad et al., 2016).

Most of these studies, however, posit at least three shortcomings. First, they reported the indirect impact of ABC. For instance, Kennedy and Affleck-Graves's (2001) study found no direct effect between ABC adoption and shareholders' values among the public listed firms in the UK. Their conclusion is also supported by Cagwin and Bouwman's (2002) research. The finding of their research also indicates an indirect effect of the ABC application on a firm's ROI. The findings of both studies unequivocally reveal that the impact of ABC application success on a firm's performance was not direct and occurred through variables such as tight cost control, total quality control, and asset utilization. Second, the studies are based on incomplete performance measures that, at best, ascertain some financial aspects of the firms' performance (Zhang, et al., 2011), whereas a thorough evaluation of the effect of ABC on the firm's performance should be based on all aspects of the firm's financial and

non-financial attributes. Third, the empirical literature in this sphere has not studied the effect of the various stages of ABC application and the ABC stage developments on the firm's performance. Hence, the role of different stages of the ABC on the firm's performance is totally unexplored.

Based on the prior arguments, the main aim of the current study is to empirically deal with the preceding issues. More precisely, the main incentives of this research are: a) to examine whether there is a significant effect between the ABC application features and firms' performance, that is, the achievement of productivity targets, costs targets, quality targets, service targets, profit targets, sales volume targets, as well as market share targets, and b) to empirically examine whether ABC application stages would play a moderating role in the process of investigating the effect of ABC application success on firms' performance. In order to provide empirical evidence with regard to the designated objectives, research samples from Chinese manufacturing firms are collected in this research.

The significance of the current study is that it: a) empirically provides evidence regarding the effect of ABC on the firm's operations in a non-Western country, that is China, b) explicitly considers contingent variables, financial and non-financial, affecting this relationship, c) considers the role of the ABC stages as a moderating variable, hence providing a more accurate and real research design in this sphere, and d) extends the knowledge and domain of the ABC literature by reporting more contemporary and complete theories and findings in this area.

The remaining parts of the study are structured as follows: The formulation of the theoretical framework for the study and the description of the main research variable under investigation, are presented in the next section. Following that, the data analysis results, including frequency of the research variables, descriptive statistics of the variables, and findings of the hypotheses testing are provided. Finally, conclusions and discussions of the research, limitations of the study, and useful suggestions for future studies are presented in the final section of the article.

Research Structure and Hypotheses

Research structure

As mentioned in the discussions of the prior section, this research's intention is to test the impact of ABC application stages on the firms' performance. In considering this effect, the dependent variable (DV) is firm performance and its indicators, while the independent variable (IDV) is ABC application success. Furthermore, the stages of ABC application are treated as the moderating variable. The research framework for the current research is showed in Figure 1. The details of the framework are explained in the following parts.

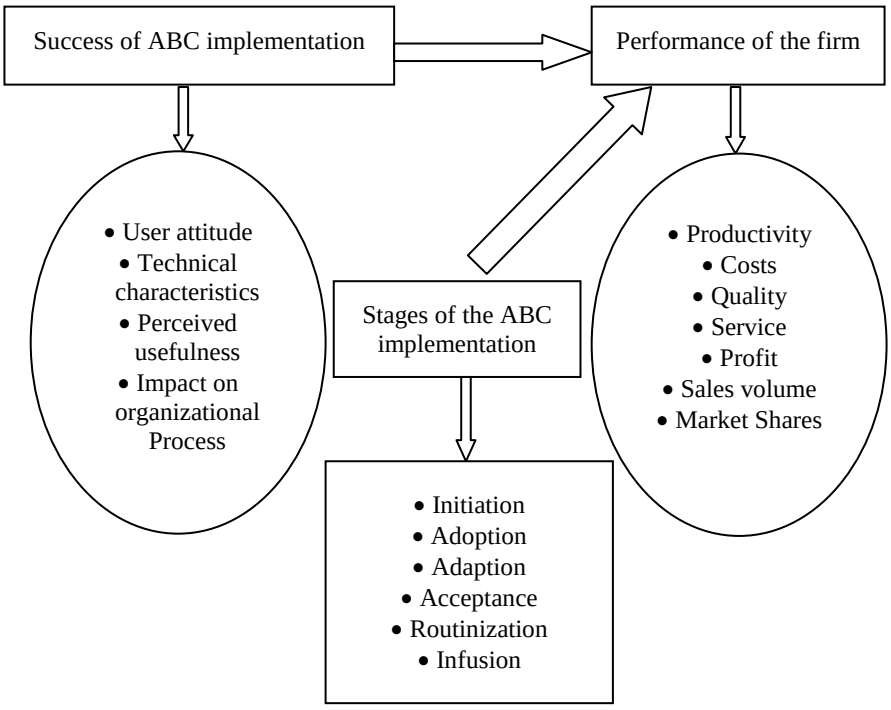

Fig. 1. Research framework

Theoretical development and hypothesis

The theoretical structure of this study is established on the basis of the contingency theory (Anderson & Lanen, 1999; Shields, 1995), which states that the performance of firms is conditional on the extant

variables, and can be enhanced when management control system is properly established (Williams & Seaman, 2002). The suitable control system for a company is, however, contingent on the endogenous and exogenous environmental variables which are prevalent within and outside of the firm. These variables, in essence, would affect the firm's performance (Chenhall, 2003; Soheilirad & Sofian, 2016).

Figure 2 presents the schematic description of the contingency theory aptly described as the Structural Contingency Theory (SCT) since it fits the structure of the organization with contingencies affecting the organization.

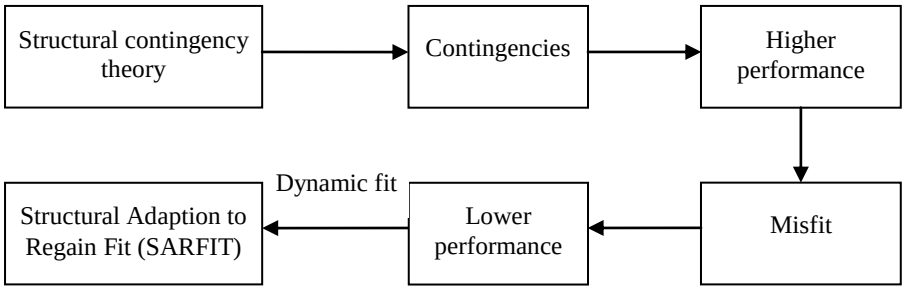

Fig. 2. Contingency theory framework

Figure 2, based on the Hamilton and Shergill's arguments (1992), shows that when the structure of the company is designed in such a manner that is matched with the contingency variables such as strategy, culture, and technological variables, the firm would attain a higher level of performance, obtain additional resources, and experience a rapid growth. A higher performance would, in effect, result in achieving performance. Since the organization is at the expansion stage, the level of the contingency variables would increase. This situation, will lead to a misfit of the existing structure, and results in a lower performance of the firm which eventually leads to the adoption of a dynamic fit of the organization. The dynamic fit's characteristic is being adaptive and susceptible to the changes of the endogenous and exogenous organizational variables. This characteristic is defined by Donaldson (1987; 2001) as the "structural adaption to regain fit" (SARFIT). In this case, the fit and also misfit

situations of the organization are not permanent, and they are frequently alternating with each other.

In this study, because the major objective of the research is to test the impact of ABC application success on a company's performance, theoretical aspects of the ABC, as a significant contingency variable, is briefly provided. ABC, contrary to traditional volume-based cost accounting approaches, is a contemporary cost management technique that concentrates on the *activities* and the designated *resources* required to produce various goods or services. It adopts two cost allocation procedures and distinct cost drivers: 1) primary cost allocation, which assigns costs of the resources to the identified activities based on the expensed resources and related activity drivers, and 2) Secondary cost allocation, which allocates activity costs on the basis of the identified cause-effect cost drivers to assign accumulated costs to the cost objects (products, customers, services, etc.). The identified cost drivers, at each stage, could be based on the quantitative or qualitative criteria (Cooper, 1987; Cooper & Kaplen, 1998; Namazi, 2016b). Since ABC provides more accurate and detailed information regarding each of the firm's activities, it facilitates the management decision-making, and therefore is expected to enhance the performance of the firm.

To date, empirical studies pertaining to the impact of the ABC on the performance of the firm (Foster & Swenson, 1997; Gosselin, 1997; Shields, 1995) have mostly been carried out among firms in the Western countries, and they have provided constrained evidence in relation to the effect of ABC application on the firm's performance. Since China is characterized as an Asian culture that is unequivocally different from that of Western countries (Hofstede, 1983), it is probable that the ABC application stages and its effect on the performance of the Chinese companies, are distinctly different from those of the Western companies. China is ranked by Hofstede (1983) as a high uncertainty-avoidance culture, while Western countries are considered as low uncertainty-avoidance cultures. As Brewer (1998, p. 246) points out "risky cultures are not comfortable with ABC implementation particularly when ABC benefits will be materialized

in the future". Thus, Chinese firms might be reluctant to adopt and use ABC in their firms. This situation finally results in the perception that the level of ABC application success is higher among companies in Western countries than the Chinese firms.

ABC application and firm performance

Mia and Clarke (1999) defined a firm's performance as the achievement of the firm's targets in terms of quality, market share, service, cost, productivity, and so on. They maintained that the scope of the firm's performance should cover both qualitative and quantitative aspects as well as financial and non-financial measures. Mia and Clarke (1999) also found that the use of contemporary management accounting techniques can lead to improvement in the firm's performance. Since ABC is an important cost management accounting technique, its application will result in superior performance.

Zaman (2009) also studied the impact of ABC system on the overall performance of the 17 manufacturing firms in Australia which had adopted ABC. By utilizing a survey and seeking the opinions of financial and non-financial executives, Zaman concluded that adopting ABC provides value to customers, increases overall revenues of the firms, and creates higher financial returns for the firms. However, it does not lead to situations in which customers get lower price.

Zhang and Isa (2011) investigated the role of ABC in predicting the performance of manufacturing firms in China. By choosing a survey research, they found that the examined firms generally attained a moderate level of success in implementing ABC. Furthermore, the ABC application success could lead to a reduction in production cycle operation and accomplishment of targets regarding to firms' performance.

Kayali et al. (2014), by conducting a field study, investigated the effectiveness of the ABC system in measuring the performance of sales representatives. They concluded that the ABC system is a useful method for attaining accurate and fair performance evaluations of the

firms' representatives. The ABC system also provides the sales representatives with accurate information regarding their customers, time spent on each activity, and the amount of resources used for each activity. This information would provide a basis on which sales representative's awareness can be increased.

Sajid et al.'s (2015) study, also based on the survey research, revealed that ABC implementation in Saudi Arabia helped the management bodies' in decision-making, assisted firms in identifying relevant cost drivers and reducing product costs, led to lower prices and higher quality of products, and provided benefits to customers.

Al-Hroot et al. (2015) studied the effect of ABC on the financial performance of 13 Jordanian industrial firms in the period 2000-2014. The dependent variable in this study was the implementation of ABC, while independent variables were gross profit margin, margin before interest and tax ratio, net profit margin ratio, return on assets, return on equity, and return on investment ratio. The results showed that among 78 performance variables, only 37 ratios (47%) improved; the remaining 41 (53%) performance variables deteriorated after ABC system implementation.

Recently, Pokorna (2016) also attempted to study the effect of the implementation of ABC on 548 medium-sized and large Czech corporations and their financial performance. Financial performance was measured by standardized *return on assets* from 2005 to 2011. Surprisingly, the statistical significance of this study showed that financial results of the companies that had adopted ABC were lower than companies that had not adopted ABC.

From previous studies, it can generally be inferred that a moderate effect is present between the application of cost management accounting techniques and firms' performance (Isa, 2004; Williams & Seaman; 2001; 2002). Furthermore, numerous studies consider ABC as an important management accounting technique (Cooper, 1987; Cooper, 1998; Cooper & Kaplan, 1998). Therefore, the current study maintains that the application of the ABC may have an impact on firms' performance. Under the ABC system, each activity is clearly recognized, the costs of resources consumed by each activity are

identified precisely, cost assignments are conducted on the basis of relevant cause–effect relations, both quantitative and qualitative cost drivers are selected, and zero-value added activities are identified distinctly (Namazi, 2016a; 2016b). Hence, it is possible that ABC application would influence the firm's performance by supplying more applicable, complete and precise information relating to each activity. Based on the theoretical backgrounds, the preceding extant literature, and especially after Zhang and Isa' (2011) and Mia and Clark' (1999) findings, the following hypotheses and sub-hypotheses are presented:

Hypothesis 1. ABC implementation posits a significant effect on the performance of Chinese manufacturing firms.

The sub-hypotheses of this research are presented as follows:

Sub-H1. ABC implementation posits a significant effect on the achievement of the productivity targets of the Chinese manufacturing firms.

Sub-H2. ABC implementation posits a significant effect on the achievement of the cost targets of the Chinese manufacturing firms.

Sub-H3. ABC implementation posits a significant effect on the achievement of the quality targets of the Chinese manufacturing firms.

Sub-H4. ABC implementation posits a significant effect on the achievement of the service targets of the Chinese manufacturing firms.

Sub-H5. ABC implementation posits a significant effect on the achievement of the profit targets of the Chinese manufacturing firms.

Sub-H6. ABC implementation posits a significant effect on the achievement of the sales volume targets of the Chinese manufacturing firms.

Sub-H7. ABC implementation posits a significant effect on the achievement of the market share targets of the Chinese manufacturing firms.

Moderating effects of the ABC implementation stages

Cooper and Zmud (1990) described the implementation process of IT into six sequential stages. Consequently, Krumwiede and Roth (1997, p. 9) adopted the Cooper and Zmud's (1990) model and divided ABC implementation process into the following six stages: Initiation, adoption, adaption, acceptance, routinization, and infusion .Initiation occurs when the firm feels it is time to change the existing system because the current system is either old and inadequate for successful operations of the firm or innovation emerged. At the adoption stage, top management of the firm finally arrives at this decision to invest in ABC. It is at the adoption stage that the firm's management team actually investigates the inputs and infrastructures required for implementing ABC. It is, however, only at the acceptance stage that the firm will operationally arrive at a final conclusion that the benefits of implementing ABC are more than its costs and actually devotes some financial resources to adopt ABC. Routinization occurs after the acceptance stage. It encompasses situations in which the firm's adoption of ABC has gone beyond accounting and finance departments, and it is used by various managements throughout the organisation. Finally, infusion emerges when ABC is integrated with other systems within the firm and ABC is used as a powerful technique for management decision making (ABM).

Zhang and Isa (2011) examined implementation impact of the ABC on the firm performance among Chinese manufacturing firms. However, they failed to consider the effect of the various stages of ABC implementation on a firm's performance. On the other hand, Swenson (1995) and Krumwiede (1998) emphasize that the users of ABC might perceive the level of successful application of the ABC differently at different stages. Krumwiede (1998) further states that higher level of the satisfaction of ABC is obtained when a firm reaches a higher level of ABC stages. Hence, this study argues that the effect of ABC implementation on the firm performance might be attributed to other potent contingent variables in addition to the ABC implementation. Specifically, the effect of the firm's performance might also be explained by the stages of the ABC application. In other

words, firms at different stages of adoption would experience performance differently. Accordingly, the impact of the ABC stages on the effect of ABC practice and firms' performance needs to be studied carefully at each stage. In effect, the present study extends the design and findings of Zhang et al.'s study (2011) by explicitly incorporating the stages of ABC practice as a moderating variable. The reason that this variable was considered as a moderating variable, also relates to our theory that, in addition to ABC application success, the stages of ABC implementation would affect the firm's performance. This theory is also compatible with the definition of moderating variable since a moderating variable is characterized as a qualitative or quantitative variable that affects the strength of the relationship and/or changes the direction of the criterion and predictor variables. It may be naturally occurring or can be artificially designed (Namazi & Namazi, 2016). Hence, the following hypothesis is tested in this research:

Hypothesis 2. The ABC implementation stages will moderate the effect of the success of the firm's implementation and business performances among Chinese manufacturing firms.

This hypothesis will be tested for various ABC stages.

Methodology

Research method and sample

This research is a quantitative study, which is based on the survey method. Previous studies (Bjørnenak, 1997; Khalid, 2005; Elhamma, 2012) have found that product variation posit a significant effect on the ABC adoption. Hence, this study randomly distributed a total of 1,000 questionnaires to the manufacturing firms registered on China Chamber of Commerce and Industry 2013 Directory, all of which produced more than three products. The chief financial officers (CFOs) and financial directors (FDs) were selected as participants due to their responsibilities in carrying out management accounting practices including the implementation of the ABC system. However, since small companies do not maintain the position of CFO or FD,

finance managers were also used for this study. Among the participants, CFOs made up 33% of the total participants, 27.4% of the respondents were finance managers, while 25.5% were FDs. Others, including chief accountant and financial analysts, accounted for only 14% of the total respondents.

Williams and Seaman's (2001) method was employed to test whether this study had a non-response bias. Hence, participants were separated into two categories, early and late repliers, based on the time period in which the questionnaires were received. In all, 33 completed and usable questionnaires were received within a month after the questionnaires were sent out, these respondents were considered as early replier. The late repliers were the ones who sent back the remaining 73 questionnaires after a month from the distribution. Table 1 shows the result of the independent sample *t*-test. The results present no apparent difference between the late replier and the early group. Thus, no response bias arose in the current research.

Table 1. Test of non-response bias

Variables	Reply	N	Mean	Sig
Firms' performance	Early	33	3.03	0.36
	Late	73	3.07	
Perceived level of ABC application success	Early	33	3.43	0.87
	Late	73	3.79	

Measures

ABC users

This study focused only on the last three main stages of ABC application: Acceptance, routinization, and infusion/integration, because these stages occur prior to the actual implementation of the ABC, and they are considered as the ABC adoption stage. Since the current study's goal is testing the effect of ABC application success on the firm's performance, the study just considered actual implementation stages. Furthermore, as Anderson and Young (1999) and Byrne et al. (2009) pointed out, frequently at the acceptance stage,

ABC is not used by a firm, and it is considered as a contemporary model by upper management team. Whereas at the adaption stages, top managements of a firm would apply ABC intensively, especially in their day to day operations.

Due to the fact that Chinese firms are still at the early stages of the ABC application (Yanren et al., 2008; Zhang et al., 2015), this research also added another type of ABC users into consideration. That is, those firms that applied one or two perspectives of the ABC system rather than adopting the whole aspects of system. Yanren et al. (2008) defined such users as partial ABC users.

Consequently, in this study, the firms under investigation were classified into two distinct categories: Initial ABC participants, who encompassed acceptance and partial firms' users, and mature participants including routinization and infusion firms' users. Krumwiede and Roth (1997) also identified those firms which are at the stages of routinization and infusion as "mature ABC users", while the "initial users were selected at the acceptance stage".

Initially, this study first differentiated ABC fully users and partial users by requiring participants to indicate Yes or No to the statement: "Your firm is currently using ABC system to assign overhead costs to final product". If the participants' replies were positive, they were categorized as full adapters of ABC. In addition, full adopters of ABC system were also further requested to specify the status of ABC implementation by stating whether in their firms ABC was "occasionally employed", "commonly applied", or "extensively adopted".

Apart from the full adopters of ABC, this study also considered additional type of the ABC adopters; that is, firms which only applied one or two perspectives of the ABC system. The previous measure was adapted from Yanren et al. (2008), who applied this criterion to recognize the partial ABC adopters in China. If the participants selected No against the statement listed above, they were further requested to rate their views on their current management accounting practices by using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) for four statements: "Your company

employs multiple cost drivers to assign overhead costs"; "cost drivers are growing remarkably in numbers"; "period expenses, such as the expenses occurs on the stage of research and development, administrative expenses, and marketing expenses traced to final products or services"; "the proportion of the period expenses recorded in the closing stock is rising". If the participants rated 3 or above regarding any one of the four prior statements, they were classified as the partial ABC users, and they were also deemed to be appropriate participants for the present research. While, respondents who rated 2 or below against any of the statements listed above, indicating that they were not implementing any perspectives of the ABC system, were excluded from this study.

ABC application success

McGowan (1998, p. 33) classified successful ABC implementation factors into four elements: "Users' attitude, technical characteristics rating, perceived usefulness in improving user's job performances, and the impact of the organizational process". McGowan's method to measure ABC application criteria, was also used by Byrne et al. (2009), Zhang and Isa (2011), and Zhang et al. (2015). Thus, in this study, McGowan's method was also employed to measure the success of the ABC application. In effect, respondents were requested to express their attitudes towards the four perspectives of the ABC success and their details on a five-point Likert scale ranging from 1 (strongly unfavourable) to 5 (strongly favourable).

Firms' performance

This research adapted Mia and Clarke's (1999) measures to investigate the effect of ABC stages' implementation on the firms' performance. Isa (2004) and Zhang et al. (2015) have also utilized these measures. Hence, in this study, respondents were requested to rate their perception of the performance of their own firms on the different dimensions of performance: Achievement of productivity targets, cost targets, quality targets, service targets, profit targets, sales volume targets, and market share targets, on a five-point Likert scale. The scale was designed to cover a range of 1 (very poor performance)

to 5 (very excellent performance) after the ABC application. A high (low) score means a high (low) level of achievement in the planned performance.

Statistical techniques

This study adopted the frequency analysis to describe the profile of the participants and revealing the situation of the ABC stages. Consequently, the position of the participants, the status of ABC applications, the number of ABC full adopters, as well as the number of partial users were used in this study.

Descriptive analysis was also performed to demonstrate the population's characteristics such as the mean value and other indications of the main research variables. In addition, this study performed face validity and Cronbach's alpha suggested by Cavana et al. (2001) and Peter (1979), to conduct the validity and reliability test to determine the validity and also the extent in which the items in the questionnaire are correlated with each other.

Confirmatory Factor Analysis (CFA) was also executed to examine the overall fitness of the research model. Moreover, other statistical techniques including the independent T-test analysis was employed to test whether the research samples are free from response bias.

The multiple regression analysis and structural equation modelling (SEM) were also performed to test the main research hypotheses of the study. In regression analysis, the overall perceived ABC application success was regressed with designated perspectives of the business performance. In addition, SEM was employed to examine the moderating effect of the ABC stages on the effect of the ABC application success on each dimensions of the firms' performance.

Results

Frequency

In this study, 61 (57.5%) participants specified that they were employing ABC system to assign overhead costs, hence, they were treated as ABC users. Consequently, based on the responses, they were further divided into three categories: 17 (16%) participants

contended that ABC was seldom adopted and still deemed by upper management as a contemporary model. However, 15 (14.2%) participants claimed that ABC were frequently employed and considered as an important part of the information system. The rest 29 (27.3%) of the participants stated that, ABC system was successfully combined with the accounting systems and was comprehensively used by the higher-level management in their firms.

On the other hand, 45 participants (42.5%) indicated that ABC was not adopted to assign overhead costs. Only one or two perspectives of the ABC were being applied, such as allocation of some administrate costs for the purpose of management decision-making and employment of various cost drivers for assigning overhead expenses to various products.

Since a major purpose of the current study is to test the effect of the ABC stages on the effect of the ABC application on the firms' performance, full and partial adopters of ABC were selected as prime participants. Consequently, this study identified 44 (41.5) participants from the ABC users, as mature adopters, while the rest of the 62 (58.5) participants, as initial adopters.

Descriptive statistics

In this study, the total mean value for the perceived overall ABC implementation success, technical characteristics, perceived usefulness in improving job performance, and impact on organizational process were 3.58, 3.59, 3.65, 3.44, and 3.62 respectively, suggesting that the participants perceived that the implementation of ABC system was a moderate success. In addition, the result of the reliability test for the questionnaire of ABC application success, were as follows: Technical characteristics (0.92), perceived usefulness in improving performance (0.91), and impact on process (0.90), which are acceptable.

The average value for the dimensions of the firms' performance were as follows: Productivity targets (3.11), costs target (3.33), quality targets (3.20), service targets (3.17), profit targets (3.25), sales volume targets (2.96), and market share targets (2.44), indicating that

participants were most content with the capability to achieve the objectives regarding the costs after a successful ABC implementation; but they were discontented with the capability to achieve the objectives regarding the sales volume and market shares even after successful application of the ABC.

By the process of confirmatory factor analysis (CFA), four aspects of the ABC implementation were also assigned into the CFA analysis to test the fitness of the model; they were overall attitude towards ABC implementation, technical characteristics, perceived usefulness, and impact on the business process. Browne and Cudeck (1993) divide CFA and its goodness of fit indices into two categories: Absolute fit and comparative fit. Hence, this study used CFA to test both mentioned indices. Table 2 shows the acceptable criteria proposed by Browne and Cudeck (1993) and the results of the CFA test for the main research variables.

Table 2. The results of the CFA test

	Absolute fit					**Comparative fit**	
	RMSEA	**AFGI**	**GFI**	**RMR**	**CMIN/DF**	**CFI**	**NFI**
This study	.970	.940.	.971	.025	1.979	.990	.980
Standards	＜0.08	＞0.9	＞0.9	＜0.05	＜2.00	＞0.9	＞0.9

Significance=0.138

Table 2 shows that the significance level of the variables is above the value of 0.05; therefore, the designated model with the identified variables is confirmed. According to the standards indicated by Browne and Cudeck (1993) and Maccallum et al. (1996), other indices also generally demonstrate that although the fitness of some variables such as RESEA is mediocre, the overall fitness of the research model is acceptable. Hence, the multiple regression test and path analysis can be performed.

Analysis of the structural model

In this research, Structural Equation Modelling (SEM) was also employed to assess the measures of fitness. Hair et al. (2006, p. 711)

argued that "SEM simultaneously estimates a series of separate but interdependent multiple regression equations in identifying the structural model." Hence, this study examined the overall fitting of the model by applying some of the most common measures recommended by Hair et al. (2006), Bentler and Bonett (1980), as well as Steiger (1990); they are, goodness-of-fit (GFI), Chi-square/df ratio, adjusted goodness-of-fit (AGFI), and root mean square error of approximation (RMSEA).

The results of the analysis of the structural model and its acceptable standard proposed by Hair et al. (2006), Bentler and Bonett (1980), Maiga and Jacobs (2007), as well as Steiger (1990) are shown in Table 3. The value for goodness-of-fit (GFI), Chi-square/df ratio, AGFI, and root mean square error of approximation (RMSEA) were 0.971, 1.273, 0.904 and 0.051 respectively. This suggests that the overall fitting for the research model is acceptable.

Table 3. Analysis of the structural model

	Result	Acceptable fit standard
Statistical tests		
Chi-square	14.005	N/A
P-value	0.233	>0.5
Df	11	N/A
Chi-square/df	1.273	<2.0
Fit indices		
GFI	0.971	>0.9
AGFI	0.904	>0.9
Residual analysis		
RMSEA	0.051	<0.08

Regression Results

In this part, the dependent variable, firm performance and its indication, were regressed against the independent variable, ABC implementation success. The findings are summarized in Table 4.

Table 4. Estimated measurement coefficients

	Standardized coefficient	R^2	P-value
- Sub-H1: ABC implementation – achievement of the productivity targets	0.062	0.113	0.523
- Sub-H2: ABC implementation -achievement of the cost targets	0.240	0.117	0.007
- Sub-H3: ABC implementation -achievement of the quality targets	0.429	0.116	***
- Sub-H4: ABC implementation -achievement of the services targets	0.027	0.109	0.739
- Sub-H5: ABC implementation -achievement of the profit targets	0.016	0.104	0.843
- Sub-H6: ABC implementation -achievement of the sales volume targets	0.137	0.098	0.057
- Sub-H7: ABC implementation achievement- of the market shares targets	-0.058	0.134	0.539

***P<0.01

The value of *R* Squares and the significance of the variables are shown in Table 4. It indicates that the ABC implementation success could respectively account for 11.3%, 11.7%, 11.6%, 10.9%, 10.4%, 9.8%, and 13.4% of the variances in achieving the performance objectives including the productivity, costs, quality, service, profit, sales volume, and market shares.

This study also tested the standardized parameter estimates for the research framework. The results are presented in Table 4 and Figure 3.

The results of the multiple regression tests indicate that a positive and significant relationship exists only between ABC application success and achievement of the cost targets and quality targets. Therefore, with respect to the first hypothesis, Sub-H2 and Sub-H3 are merely supported. Furthermore, the regression results also indicate that ABC application success could only produce a marginal impact on achievements of sales volume targets. Hence, Sub-H6 can only be considered as marginally supported. In addition, this research failed to find a significant effect of ABC application success on achievement of the targets pertaining to productivity, service, and profit. But, they all posit a positive relationship with ABC application success. The results

of the study also presented a negative but non-significant effect of the ABC application success on achievement of the market share target. Hence, Sub-H1, Sub-H4, Sub-H5, and H7 were not supported.

The regression results also indicated that participants perceived that the successful implementation of the ABC system could lead to the reduction in costs, noticeably enhancement in quality of products, and marginally improvement in sales volume. However, participants perceived that ABC implementation plays insignificant role in the increase of market shares, profit, sales, as well as productivity.

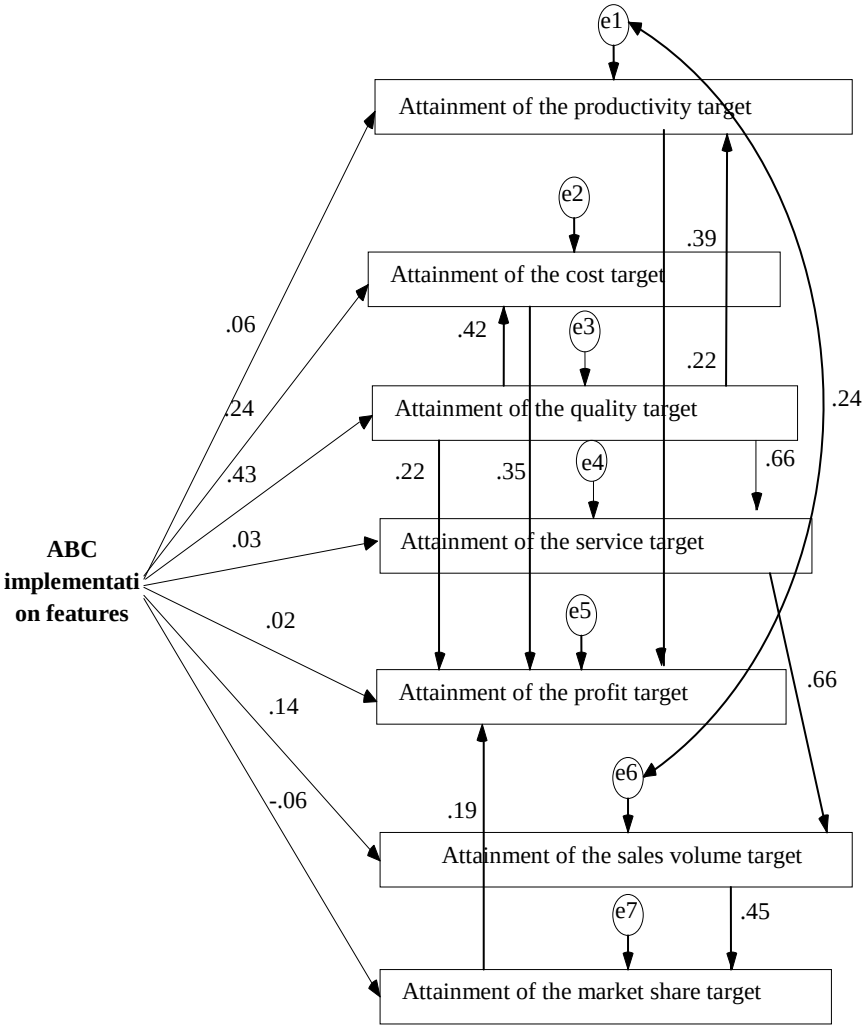

Fig. 3. Model path significance results

Moderating effects

In order to examine the moderating effect of the ABC application stages, this study classified the participants into two categories, initial adopters and mature adopters. In all, 62 respondents were classified as initial ABC adopters. They merely applied one or two, at most three, perspectives of the ABC system rather than adopting the full system. Also participants who reported that they use ABC system occasionally were identified as the ABC initial adopters. Another 44 participants, who claimed that they intensively used ABC system or ABC were already successfully integrated with their financial management system, were classified as mature ABC adopters.

In order to investigate the moderating effect of the ABC stages, Analysis of Moment Structure (AMOS) was attempted. Consequently, following Hair et al. (2006), the moderating effect of the ABC stages was examined for the designated two groups. To test the moderation effect, following Hair et al. (2006), first, the main effect of the success of ABC implementation on the performance of the firm was tested by using the regression analysis. Then, by adding the moderating variable, the new effect of the independent variable on the dependent variable was investigated via the second regression analysis. The difference between the effects of the two models (ΔX^2) was judged to show the moderation effect. When the value of ΔX^2 is statistically significant, it is concluded that a moderation effect exists. Table 5 shows the result of the moderating test.

Table 5. The results of the moderating test

	Chi-square	**Df**
Un-constraint	49.4	22
Constraint	95.3	39
$\Delta X^{2.}$	45.9	17
Significance	0.0001	

Table 5 reveals that the value of $\Delta X^{2.}$ is 45.9 with a degree of freedom 17, and it is significant in value. Thus, it can be concluded that the effect of the ABC implementation on the firms' performance

among manufacturing firms in China is moderated by the stages of ABC application. Therefore, H2 is supported.

To further study the moderating role of the ABC implementation stages, this study also performed regression tests for the initial ABC users and mature ABC users separately to determine the role of the ABC stages on the effect of the application success on the firms' performance. The results are given in Table 6.

Table 6. Regression results for the ABC initial users and mature users

ABC initial users	**Standardized coefficient**	***P*=value**
ABC implementation - productivity targets	-0.115	0.557
ABC implementation – costs targets	0.531	0.006
ABC implementation – quality targets	0.765	***
ABC implementation – services targets	0.315	0.034
ABC implementation – profit targets	0.222	0.021
ABC implementation - sales volume targets	0.191	0.253
ABC implementation - market shares targets	-0.542	0.012
ABC Mature Users	**Standardized Coefficient**	**P=value**
ABC implementation - productivity targets	0.239	0.056
ABC implementation – costs targets	0.168	0.233
ABC implementation – quality targets	0.331	0.034
ABC implementation – services targets	-0.187	0.257
ABC implementation – profit targets	-0.014	0.899
ABC implementation - sales volume targets	0.252	0.060
ABC implementation - market shares	0.155	0.370

*** P<0.005

The stages of ABC application are considered as a categorical variable. Hair et al. (2006) suggested that when the effect of a categorical variable is significant under a situation, but insignificant under another, the moderating effect is present. The regression results in Table 6 demonstrate that ABC application success posits a significant effect on the achievement of the cost targets, quality targets, service targets, profit targets, as well as market shares targets among ABC initial adopters. However, ABC application posits significant effect on the achievement of the targets regarding the quality only among the group of mature ABC users. Hence, it can be

concluded that the stages of ABC implementation could play a moderating role in the effect of ABC application success on achievement of the costs targets, service targets, profit targets, and market share targets. Furthermore, this study shows a surprising result that ABC initial adopters perceived a higher level of performance in contrast to ABC mature adopters.

Conclusion and Discussion

The main aims of the current study were: 1) To examine whether ABC implementation could produce salient impact on the firm performance of Chinese manufacturing companies; and 2) To determine whether the stages of ABC application could play a moderating role in the relationship between firm performance and ABC application success.

The results of the current research, based on the multiple regression analysis with regard to the first objective, generally support the hypothesis that ABC implementation posits a significant and direct effect on the firm's performance. In particular, the finding shows that ABC implementation positively and significantly affects only the accomplishment of the costs and quality targets. This result is inconsistent with prior research findings conducted in the Western countries such as Kennedy and Affleck-Graves (2001), Cagwin and Bouwman (2002), and Ittner et al. (2002). But, it is consistent with previous studies reported by Isa (2004) among manufacturing companies in Malaysia and Williams and Seaman (2002) in Singaporean context. The finding is also consistent with the views expressed by Carolfi (1996), who pointed out that the information provided by the implementation of ABC system would directly assist managers in identifying difficult problems such as zero-value added activities and reworks.

The results of this study also demonstrate that the stages of ABC application will moderate the effect of the relationship between the successes of ABC implementation and firm's performance. In particular, costs, services, profits, and market shares, as components of a firm's performance, were moderated by the ABC stages. Surprisingly, the fact that ABC initial adopters perceived the

performance of the firm as a result of the successful implementation of the ABC, is more superior to that of ABC mature users. These results are generally consistent with prior non-Western researches (Zhang & Isa, 2011; Zhang et al., 2015; Sajid et al., 2015). However, they are not consistent with Western countries' findings like Anderson and Young's (1999) and Byrne et al.'s (2009) results, who found that higher stages of ABC application could result in higher level of perceived performance of the firms. The reasons for our findings might be due to the existence of uneven numbers of ABC initial adopters (62 participants) and mature adopters (44 participants). The findings may also be attributed to the awareness of the matured firms concerning obstacles and weaknesses involved in implementing ABC. As Kaplan and Anderson (2004, 2007) and Namazi (2009, 2016a, 2016b) extensively pointed out, a major impute for the emergence of the time-driven activity-based costing (TDABC) and performance-based activity-based costing (PFABC), as the second and third generations of the ABC, relates to the awareness of the companies about the ABC weaknesses. This awareness led to the abundance of the ABC by various firms.

The significant implications of this research are as follows. First, it extended the sphere of the extant ABC literature to studying the effect of ABC implementation on the firm's performance in Asian context (China). Second, by providing empirical evidence, the study particularly revealed that, in contrast with Western findings (Shields, 1995; Kennedy & Affleck-Graves, 2001; Cagwin & Bouwman, 2002), the effect of ABC implementation on the firm's performance among Chinese firms is direct, at least for the achievement of cost targets and quality targets. This indicates that management accountants and upper management team should concentrate on the issues of cost and quality when restructuring cost management systems, particularly for the purposes of performance assessment. Third, this study extended the existing literature and theories of ABC by considering various stages of ABC implementation as an influential variable affecting the performance of the firm. It unambiguously showed that considering ABC stages, as a moderating variable, will not only improve the

theory of the ABC in the domain of the performance evaluation, but also would result in strengthening the relationship between the ABC implementation and performance of the firm. Fourth, the study unequivocally demonstrated that the moderating effect of the ABC stages on the investigating the effect of the ABC implementation on the firm's performance is significant. This finding is predominantly salient for the ABC initial users when the issues of costs, service, profit, and market shares are involved in their performance assessment procedure.

Limitation of the study

This study, however, was encountered with a number of limitations. It used questionnaire as a method for collecting data, which has its intrinsic obstacles. The number of the respondents was low, and several questionnaires were answered by chief accountants or finance analysts whose knowledge of the concept of ABC system might be dissimilar with that of CFOs or FDs. Moreover, the study only focused on several stages of ABC in manufacturing companies in China. Despite these limitations, professional and technical care was exercised as much as possible to maintain the validity and reliability of the research.

Suggestions for future research

Based on the findings of the study, the following recommendations are provided:

1. The significance of the stages of ABC, particularly in the domain of the performance evaluation of the firm, should be more emphasized by managements and accountants.
2. Other moderating variables, in addition to the stages of the ABC, and also mediating variables, can be considered in the relationship between ABC implementation and firm's performance.
3. The domain of this study can be extended to other non-manufacturing areas in China. The study can also be applied in manufacturing as well as non-manufacturing companies in other countries, particularly in the developing economies.

4. In future endeavours, other research methods, such as interviews or case studies, can be used to collect the necessary data. Likewise, other research methodologies such as action research can be used for this type of studies. These approaches might produce a more wide-ranging and deeper realization of the influence of ABC implementation on the firm's performance.
5. Future studies can also consider other predictors that may impact the perceived business performance.

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