

Factors Influencing Activity-Based Costing Success: A Research Framework

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Abstract—In today's advanced manufacturing and competitive environment, accurate costing information is crucial for all the kinds of businesses, such as manufacturing firms, merchandizing firms, and service firms. Argued to be superior to the traditional volume-based costing system, Activity-Based Costing system (ABC) has increasingly attracted the attention of practitioners and researchers alike as one of the strategic tools to aid managers for better decision making. The benefits of ABC system and its impacts on companies' performance have motivated numerous empirical studies on ABC system and it is considered as one of the most-researched management accounting areas in developed countries. Previous research on ABC have examined pertinent issues related to ABC implementation such as the levels of ABC adoption in various countries, the reasons for implementing ABC, the problems related to ABC and the critical success factors influencing ABC. This paper reviews the research on ABC carried out within the last decade, from 1995-2008, and from the review research gaps are identified. Specifically, this paper examines the selection of factors influencing successful ABC implementation, variables used by previous research and the definitions and operationalization of the variables. The review reveals that past research concentrated mainly on behavioral, organizational, and technical variables as the main determinants of ABC success but very little research have been done to examine the roles of organizational culture and structure. Based on the research gaps identified, a research framework for future research is provided.

Index Terms—Advanced Manufacturing Environment, Activity-Based Costing, ABC Success

I. INTRODUCTION

In today's competitive and continually changing business environment, firms need to be vigilant of the impacts of the changes in the business environment and devise appropriate strategies to survive and prosper. Advancements in manufacturing and communication technologies have drastically changed the ways businesses conduct their activities. Adoption of advanced manufacturing technologies such as robotics and computerized manufacturing have resulted in significant changes in the manufacturing cost structure which have led academics and practitioners to argue that the traditional costing methods are no longer sufficient within this new manufacturing environment [1] (Johnson and Kaplan, 1987). This had resulted in the change from the traditional volume-based cost model to new costing methods such as Activity Based Costing (ABC) [2].

Due to its ability in providing more accurate costing information and enhancing firms' performance, ABC is

becoming more and more popular [3-7] ABC aims to provide accurate costing information to managers to allocate activity costs to products and services by applying cost drivers [8]. Academics who advocate ABC, such as, Cooper and Kaplan [9], and Swenson [10] argue that it provides more accurate cost data needed to make appropriate strategic decisions about product mix, sourcing, pricing, process improvement, and evaluation of business process performance. These claims have led many firms to adopt ABC systems [8].

The benefits of ABC and its positive impact on firm's performance motivated a numerous studies which examined various aspects of ABC. Among such studies are McGowan [11] who assessed the integrity of ABC success, Innes and Mitchell [4, 12] and Yanren [13] who conducted research on factors affecting ABC adoption, and Shield [3], Shields and McEwen [14], Gosselin [15] and Baired et al.[16, 17]who concentrated on factors influencing ABC success especially at the implementation stage.

However, there is mounting evidence that suggests most of firms are experiencing problems in implementing ABC and, in some extreme cases, ABC implementation is not successful [3], which later resulted in abandoning the ABC systems altogether [15]. Questions arise as to why ABC implementation is successful in certain companies and fails in others. Based on the contingency theory, researchers have argued that the reasons for different degrees of ABC success could be due to the different contextual factors faced by each firm. These have led researchers to recognize assessing factors that influence ABC success implementation as an important research area. The following are among the research that have been carried out to examine factors that influence ABC success: Anderson [18]; Shield [3]; McGowan and Klammer [19]; Krumwiede [20]; and Anderson and Young [21]

This article has two main objectives; the first objective is to identify research gaps based on the revision of previous research and the second objective is to propose theoretical research framework for current research. This article is organized as follows: Section II presents a discussion of selected articles related to factors influencing ABC implementation and gaps or limitations of previous studies and suggestions for current research are stated in the section III and IV. The framework for current research is provided in section V, Section VI defines each research variable and the final section presents the conclusion.

II. PREVIOUS RESEARCH

In this section, selected ABC implementation empirical

studies, which spanned 1995-2008 periods, were collected from four prominent refereed accounting research journals, in management accounting field: Journal of Management Accounting Research, Accounting, Organizations and Society, Management Accounting Research and British Accounting Review. Factors used by previous research to investigate the effect on ABC success implementation are summarized, and stage of ABC implementation also is outlined.

A. Technical Variables

Early studies of ABC adoption and implementation undertaken by previous researchers concentrated on technical factors, such as identification of main activities, selection of cost drivers, problem in accumulating cost data. Example of these research are Cooper [9], Morrow and Connelly [22].

However, technical factors alone may not be adequate to explain the factors influencing ABC success implementation. Cooper et al. [23] argued that the key problem during ABC implementation stage is that companies only focus on technical factors. They suggested that to make ABC implementation more effective, non-technical factors such as involvement of non-accounting in ABC implementation process, top management championship, adequate training program to employees about the objectives and benefits of ABC should be emphasized as well.

Similar opinions were expressed by Shield [3] and Shields and McEwen [14]. Shield (1995) found no significant relationship between technical factors and ABC success. Shields and McEwen [14] also highlighted that sole emphasis on the architectural and software design of ABC systems leads to the failure of ABC implementation. Therefore many researchers have suggested that new variables should be considered to investigate factors influencing ABC success.

B. Contextual, Behavioral and Organizational Variables

Recognizing the research gaps in identifying factors that may affect ABC success, academicians shifted their focuses from technical factors to other variables, such as contextual, behavioral and organizational, culture, as well as organizational structure.

Anderson [18] conducted a longitudinal investigation of ABC process in General Motor (GM) from a period of 1986 to 1993. In his research, he examined the effects of organizational variables and contextual variables, and segmented ABC implementation into four major stages, initiation, adoption, adaptation and acceptance. He found that organizational factors, such as top management support and training for the ABC system affected various stages of ABC significantly, while contextual variables, such as competition, relevance to managers' decisions and compatibility with existing systems produced different degree of impact on different stages of ABC.

Shield [3] examined the relationships between diversity of behavioral, organizational and technical factors and the success of ABC implementation. She employed Shield and Young's [24] framework and summarized behavioral and organizational variables as top management support, adequate resources, training, link ABC system to

performance evaluation and compensation, non-accounting ownership, link ABC to competitive strategies as well as clarity of ABC objectives. She found that top management support, linkage to quality initiatives and to personal performance measure (pay/appraisal), implementation of training and resource adequacy were the significant predictors in explaining ABC success. She also found that technical variables were not associated with ABC success.

Shield's findings are supported by other researchers, such as Shield and McEwen [14], who argued that a significant cause for unsuccessful implementations of ABC of several companies could be due to the emphasis of architectural and software design of the ABC system and less attention given to behavioral and organizational issues, which were identified by Shield [3]. Krumwiede and Roth [25] also stated that barriers of ABC implementation can be overcome if firms could give importance to behavioral and organizational variables identified by Shield [3]. Similarly, Norris [26] agreed with Shield's [3] findings that the association between ABC success and behavioral and organizational variables is stronger than with technical variables. She further highlighted that the impact of behavioral, organizational and technical should be focused at individual level.

McGowan and Klammer [19] conducted a survey of 53 employees from 4 targeted sites in the U.S. to examine whether employees' satisfaction levels are associated with ABC implementation by They also measured their perceptions of the factors associated with the degree of satisfaction, such as top management support; the degree of involvement in the implementation process; objectives clearly stated; objectives shared; training; linkage to performance evaluation system; adequate resources; information quality and preparer over user. Their results indicated that employees' satisfaction with ABC implementation was positively related with clarity of objectives and quality of ABC information.

Gosselin [15] carried out a survey of 161 Canadian manufacturing companies to examine the effects of strategic posture and organizational structure on adoption and implementation of general forms of Activity-based costing. He segmented the ABC implementation stage into adoption and implementation. The research findings showed that a prospector strategy was associated with manager decision to adopt ABC, while centralization and formalization were significantly associated with ABC success implementation.

Krumwiede [20] surveyed U.S manufacturing firms to study how contextual factors, such as the potential for cost distortion or size of firms; organizational factors, such as top management support, training or non-accounting ownership, affect each stage of ABC implementation process. His findings showed that the different factors affected the various stages of implementation of ABC and the degree of importance of each factor varies according to the stage of implementation. Contextual factors, such as usefulness of cost information, IT existence, less task uncertainty and large organizations were related to ABC adoption. Moreover, organizational factors, such as top management support, non-accounting ownership, and implementation training affect ABC success implementation.

In another study by Anderson and Young [21], the relationship between organizational and contextual variables, such as organizational structures, task characteristics, management support, information technology and ABC success was examined. The result confirmed the importance of organizational factors (top management support and adequacy resources) during the ABC implementation stage.

In South Africa, Sartorius et al. [27] carried out a mail survey to investigate the effect of organizational factors such as top management, adequate resources, coherence with organizational goals and strategy on ABC success. They found top management support and resources were the crucial factors in explaining ABC success.

In the UK, Innes and Mitchell [4] and [12] surveyed the extent of ABC adoption among largest firms. The study aimed to find out factors influencing ABC success by using behavioral and organizational variables, and it was found that top management influenced ABC success significantly.

In another study conducted by Khalid [28] using a questionnaire survey among the largest 100 firms in Saudi Arabia, ABC adoption was found to be positively related to diversity of products. In Malaysia, Ruhanita et al. [29] conducted a mail survey and a case study to examine that factors influencing ABC success, especially at adoption stage. They found the significant factors were cost distortion, decision usefulness, information technology and organizational factors. In addition, the findings showed that decision usefulness, top management support, link ABC to performance measure and compensation influenced the ABC success adoption significantly.

A case study of one Chinese manufacturing firm was carried by Lana and Fei [30] in China. Their research aimed to examine some key success factors pertinent to ABC implementation within Chinese organizational and cultural setting. The research findings showed that top management support, hierarchical and communication structure and high proportion of dedicated professionals were the significant factors in determining ABC success implementation.

Majid et al. [7] used a case study approach to describe the process of ABC implementation in a Malaysian service company and a Malaysian manufacturing company. In this research, they categorized ABC implementation into initiation and adoption, design, implementation and use of information. The purpose of the research was to find out the problems faced during ABC implementation, He found that the factors determining ABC success were top management support, suitable ABC software, and finally, ensuring that all affected employees understand and participate in the ABC implementation stage. And they also found that at different stages of ABC, the dominant factors influencing ABC success were also different.

Colin et al. [31] adopted behavioral and organizational factors summarized by Shield (1995) to examine factors influencing the adoption and degree of success of ABC systems and determinants of that success. In their research, the targeted research population was manufacturing and service firms in the UK. They found that top management support, non-accounting ownership, adequate training provided to ABC determined the ABC success.

Besides behavioral, organizational and technical variable, some researchers also indicated that the dimensions of national cultures could affect the level of ABC success [32, 33]. Brewer [32] used Hofstede's taxonomy of work-related cultural values to examine the relationship between national culture and Activity-Based Costing system. In the study, Hofstede [34]'s work was applied to the case of Harris Semiconductor (HS), which has implemented ABC at plants in Malaysia and the USA. The results showed that the level of ABC success in Malaysia was higher than that of U.S due to high-power-distance and collectivist cultures in Malaysia. In addition, Supitcha and Frederick [33] also included national culture's dimension into framework in a case study of one Thai state-owned enterprise's budgeting system. They found that due to cultural differences, modifications were required when the organizations in Thailand tried to implement ABC system in Thai environment.

Apart from national culture, corporate culture factors were also tested by prior research. Baird, Harrison and Reeve [17] conducted a study to investigate the relationship between the extent of ABC adoption and the organizational variables of size and decision usefulness of cost information and business unit culture. In their research, data were collected by a mail survey questionnaire and samples were randomly selected from business units in Australia. The research finding showed significant relationships between ABC adoption and decision usefulness, cultural dimensions of outcome orientation and tight verse loose control.

Baird, Harrison and Reeve [16] examined the relationship between success of activity management practices and organizational factors (top management support, training, link to performance evaluation and compensation, and link to quality initiatives), and organizational culture (outcome orientation, team orientation, attention to detail, as well as innovation). They adopted a survey questionnaire method on randomly chosen business units in Australia. The findings showed that two organizational factors (top management support, link to quality initiatives) explained the variations in success of activity management practices, such as ABC, and outcome orientation and attention to detail of organizational culture were associated with ABC success. They also stressed that compared with organizational culture, organizational factors had stronger associations with the ABC.

Table 2.1 presents a summary of the previous research discussed in this section, which highlights the factors influencing ABC success and the research method adopted by each research.

TABLE 2.1: A SUMMARY OF PREVIOUS RESEARCH RELATED TO ABC SUCCESS IMPLEMENTATION

Author	Method	Variable	Stage
Shield (1995)	Survey	Behavioral, organizational, technical	Not specify
Anderson (1995)	Case	Individual, organizational factors, technical, task and so on	All the stages

Innes et al. (1995)	Survey	Behavioral & organizational variables	Adoption
Gosselin (1997)	Survey	Structure & strategy	Adoption & Implementation
Norris (1997)	Case	Behavioral & Organizational	Not specify
McGowan & Klammer (1997)	Survey	Behavioral & organizational	Not specify
Foster & Klammer (1997)	Survey	Non	Not specify
Brewer (1998)	Case	National culture	Not specify
Krumwiede (1998)	Survey	Contextual & organizational	All the stage
Anderson & Young (1999)	Interview & survey	Organizational & contextual variables	Implementation
Supitcha et al (2001)	Case	National culture	Not specify
Innes et al. (2000)	Survey	Behavioral & organizational variables	Adoption
Sartorius et al (2000)	Survey	Organizational variables	Not specify
Cotton et al (2003)	Survey	Behavioral & organizational variables	Adoption
Khalid (2003)	Survey	Size, production, overhead	Adoption
Baird et al (2004)	Survey	Size, decision usefulness of cost information, culture	Adoption
Ruhanita et al. (2006)	Survey & Case	Cost distortion, decision usefulness, IT, organizational	Adoption
Lana & Fei (2007)	Case	Technical, behavioral, organizational, contextual factors	All the stage
Baird et al. (2007)	Survey	Organizational factors, culture	Implementation
Sartorius et al. (2007)	Survey	Organizational, technical factors	Adoption
Colin et al. (2008)	Survey	Behavioral & organizational	Implementation
Majid et al. (2008)	Case	Behavioral, organizational &	Adoption &

		technical variables	implementation
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Adapted from Lana and Fei [30]

III. GAPS FROM PREVIOUS RESEARCH

From the review of previous research, this section highlights the gaps from previous research. First, as highlighted by Lana and Fei (2007) a majority of ABC research still was done in developed countries and very little research has been done in developing country, especially in Asian context. Thus it is necessary to identify whether the Asian culture and way of doing business may have a different impact on the extent of ABC adoption and implementation.

Second, a majority of ABC research reviewed adopted the behavioral and organizational variables identified by Shield [3] to investigate factors influencing ABC success. So far only one research., which was conducted by Gosselin [15] examined the effect of organizational structure on ABC success among Canadian business units. The importance of organizational structure effect on management accounting practices is stressed by many researchers. For example, Damanpour [35] stated that whether an innovation can be successfully adopted or implemented to some extent is determined by the type of structure the a firm adopts, so the current study also will consider organizational structure as one of the predictors of ABC success.

Third, few research have examined the effect of corporate culture on ABC success empirically. Hence it is necessary to examine the association between ABC success and corporate culture, as well as how important cultural factors might be relative to organizational, non-cultural factors [16].

Forth, very few studies have investigated the effect of national cultural on ABC and so far, only two researchers, namely, Brewer [32] and Supitcha and Frederick [33], have included this variable in their studies. Supitcha and Frederick [33] argued that national culture differences often require successful accounting practices in one country to be modified for effective use in another country. So the influence of national culture should not be ignored [32]), especially in developing countries, and differences in term of perceived ABC success could be explained by national culture.

The next research gap is that some previous research did not specify the ABC implementation stage for example, Shield [3] and Brewer [32]. According to Krumwiede and Roth [25], ABC implementation has six different stages. They are initiation, Adoption, Adaption, Acceptance, Routinization, Infusion, the final two stages are considered as "mature stage" [25]) and it is argued that at different stage, the dominant factors that determine ABC success implementation are also different. In order to investigate the factors influencing ABC success more accurately, the current research will concentrate on one particular stage of ABC implementation that is mature stage.

Finally, the selected articles show most of ABC implementation research were conducted using quantitative method such as questionnaire survey, and there are very few research used qualitative method (see Table 2.1). According

to Cavana et al. [36], questionnaire survey of data collection often encounters problems of low response rate and to counter this problem researchers are encouraged to use multiple methods to collect data.

IV. PROPOSED FRAMEWORK FOR FUTURE RESEARCH

As very few empirical research have been done in developing countries on ABC adoption and implementation, future research should be conducted in developing nations, especially, in Asian countries such as China. Since China is one of the fastest growing economies in the world, it would be interesting to know if ABC success is affected by similar factors as in the western countries. Furthermore, since joining the WTO in the year of 2001, Chinese enterprises started adopting western management accounting techniques, thus it is necessary to know the impact of Chinese culture on the ABC success. Hence the current study will focus on ABC success among Chinese manufacturing companies.

Krumwiede and Roth [25] classified ABC implementation into different stages; initiation, adoption, adaption, acceptance, routinization, and infusion. It has been suggested in the literature that the dominant factors that determine ABC success implementation are also different at different stages [20]. A review of the literature shows that more research has been done to examine the determinant factors at the adoption and very few studies on implementation stage. Thus the current research will concentrate on one particular stage of ABC implementation, especially, the 'mature' stage (Routinization, Infusion).

The current research will also examine the effect of structure on ABC success. It has been argued that in order to examine the effect of structure, the sample should come from only one industry. Gosselin [15] argued that different industries have different level of centralization, and formalization, and he suggested that a study should concentrate on one particular industry. Similarly, Rotch [37] stated that compared with manufacturing firms, non-manufacturing firms are very different in terms of characteristics. For instance, hotels are different from manufacturing firms and output of non-manufacturing firms are extremely hard to determine. Moreover, activities in non-manufacturers, especially in service sectors are hard to be predicted, and also large proportion of total cost are joint costs, which often difficult to assign to output. Similarly, Clarke, Hill and Stevens [38] highlighted that significant differences exist in terms of cost structure between manufacturers and non-manufacturers. In non-manufacturing sector, direct labor and direct material cost are almost equal to zero, and fixed overhead costs are the dominant costs in the cost structure and this difference makes researching ABC application in this type of industry more problematic. Hence the current study will focus on manufacturing industry only and since ABC is more likely to be implemented by larger firms [28], this research will also concentrate on large sized manufacturing business.

As discussed in the earlier section, previous research has not systematically examined the effects of organizational structure and organizational culture on ABC success. This motivates the current research to investigate the effects of

these variables on ABC success.

V. RESEARCH FRAMEWORK

A. Proposed theory

The current research will adopt Contingency theory and organizational theory to develop the research framework. Contingency theory has been widely adopted to conduct research in management accounting field [39-41]. Contingency theory asserts that the design and application of control systems are contingent on the environment of the organizational setting in which these controls operate and function [39]. It is widely used to explain the characteristics of management accounting system [42]. Waterhouse and Tiessen [43] stated that the design and structure of management control system is contingent on number of factors; there are product diversity, cost structure, size, level of competition and degree of customization [44, 45]. Sartorius, Eitzen and Kamala [45] illustrated an example to explain the relationship between ABC and the contingency factors. They stated that increasing fixed costs leads to a need for more accurate cost allocation technique such as ABC. This is especially true for firms which produce more than one products as different product products use differential amounts of resources [17]. Competition is another contextual factor that leads to the emergence of more sophisticated costing system such as ABC. In addition, large sized firms are more likely to adopt ABC than smaller firms due to the size of overhead, number of activities needs to be coordinated, as well as limited resources[16, 45].

However, adoption and implementation of an innovation are totally different[41]. Hence, Contingency theory alone may not be adequate to explain ABC implementation stage. Krumwiede [20] concluded from a survey among US firms that contextual factors may influence the ABC adoption stage while implementation stage is more associated with organizational factors. He also suggested that once a firm arrives at ABC implementation stage, it should pay attention to organizational factors. Hence, another theory should be applied to explain ABC implementation stage, which is organizational change theory [29].

According to organizational change theory, changes in organizations could be classified into four categories: technology, products, structure, and culture [29]. Gosselin [15] categorized ABC implementation stage as the administrative procedure. Therefore, ABC could be considered as a structural change and its success is determined by top-down approach. Based on organizational change theory, Cooper and Zmud [46] divide IT innovation into six sequence stages; 1) initiation, 2) adoption, 3) adaptation, 4) acceptance, 5) routinization, as well as 6) infusion. They also stated that at various stages the dominant factors in determining IT innovation are also different.

B. Research Framework

In view of the discussion in the previous sections, the following framework is proposed, depicted by Figure 1, for this research. Prior research test the relationship between ABC success and behavioral, organizational variables, hence

the current research will also base on Shield [3]'s model to examine the impact of behavioral, organizational variables on ABC success. In addition, it also will include two additional variables, organizational culture and structure as Gosselin [15] stated that effect of organizational culture and structure on ABC success should not be ignored.

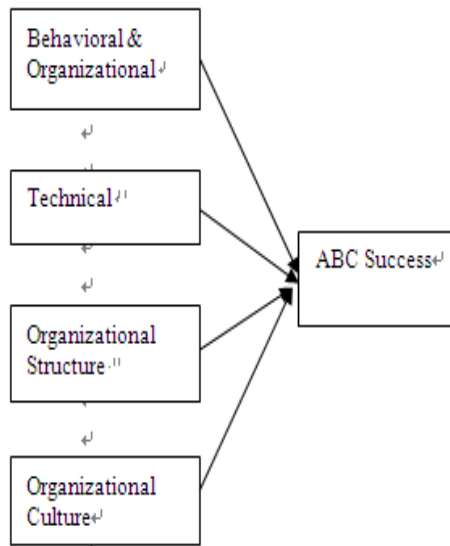


Fig 1: Theoretical Research Framework

Seven behavioral and organizational variables are important to cost management practices identified by Shield and Young [24]. They are: 1) Top management support; 2) linkage to competitive strategies, 3) performance evaluation and compensation, 4) non-accounting ownership, 5) sufficient resources, 6) training in designing, implementing and using cost management system and 7) consensus about the clarity of the objectives of the cost management system, so current study will use all this indicators as behavioral and organizational variables. Lana and Fei [30] reviewed past empirical research about factors influencing ABC success and summarized the technical used by prior research, they are software packages, gathering data on cost drivers, identifying activities, knowledge of data requirement and data collection, the participation of external consultants. The current study also employed Lana and Pan [30]'s definition and its measurement for technical variables.

Whether a company can adopt and implement a management innovation can be significantly affected by organizational structure [35]. Burns and Stalker [47] classified organizational structure into mechanistic and organic, mechanistic organizations have higher level of centralization and formalization than that of organic structure [15]. Gosselin [15] found that ABC can be more successfully implemented in mechanistic organizations. Centralization and formalization will be treated as indicators for organizational structure in current research.

Organizational culture still produces significant on ABC success, as Skinner [48] pointed out uncaring culture leads to the failure of ABC. Baird *et al.* [16] used outcome orientation, team orientation, attention to detail, as well as innovation to examine the relationship between activity management success and organizational culture. And the current study

also will adopt those dimensions. As for ABC success, the current study will adopt McGowan 's [11] definition. McGowan [11] used four perspectives to measure Activity-Based Costing Management, namely users' attitude, technical characteristics rating, perceived usefulness in improving job performance and impact on organizational process. This measure subsequently adopted by Byrne *et al.* [49] to test ABC success implementation in Australian context. In their research, they stressed that McGowan's [11] definition provides the most robust measure, hence the current study will also apply McGowan's [11] definition as the indicators as ABC success.

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