

Emergence of the Time- Driven Activity- Based Costing

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Abstract

The main aims of this article are to provide a brief analysis for the following inquiries: 1) what are the potent influencing contexts that have led to the emergence of the Time-driven Activity -Based Costing (TDABC)? , and 2) what can be learned from the development of the TDABC for future research? The research method is based on the "Archival Approach"- library search and exploring of the content of the published literature in the sphere of the Conventional Activity Based Costing (CABC) since 1980's to date. "Qualitative Content Analysis", "Exaggeration Theory" and "Innovation Theory" are also used. The findings of the study revealed unambiguously that five imputes were influential in the emergence of the TDABC: 1) abundance of the incompatible theoretical and empirical evidence pertinent to CABC, 2) implementation obstacles involved in expending CABC, 3) low rate adoption of the CABC, 4) exaggeration of the usefulness of the CABC and 5) assimilation of the TDABC as a contemporary and innovative technique by proponents. These factors holistically indicate that a successful implementation of any system is dependent on designing thriving and solid theoretical, as well as practical premises for the system. Furthermore, the marketing aspects of the system are an influential factor in diffusing the system. Innovative features of the system are also extremely significant in this regard. Thus, proponents of the TDABC should not exaggerate the usefulness of the TDABC. Otherwise, TDABC will pursue the same path as CABC, and it may be abolished soon.

Key Words: *Time- Driven Activity Based Costing (TDABC), Conventional Activity Based Costing (CABC), Exaggeration Theory, Innovation Theory, Cost Management System.*

Introduction

A remarkable phenomenon in the theoretical and practical applications of management accounting, which emerged in the 1980s, was explored in the field of Activity Based Costing (ABC) system. In essence, presently, there exist two main versions of the ABC mechanism in the literature, as well as practice; they are: 1) the Conventional ABC (CABC) System, (e.g., Cooper, 1987, Cooper and Kaplan, 1992; Kaplan and Cooper, 1998, Johnson, 1998, Schuhmacher and Burkert, 2014), and the Time-Driven ABC (TDABC) System, (Kaplan and Anderson, 2004 and 2007, Chamie and Saigal, 2015, Öker and Adıgüze, 2016, Akhavan et al., 2016, Namazi, 2016). At present, the literature is already replete with various discussions and studies concerning antecedence, different aspects, assumptions, limitations, and surveying prevalent scholarly investigations pertinent to CABC and TDABC (see; Menak and Mitchell, 2002; Charles and Hansen, 2008, Everaert, 2008, Namazi, 2016). Thus, this will not be the subject of this study.

This study explores the major imputes that led to the development of the TDABC. In particular, the main aims of this article are to provide a brief analysis for the following inquiries:

- 1) What are the potent influencing contexts that have led to the emergence of the TDABC? ,and
- 2) What can be learned from the development of the TDABC for future research?

In effect, this study is expected to generate several major contributions. First, it discloses the major limitations of the CABC, both theoretically and practically. Second, by adopting such novel theories as "The exaggeration theory" and "Diffusion of innovations theory", and also providing empirical and theoretical status, the study, for first time, explains the major factors underling the emergence of the TDAB. Thus, it would enhance the present knowledge about this thriving field comprehensively.

Third, it sheds light for professionals that might be attempting to adopt this contemporary cost management technique in the future, and would provide inclusive relevant information for the future accounting scholars. Consequently, rejuvenated cost management models are expected to be developed, which would be more accurate, advanced, powerful, and less costly than CABC.

The organization of the article is as follows. First following section briefly provides relevant information about the research method. Then, major findings regarding the development of the TDABC, including the most prominent concomitant factors that are potentially responsible for the emergence of the TDABC are presented. After that, the implications of the findings for future research, along with the discussion, concluding remarks and suggestions for future research in this domain are provided.

Research Method

The research design of this study is compatible with" one-shot ex-post design" (Smith, 2015). The research method is based on the "archival approach"- library search and exploring of the content of the major books, case- based studies and articles published in the literature in the sphere of ABC since 1980's to date. Because the objective of the study is specifically to identify major imputes affecting the emergence of the TDABC; "Qualitative Content Analysis" (Smith, 1975; Krippendorff & Bock, 2008; Hsieh & Shannon, 2005) was applied for extrication of the substance of the CABC and TDABC literature. Content analysis was adopted because it allows for the systematic examination of artifacts of the social oral and/or text of the CABC and TDABC to make a valid inference (Smith, 1975). It also permits an in-depth analysis of qualitative as well as quantitative analysis of the literature regarding the emergence of the TDABC.

Findings: Major Development of the TDABC

This section briefly discusses the result of the content analysis to provide explanations for this inquiry: What factors were the major imputes responsible for the emergence of the TDABC? This development can be investigated form economic, social, organizational and accounting perspectives. This inquiry would, however, require a comprehensive investigation which is beyond the scope of this article. Hence, this study is merely confined to identify the most pertinent and dominant influential contextures based on the published literatures on ABC.

Five possible reasons for the emergence of the TDABC are provided based on literature: 1) incompatibility of the empirical findings with the claimed advantages of the CABC, 2) implementation problems of the CABC, 3) low rate adoption of the CABC, 4) contradiction of the premises of the CABC with the concept of the exaggeration theory, and 5) diffusion of innovation in cost management techniques. The first three reasons are extracted from practical and empirical evidence, and the last two are based on the prevalent theories. Each will be discussed accordingly.

Incompatible Evidence

Although the concept of activity costing can be traced back to the study of Hamilton Church, nearly 100 years ago (Harrison and Sullivan, 1996), and it was somehow pointed out by Solomon in 1968 and by Staubus in 1971, among others, it was not until the mid 1980s that the concept of ABC was flourished mainly by Cooper (1987), Johnson (1988) and Kaplan and Cooper (1988). Kaplan (in Kaplan, et al., 2000, p. 5) describes the development of the CABC:

We did not invent this name [Activity- Based Costing (ABC)]: it was used by the John Deere Company, one of the organizations that we studied to learn about ABC. It's also important to recognize that neither we nor any other academic invented this approach. We were fortunate to have found several organizations around the world that had apparently independently developed the ABC approach to enhance their understanding of organizations expenses. Our initial role was to uncover these innovate implementations, and to recognize and articulate the theory that underlay all the applications.

In spite of this fact, CABC was introduced by Johnson and Kaplan (1987) as a significant response to the concept of "relevance lost", (but Johnson later called it "pure snake oil", Thomson and Gurowka, 2005, p. 28) and introduced it as a "revolutionary cost technique". Consequently, promoters of the CABC diffused this tool as a powerful cost management system which would produce immense advantages, including the followings (see e.g. http://www.12manage.com/metuds_abc.html; Kaplan and Cooper, 1998).

- It identifies the most profitable customers, products and channels.
- It identifies the least profitable customers, products and channels.
- It determines the true contributions to and detracts from financial performance.
- It predicts costs, profits and resources requirements associated with changes, in production volumes, organizational structure and costs of resources accurately.
- It identifies the root causes of poor financial performance easily.
- It tracks costs of activities and work processes.
- It equips managers with cost intelligence to stimulate improvements.
- It facilitates a better marketing mix.
- It enhances the bargaining power with the customer.
- It achieves better positioning of products.

Given the exorbitant advantages claimed by the proponents of CABC, there exist two contemporary phenomena .First, in the late 1980s and in 1990s, the enthusiasm pertaining to applications of this novel technique among academics and professionals arose. As a result, some small and large firms around the world, including companies listed in the Blue Chip 500 (Ostrenga, 1990), AT & T and Hewlett-Packard, among others, began its rapid and impatient adoption. However, while some firms experienced cost reduction and profit enhancement by adopting CABC, as will be explained later, many other firms did not realize similar benefits (Cooper et al., 1992; Anderson, 1995); some others abandoned the implementation, some experienced ample obstacles (Thomson and Gurowka, 2005), and still some others were never able to predicted merits of the CABC and advantages (Kaplan & Anderson, 2004, & 2007). The negative experience, in effect, caused a low rate of adoption, disappointment, uncertainty, and dissatisfaction with CABC, and provided a basis in which TDABC emerged.

Second, with the advent of CABC, accounting scholars also began scrutinizing various aspects of the CABC and some presented potent contradicting results and evidences. For example, Bromwich and Bhimani (1989) empirically showed that contemporary management accounting techniques (including CABC) are not "revolutionary" rather they are "evolutionary". Consequently, Scapans (1994), Burns and Scapans (2000) and Burns (2000), among others, presented an "evolutionary" framework for conceptual changes within the organizations. Coad and Cullen (2006) applied the "evolutionary theories" to inter-organizational cost management situations empirically. Gossline (1997) reported the "ABC paradox"- that

is, despite the widespread diffusion of the advantages of the CABC, its implementation rate is still not intense.

Horngrén (1990) argued that CABC may have a new name, but it is far from new. In addition, there are some disturbing issues associated with CABC (p. 23). First, some claims and advantages are outrageously exaggerated. Second, concentrating on the concept of full costs as a "true costs" for pricing decisions would lead to the neglect of other price-influencing variables. Third, an informal survey indicates that ABC consultants are not adopting ABC for their own operations. That is, they do not practice what is preached (p. 23).

Nanni et al. (1992) provided evidence on some firms that have abandoned the implementation of CABC, and they found that there was little evidence that CABC would actually lead to enhancing profitability. Inns and Mitchell (1990) explicitly reported that there was no empirical evidence to indicate that adopting CABC would impute profitability to be increased. Bromwich and Bhimani (1994) concluded that the superiority of CABC over traditional and/or contemporary management cost systems cannot be determined unambiguously, and despite the claims of its advocates, CABC has not been able to deal with the "overhead bold" issue. Kennedy and Affleck-Graves (2001) reported that little evidence has been presented to show that the adoption of CABC would indeed result in an increase in either shareholders' value or the firm's profitability. Finally, Abdullah and Li (2008) provided various reasons responsible for the failure of CABC (at the Bank of China).

Furthermore, some other scholars have also pointed out the weaknesses underlying the infrastructure mechanism of CABC. For instance, Babad and Balachandran (1993) and Homburg (2001) discussed problems involved in selecting the optimal cost drivers' selection of the CABC and provided an appropriate mathematical model pertinent to this obstacle. Kim and Han (2003) propounded weaknesses underlying CABC. They maintained that first; CABC does not provide relevant criteria for selecting cost drivers. Second, it assumes that a linear relationship exists between the consumption of activities and the assigned quantities of indirect costs. Consequently, they introduced a "hybrid genetic algorithm and neural network approach" to solve the problems of CABC. Roztocki and Weistroffer (2005) pointed out that the greatest challenge of the CABC is related to the lack of precise and reliable accounting data and uncertainty. Consequently, a mathematical fuzzy activity-based costing system was presented. Natchmann and Needy (2003) also contended that data relating to CABC are often estimated based on some costs and time constraints which are inherently imprecise and uncertain. Consequently, the fuzzy set theory and Monte Carlo simulation was applied to solve the problem of cost estimation associated with CABC.

Piper and Walley (1990) propounded the concept of the ABC "logical fiction". That is, they claimed that the proponents of the CABC attributed any cost management success just to one influencing factor,- the CABC system; Whereas, in reality, the success depends on various concomitant variables. Their argument was supported by later empirical research. Krumwiede (1998), for example, showed that the top managements'support, sophistication of the system, the large size of the firm, and integration with the financial systems, among other variables, are significant confounding variables for a successful implementation of CABC. Endorsing the role of the adoption process, Anderson and Young (1999) also found that the implementation process of CABC does indeed exhibit an unambiguous influence on the ABCM success, and the contextual variables would directly influence the outcome.

Drake et al. (1999) via an experimental approach also found that the success of the firm in adopting CABC depends on its linkage with an incentive structure. In particular, they found that "providing ABC information did not, in and of itself, consistently lead to increased innovation, efficiency or profits. However, when workers had both increased cost driver information and higher incentives to cooperate, they initiated more cooperative innovation, had lower production costs and higher profits than any other examined combination of the costs system and incentive structure" (p. 340).

Kennedy and Affleck- Graves (2001), by an experimental design, showed that the choices of the CABC may posit a significant impact on the value of the firm. Specifically, for a sample of U.K firms, they exhibited that those firms which had adopted CABC, outperformed the matched non-ABC firms by approximately 27% over the first three years of applications (p. 19).

In a later work, Piper and Wally (1991), after reviewing various CABC case studies, concluded that it is the "strategic decisions" not "activities" that causes costs to be gathered, analyzed, and implemented. Later research on the strategic cost management and value chain analysis (e.g., Shank and Govindarajan, 1995), also have emphasized the significance of the "strategy" in cost management implementation process.

From the preceding studies, the following brief conclusions can be extracted:

TDABC emerged because:

- 1) Conventional ABC system showed that it suffers from lack of major theoretical basis and infrastructures.
- 2) CABC illustrated that it is not always relevant for every organization and situation.
- 3) The advantages claimed by proponents of CABC have not often been materialized empirically.
- 4) The success of the CABC depends on various contextures, including organizational, behavioral, and social factors, at both internal and external levels.
- 5) The advantages of the CABC have been exaggerated in the early publications of the CABC. This exaggeration has actually been one of the major imputes for the emergence of the TDABC.

Implementation Problems of the CABC

Proponents of the TDABC (e.g. Kaplan & Anderson, 2004& 2007) contend that the obstacles associated with the implementation of CABC have been a major confounding factor responsible for the emergence of the TDABC. Reported field studies and surveys (e.g., Malmi, 1991; Palmer and Vied, 1998, Thomson and Gurowka, 2005, Madhock et al., 2015) would actually support their connotation that in practice, various adoption problems are indeed prevalent.

Horngren (1990) and Nanni et al., (1992) for instance, reported the disappointment of some companies in adopting CABC. Cobb et al. (1992) showed that many CABC implementation attempts have failed. They found that the most common CABC problems for those companies which had assessed it for at least one year were: 1) the amount of work involved, 2) other higher priorities, 3) lack of staff time, 4) scarce computer resources, and 5) selection of the relevant cost drivers. Further, during the first year of the implementation process, the most major obstacle was the amount of the time spent by both accountants and IT personnel. After the first year of the implementation, however, the most prevailing problems were: 1) updating the system, 2) gathering relevant information relating to cost drivers, and 3) determining the cross departmental problems and activities.

Roberts and Silvester (1996) also empirically showed that the most technical adoptions pitfalls of the CABC were: 1) the existence of too many or too few activities or cost drivers, 2) maintaining an overly complex system, 3) encountering with reciprocal cost allocations, and 4) lack of technical expertise in identifying activities, or cost drivers. Furthermore, the most significant difficulties with the implementation of the CABC was not due to technical aspects of the technique or it's theory, rather it was related to the structural barriers of the managements and organizations.

Further limitations of the CABC were presented by Kaplan and Anderson (2004 & 2007). After applying CABC in various organizations, they found that some companies either did not implement CABC, or abandoned it, because of the organizational resistance which usually exists for any contemporary technique. However, much of the resistance was rational and stemmed from technical problems of the CABC. The

design of the CABC is costly, overly complex, and difficult to modify. The cost assignment of the system is also based on subjective estimates of the percentage of times that employees should spend for each activity, and the model is not granular enough to encompass the inherent complexities which usually exist in every real operation. Thus, it would not be able to determine the cost object's (products, customers, departments, etc.) profits accurately. In addition, when activities are increased, the demands for storing and processing data would be enhanced conceivably, and maintaining a relevant computer packages becomes a subtle task. "For example, a company using 150 activities in its enterprise wide ABC model, applying the costs to 600,000 cost objects (products, SKUs, and customers), and running the model monthly for two years, requires data estimates, calculations, and storage for more than 2 billion items. Such expansion gives rise to many ABC systems exceeding the capacity of generic spreadsheet tools" (Kaplan and Anderson, 2007, p. 6). A much more subtle pitfall, however, occurs when CABC systems determine the cost rate based on the assumption that resources (including employees) are operating at full (100%) capacity. In these situations, the potential for considering unused capacities are strayed.

In conclusion, practical cases have revealed different limitations of the CABC, mainly on the grounds of costs, IT requirement and application process. Ironically, these inherent subtle difficulties and drawbacks have paved the way for the emergence of the TDABC.

Low Rate adoption of the CABC

Another potential inference, which has led to the development of the TDABC, is the occurrence of low implementation rate of the CABC. In spite of the initial enthusiasms generated by the advent of the CABC among some professionals and academics, CABC was not universally accepted, and its adoption has not been really intense (Gosselin, 1997). A survey revealed that among various management techniques, CABC ranked below the median, with only a 50% percent adoption rate (Rigby, 2003). Another survey of British companies disclosed that only 11 out of 187 firms selected in the study, actually implemented the CABC system (Cobb, 1993).

Innes and Mitchell's (1995) survey of activity-based costing practices of 251 UK companies also revealed that only 19.5% of the companies implemented CABC, and 27.1% of them were assessing its adoption. Approximately, five years later, Innes et al. (2000) surveyed the CABC's implementation of 177 UK's largest firms in an attempt to determine the probable changes that might occur in the adoption rate. They found that the adoption rate of the CABC was reduced to 17.5%, and the rate of assessment also fell to 20.3% from 21% and 29.5% respectively. On the other hand, the rejection rate of the CABC increased from 13.3% to 15.3% during this period.

The adoption rate of the CABC in the United States has also been generally low. Groot's (1999) survey, for example, revealed that 18% of the respondents companies operating in the food and beverages industry adopted CABC, while 58% were just considering it.

Hicks (2005) pointed to the Roztock and Schultz's (2003) study in which it was reported that ABC was implemented by only 21 % of the organizations, and then contended that from his personal professional experience with more than 200 companies, this rate was actually lower than that. He then cited the Kennedy's study (2000) who reported that "worldwide adoption rates of ABC have peaked a 20 percent and a declining number of firms are giving it a further consideration. This situation must be particularly disappointing for its advocates, despite the extensive, high-profile marketing and consultancy services that have been developed. Anecdotal experience of problems associated with ABC implementation is supported by research documenting a high number of it projects falling short of their stated objectives" (p. 34).

A survey of Dutch companies in the food and beverages industry also revealed that only 12% of the investigated companies were implementing CABC, and 25% were considering it. In Canada, one survey

found that 14% of the selected companies had adopted CABC, while 15% were considering it (Horngren, et al. 2003, p. 153).

There are several potential inferences for the existence of the low adoption rate of the CABC (Kennedy and Affleck-Graves, 2000: 22, 23):

- 1) Managements and accountants may not have perceived prescribed advantages of the CABC.
- 2) CABC may not be useful for every organization.
- 3) The costs of designing, maintaining, and up-dating the system exceeds its potential benefits, at least, for some companies.
- 4) CABC may not directly add values, but may merely be correlated with other variables which generate the designated values.
- 5) Despite the claims of the CABC, it has not been able to demonstrate significant practical evidence on the direct relation between adoption of the CABC and increasing shareholders' values or profitability, and other advantages of the CABC.

Considering the preceding reasons, the low rate of the adoption of the CABC has gradually caused a reduction of interests in implementing CABC, particularly in the developed countries, because their managements and accountants have become more familiar with the mechanism and implementation issues of the CABC, its drawbacks, limitations, and usefulness. This, in turn, has transmitted a vital signal to some leading professionals and academics that it would be a good time for change; and hence, TDABC emerged.

The Exaggeration Theory

The advent of the TDABC can also be explained in terms of the "Exaggeration Theory" (Ramiller, 2006, Schmeichel, et al. 2006, Shields, 2008 Igarashi Y, et al., 2013). Exaggeration or hyperbole embraces the practice of rhetoric. Rhetoric involves employing language in a compelling manner that would inspire and persuade others to act (Zanna, 1998; Ramiller, 2006). Exaggeration may be positive or negative (Kiedinger, 2008). In its accentuating positive role, exaggeration may consist of overstatement, amplification or magnification to a positive act. However, exaggeration may also involve in understatement marginalization or even silence, leading to a negative practical action. The outcome of the exaggeration actions, however, is uncertain. A significant uncertainty also exists surrounding the fact, and a discrepancy is prevalent between and individual's perceptions and facts.

Ramiller (2006: 2-4) identified five knowledge modes of the exaggeration: 1) knowing what, 2) knowing why, 3) knowing where, 4) knowing when, and 5) knowing how. In reflecting these modes to the concept of the CABC, knowing what indicates that organizations learn what CABC is made up of, and the intent of its rhetoric is "rhetoric of novelty", that is it seeks to send a message to adopters that CABC is a novel technique. Since claims of the newness may raise a question about the interpretability and understandability of the modern technique, the rhetoric of novelty may be joined by a "rhetoric of interpretability" through which proponents attempt to convince others that CABC, while truly recent, is also comprehensible. In this case, knowing what may also invite "rhetoric of plausibility" (p. 3).

Knowing why involves offering advantages of the contemporary technique, in this case CABC. Its rhetoric, known as "rhetoric of transformation", sends a message to potential users that the modern technique has a significant value. Exaggeration involves overstating the importance and relative advantages of the technique, but can also function by omission. The rhetoric of transformation is joined with the "rhetoric of reward", through which adopters can conceive receipt of the exorbitant pay offs. It may also be completed by the "rhetoric of excellence", which is based on such slogan and "being excellent in practice" and "conducting the best practice", (p.3).

Knowing where extends the connotation of the "best practice" to "rhetoric of the imperative", therefore the best-practice rhetoric implicitly replies the question of "knowing where?" with "everywhere". "The rhetoric of the imperative may be joined by a "rhetoric of diffusions" that makes exaggerated claims about the degree of the diffusions that is actually taking place. Offered as an evidence of the inevitability of adoption, it reinforces the impression that right thinking managers everywhere will lead their organizations to adopt the technique (p.4).

Knowing when involves the timely adoption of a contemporary technique- CABC model, and follows the "rhetoric of urgency". This rhetoric tests the preparedness of the organization in implementing the technique and can be joined by "rhetoric of readiness". The rhetoric of readiness can deal with the following obstacles: 1) the maturity and growth of the CABC, 2) providing complementary vital resources such as consulting services for the CABC technique, and 3) the demand for internal resources and capabilities of the technique (p. 4)

Knowing how embraces the notion of "rhetoric of implementation" that attempts to convince the system users (in this case- CABC) that it is in their own interests and benefits to learn how to effectively implement the technique. Exaggeration here involves amplifying trial, communicability and compatibility of the technique "while muting its lumpiness, complexity, radicalness, and cost" (p. 4). A "rhetoric of accomplishment" can be employed as a complementary for "rhetoric of implementation". Declaring success can be lack of interest and an important means to legitimate and move forward with a modern system (p. 4).

Diffusion of Innovations

The emergence of the TDABC may also be described via the theory of "diffusion of innovations" (Abrahamson; 1991; Malmi, 1999; Bjørnenak and Olson, 1999, Burns and Scapens, 2000, Burstein and Murray, F, 2016). Diffusion is the dissemination of a new idea or an innovative technique through a population (Lapsley and Wright, 2004). Diffusion of innovations theory simply states that many changes in organizations occur as a result of direct emergence of innovations effects. In its comprehensive form, it is based on the Abrahamson's typology (1991) which consists of four perspectives: 1) efficient choice perspective, 2) forced selection perspective, 3) fashion perspective, and 4) fad perspective (Malmi, 1999: 649). In the efficient choice perspective, organizations freely and independently select a proposed contemporary change and a technology based on their prescribed goals. The objective is to close or narrow down the performance gap between the organizational goals and actual practice. In the forced selection perspective, an organization is compelled, incoming (by the government or other legal organizations), to adopt a change or a technology; thus, no choice with respect to selecting a change or a technology is made on the part of the organization, and the imitation processes do not impel adoption.

The fashion perspective involves the prescription of the outside non-adopting organizations to a particular firm or a group of firms to assent or reject the prescribed change or technology. Hence, this perspective is similar to the forced selection perspective, with the exception that here the impact of prescription is less strong than in the force selection process since it is made by consulting firms, business schools, media, etc. A significant characteristic of the fashion perspective, which makes it distinct from the previous perspectives, is the existence of uncertainty concerning the adoption of a modern change or a technology. In effect, the fashion perspective assumes that "fashion-setting" companies outside a group actually establish the diffusion within the group, and thus, imitation processes would impel the diffusion.

In the fad perspective, organizations within a group set up the diffusion within this group and imitate "other adopting organizations" instead of the "fashion-setting" organizations. Thus, non-adopter organizations do not influence the diffusion processes, and organizations imitate other organizations in an attempt to look legitimate.

Now, as far as the diffusion of innovations in the field of management accounting is concerned, the history of management accounting indicates that not much potent innovations in its techniques and tools appeared between 1925 to mid 1980s. In fact, Johnson and Kaplan (1987) contended that by 1925, virtually all management accounting practices that are prevalent today such as direct material, direct labor and overhead costing, budgeting, standard costing, variance investigation, transfer pricing, and divisional performance evaluations would have been developed, and the pace of innovation, would have been stopped since mid-1920s, until mid 1980s. This phenomenon, of course, does not indicate that managerial accounting has not been looking forward to innovations eagerly. On the contrary, the advent of the CABC in the mid-1980s, emergence of the Balanced Scorecard in 1990s, introduction of the TDABC in 2004, and theoretical as well as empirical studies in "management accounting changes" (Scapens, 1994, and Scapens and Burns, 2000) are prime examples that management accounting's practitioners and scholars have generally welcomed contemporary changes and innovations willingly, since 1980s.

The amount of diffusion, however, depends on the impacts of the internal and external variables surrounding the organization, including the efficient-choice perspective, forced-selection perspective, fashion perspective, and fad perspective. Malmi (1999), for example, reported that influential factors in early adoption of the CABC encompass the firm size, product diversity, and a large share of indirect costs relative to total costs (p. 651). By conducting an empirical study, Malmi (1999) concluded that, driving forces behind innovations in CABC, change over the diffusion perspectives. "Efficient choice may explain the earliest adoptions, whereas fashion-setting organizations exert considerable influence in the take-off stage. Later on, the influence fashion setting organizations diminishes. Further diffusion is explained both by mimetic behavior and efficient-choice" (p. 649).

Coad and Cullen (2006), in the context of a longitudinal case study, and by introducing the essence of the heuristics as a basis for cost management, demonstrated that core concepts significant in shaping the inter-organizational cost management are institutionalization, capabilities, learning and change (p. 342).

Although the time period between introducing CABC (around 1987) and TDABC (in 2004) was not prolonged, but some practitioners and scholars apparently were mentally disposed to assent the new change and technique -the TDABC. The amount of the diffusion of TDABC, however, depends on the organizations perception of the exaggeration, limitations and the rate of the adoption of the CABC, as well as the development of the four diffusion of innovations perspectives (efficient-choice, forced selection, fashion, and fad perspectives). In addition, other endogenous and exogenous variables affecting the adoption of TDABC such as information technology, size of the company, international competition, customer satisfaction, learning and growth of the employees and technology could also posit a potent impact in developing TDABC.

In conclusion, among various influential variables, exaggeration of the CABC benefits, its implementation issues from the stand point of the internal and external contexts pertinent to the system, the low rate of adoption of the CABC, and the diffusion of innovations have, individually and collectively, been effective in introducing TDABC. An analysis of the exact effects of each factor, the manner of their operations and their concomitant impacts is, of course, the subject of the empirical studies which must be conducted in the future.

Implications of Findings for Future Research

The preceding discussions revealed unambiguously that five imputes were influential in the emergence of the TDABC: 1) abundance of the incompatible theoretical and empirical evidence pertinent to CABC, 2) implementation obstacles involved in expending CABC, 3) low rate adoption of the CABC, 4) exaggeration of the usefulness of the CABC and 5) assimilation of the TDABC as a contemporary and innovative technique by proponents. These factors are not extremely noteworthy for the emergence of the TDABC system, but also are vital parts for a successful implementation of any cost management system.

Holistically, they indicate that a successful implementation of any system is dependent on designing thriving and solid theoretical, as well as practical premises for the system in such a manner that when it is tested by empirical attempt, it would disclose the claimed advantages of the system. Furthermore, the marketing aspects of the system are an influential factor in diffusing the system. Innovative features of the system are extremely significant in this regard.

Although these five factors are major imputes for the emergence of the TDABC, but they are not sufficient to guarantee a successful development of the system. In fact, a study of the mechanism, applications and limitations of the TDABC (Namazi, 2009 & 2016) revealed that TDABC was introduced by Kaplan and Anderson (2004&2007) as a more advanced, innovative and novel system which eliminates some of the obstacles involved in CABC. They claimed that TDABC, in contrast with CABC, posits the following characteristics: 1) extracts “time” as the primary cost driver for cost objects, 2) skips the first cost assignment process of the CABC and solely follows the second assignment process of CABC, 3) simplifies the costing process by eliminating the need for interview and surveys employees for the allocation of resource costs to activities before deriving them down to costs objects, 4) determines the “used capacity” as well as the “unused capacity” unequivocally 5) can accommodate complexities of actual production or services, and incorporates variations in utilizing resources by formulating different time equation models, 6) is a “pull” cost management model which operates based on two estimations: capacity cost rate, and estimated time required for each activity. Nevertheless, some practitioners and empirical and case study based researchers (Ratnatunga & Waldman, 2010, Somapa et al. 2010& 2011, Ratnatunga et. al., and 2012) have shown that the TDABC/proponents’ claims regarding the advantages of the TDABC are baseless. Namazi (2009&2016) also, after reviewing TDABC’s mechanism, applications, and limitations, concluded that although TDABC has been successfully implemented in some small, medium, and large private and public companies, the adoption rate of the TDABC has been rather slower than that of the CABC.

Furthermore, TDABC suffers from the following shortcomings:

- 1) Lack of identifying various activities in the first implementation step
- 2) Problems associated with determining the practical capacity costs rate,
- 3) Applying a uniform capacity costs rate,
- 4) Managers’ time estimation for each activity
- 5) Determination of unused capacity,
- 6) Lack of data accuracy, and
- 7) Limitations of managerial decision makings.

Finally, Namazi (2016) asserted that” As a result of these drawbacks, along with the fact that TDABC attributed advantages have been exaggerated by it’s proponents, it’s wide spread application, as a strategic cost management technique, in the future and around the world, are baseless. (P.1) Due to the dearth of TDABC empirical studies, an exact conclusion regarding this technique cannot be drawn at present, and future empirical studies will reveal the real advantages and merits of the TDABC.

Conclusion and Suggestions

The lesson is that a particular attention should be given to the preceding findings of this study for future design and research on cost management techniques. Furthermore, proponents of the TDABC should not exaggerate the usefulness of the TDABC. Otherwise, TDABC will pursue the same path as CABC, and it may be abolished soon. It should also be emphasized that a successful implementation of a system depends on many antecedents, technical, psychological, environmental and cultural factors. It is suggested that future cost management designers would consider these elements and introduce novel techniques which are not only optimum, less costly and implementable, but also would fit the organizational and cultural needs of the users. Conducting empirical and rich case –based studies is also strongly recommended.

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