Development Trends of Activity-Based Costing and Activity-Based Management Software Systems

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Abstract: - Activity-Based Costing (ABC) has been an important part of management accounting for several decades. The recent development of software systems has even strengthened this development by making it easier to calculate, assign and report cost information. However, even Activity-Based Costing seems to have a solid theoretical background several software vendors seem to highlight different aspects of it in their applications. This is due to the several reasons including different kinds of business cultures, businesses and customer needs.

The theoretical part of this paper is constructive in nature. Therefore this paper constructs new reality by using research results which have in part been presented before and sees that typically the developed new utilities are sooner or later evaluated comprehensively. In the theoretical discussion, firstly, this paper discusses about the theory of the Activity-Based Costing. The purpose of this discussion is to find a theoretical background for the Activity-Based Costing and explain why it exists. Secondly, this paper discusses about the Activity-Based Management which has been developed to use the ABC information in managerial decision making. Thirdly, this paper outlines typical failures and successes in implementing ABC and ABM systems in practice.

The practical part of this paper presents a comparison of the most common ABC software applications and their main features. As compared software applications seem to differ from each other, this paper outlines also the most typical trends of ABC software development in the history and for the near future. Methodologically, the practical part is a comparative case study where conclusions are made cross-sectionally using multiple cases. This kind of conclusion has been seen to provide a better formation for finding out the new innovative trends of ABC software development.

Key-Words: - Activity-Based Costing (ABC), Activity-Based Management (ABM), software applications and systems

1 Introduction
The Activity-Based Costing (ABC) has been introduced to help making strategic decision for over two decades. It has also been told to improve process performance and profit making for equally long time. [5, 9, 10, 12, 14, 15]

Even ABC has been seen to help many companies there are many companies which have not seen it so useful. It has been insisted to be too bureaucratic and clumsy as well as heavy for smaller companies. Some scientists have also expressed their concerns about ABC’s usefulness, relevance, and practicality. Therefore many scientists have seen that the lack of empirical evidence validating the alleged benefits of using ABC has needed to be justified using empirical evidence.

In practice many business managers see the justification of using ABC in wider perspective. In their opinion process management and cost management need to be combined together for effective everyday management using sophisticated information technology. The rapid development of IT systems with centralized database structures has naturally helped to compute more efficiently the benefits of using ABC systems in practice. Therefore all variables of highly competitive environment, complex firm processes, relatively high importance of costs, and relatively low unused capacity and intra-company transactions, which

have seen to incorporate into a model of testing the
efficacy of ABC are nowadays better understood. In this
framework it is rather surprising that several ABC
software developers do not seem to agree on all main
benefits of ABC as their software systems base partially
on different success factors.

For understanding better how different ABC system
developers see the main benefits of their ABC software
application this paper studies the theoretical and
practical implications of the ABC systems. The
theoretical part of this paper is constructive in nature.
The purpose in this part is to construct new reality on
ABC and AMB theory as well as on the failures and
successes of implementing them into practice. This is
done by using research results which have in part been
presented before keeping in mind that that typically the
developed new utilities are sooner or later evaluated.
Therefore when using this methodological framework
[13] it has been seen interesting to try to answer to the
following questions:

- Can we build an innovative understanding of the
  most common development trends of the
different ABC and AMB applications? What
  kind of innovative understanding is it going to
  be?
- What kind of development trends we can see in
  the ABC and AMB applications?
- How ought we build our particular innovative
  understanding?

Typically, constructive research is applied research, but
instead of developing “a final product” it sees that it is
possible to accept the prototype or even a plan. [13] In
this study this “prototype” is a trendline including
definitions of success features in ABC an AMB software
systems during the recent years.

The experimental part of this paper is a case study.
Typically, a case study is an empirical inquiry that meets
the following criteria: [13]

- It investigates a contemporary phenomenon
  within its real-life context, especially when
- The boundaries between phenomenon and
  context are not clearly evident.

In this study, this criterion has been seen to fulfill as the
features of several ABC software applications are
compared to each other using opinions of several real-
life companies which made them. In addition the
experimental part of this study can be considered as case
because the inquiry: [13]

- Copes with the technically distinctive situation
  in which there will be many more variables of
  interest than data points, and as a result.

2 Theory of Activity-Based Costing

Activity-Based Costing method was developed by
professors Cooper and Kaplan at the end of 1980s. The
idea of these two professors builds on following the
rationale: the operation consumes resources; the product
consumes operations, so the operation is the linkup of
the enterprise resources and the finished product.
Therefore, according to this rationale it is natural that
not only the product, but also the operation is the focus
of enterprise costing. By the ABC costing method, the
cost can be divided to different operations, and finally to
customers.

In practice, in ABC the operation costs are
apportioned to several parts according to the operation
processes and the operations character. Then the
apportioned operations in each part are divided to each
customer proportion to their order quantity and
multiplied the operation quantity apportioned in the part
to a certain customer by the cost rate, to get the
operation cost of the part for the customer. Finally,
added the operational costs in these parts apportioned to
the customer, the operation based total costs for each
customer can be got respectively. The operational cost
rate depends mainly on the consuming of manpower
and material and it can be estimated through the historical
data. Furthermore to be successful in ABC the
operations quantity is defined as a controllable variable
and proportions the order quantity. Finally, the outcome
of this step by step process is an operation based cost
model and profit model for manufacturer where
minimizing the cost and maximizing the profit are the
objectives. [3, 4, 6, 10, 17, 18]

ABC systems attempt to achieve the match between
actual cost (the essentially unknowable cost) to produce
a product and the calculated cost through a more
elaborate system of cost allocation using cost drivers
(grouped by resource and activity). ABC defines a
technique to quantify and assign all kinds of costs to cost
objects (products or services). Therefore, it allows costs
to be determined more accurately as compared to
conventional costing methods. [17, 18, 19, 20, 21, 22]

The natural focus with ABC is to establish a logical
relationship between costs and specific cost objects,
using the factors. Costs of resources are assigned to
activities, and costs of activities are assigned to cost
objects. The most common cost object in ABC is a
product or a product group. In standard practice,
relationships between cost drivers and objects are
established through interviews with representatives from
the operational areas where the driver originates. During
the interview process all drivers by product or product
grouping are determined. The collected information is
then used to create calculations for determination of
product cost. To be effective, this information should
remain current, leading to a need for follow-up interviews on some periodic interval for that purpose. [17, 18, 19, 20, 21, 22]

The definition of cost drivers is rather complex and costly. However, as the accuracy of developed system bases heavily on accurate information of cost drivers this work should not be neglected. Otherwise cost information on activities, products and product groups can be misleading.

As a whole, Activity-Based Costing is based on rationalizing and strengthening cost accounting at the process as well as at the product level. More precisely, ABC enables expenses to be driven using cost drivers, first in activities and processes, and then in products, services, and customers [5]. Naturally, the more use products make of processes, the more costs are allocated to them, and this is taken into account in product pricing too.

3 Activity Based Management

Activity-Based Management (ABM) is a method of identifying and evaluating activities that a business performs using Activity-Based Costing (ABC) to carry out a value chain analysis or a re-engineering initiative to improve strategic and operational decisions in an organization. ABC establishes relationships between overhead costs and activities so that overhead costs can be more precisely allocated to products, services, or customer segments. ABM focuses on managing activities to reduce costs and improve customer value.

Kaplan and Cooper [9, 10] divide ABM into operational and strategic. Operational ABM is about “doing things right”, using ABC information to improve efficiency. Those activities which add value to the product can be identified and improved. Activities that don’t add value are the ones that need to be reduced to cut costs without reducing product value.

Strategic ABM is about “doing the right things”, using ABC information to decide which products to develop and which activities to use. This can also be used for customer profitability analysis, identifying which customers are the most profitable and focusing on them more.

However, generally not all activities can be understood to add financial value and increase performance. Many activities can have an implicit value but not financial value. Therefore, for example nice working conditions can help to attract best workers, but are not often considered to add value from operational ABM point of view.

4 Failures and Successes of Activity Based Costing

The earlier research has indicated that there are certain similarities between ABC failures and successes. Earlier research has shown that even ABC is able to give new information on cost and profitability of activities and products, senior managers are often reluctant to use and act based on this information, which can lead to failure of ABC implementation. [2, 12]

The reason for this failure is rather often the ABC systems designers’ failure to recognize the socio-technical setting in which ABC is used [1, 11]. This failure can be a result of the management’s inability to recognize the socio-technical context of ABC by addressing and overcoming employees’ defensive behaviors and routines [2]. As well as it can be caused by employees’ ability actually to use data from the ABC system to help make decisions [9, 10].

Traditionally the ABC literature states that ABC success depends upon six components [19, 20]:
- a company has top-level managers to ‘champion’ the ABC project;
- a company gives its employees adequate ABC training;
- a company encourages its employees to become cross-functional, team-oriented generalists who can exploit ABC’s process orientation, rather than individual-oriented specialists;
- a company links activity-based, team-oriented performance metrics to employee compensation;
- a company distributes decision-making rights to its ‘front-line’ workers who have process knowledge; and
- a company and its employees adopt a long-term view of the ABC project, rather than expecting immediate short-term results.

According to the traditional view if each of these components is well managed, employee defensiveness should be minimal and ABC system usage should realize [20]. However, even the traditional ABC literature seems to have a clear view on what makes ABC successful recent research has also indicated several companies having difficulties with ABC.

Most of the few studies which have addressed ABC success and/or failure have been the so-called factors studies. Shields [19], for example, found top management support, linkage to competitive strategies, linkage to performance evaluation and compensation, training in implementing ABC, non-accounting ownership and adequate resources all positively correlated with ABC success. Cobb et al. [7, 8], suggested that the major problems experienced with ABC relate to the lack of adequate internal resources, particularly staff time and computer resources. Anderson
The recent advances in automatic control, information, and communications have been identified as factors related to the individuals involved, the organization structure, the task, the technology employed, and the external environment, which influenced ABC implementation.

Although it may be possible to establish the relative importance of various factors at various implementation phases, such factor models fail to address both the competing and complementing ways of obtaining information and controlling activities in organizations, and the existence of many stakeholders in the ABC implementation process. So, complementing approaches are required to provide a detailed understanding of questions such as why did change initiatives become thwarted, and what were the sources of resistance to change.

As several reasons for ABC success/failure seem to base on organizational human aspects it is not surprising that Argyris and Kaplan [2] have sought an alternative way of explaining ABC failure by presenting a behavioral model of why and how employees resist ABC. Their idea bases on noting that “...barriers to change arise from the defensive routines that participants trigger to protect themselves from experiencing embarrassment and threat from the new ideas”. In addition to Argyris and Kaplan [2], Markus [16] has argued that resistance to new information systems can be understood in terms of organizational power and politics.

5 Industrial Software Applications for Activity-Based Costing

Activity-Based Costing has existed for more or less than two decades. Already from the beginning it has based on the especially built software applications. Based on the theoretical discussion it is easy to see that difficulties still exist. They are related to organizational challenges, change resistance and complexity of ABC software systems.

The purpose of this multi-dimensional case study is to illustrate the main features of existing ABC and ABM software systems. For this purpose several different ABC and ABM systems were analyzed 2012 for their main features. Next companies developing ABC and ABM systems presented the most comprehensive analysis of the situation.

**Company A**

Company A stated that using their general ledger and budget system; it is possible to record and track activity performance measures. Using multiple budgets, one for actual activity-based costs and another for budgeted activity-based costs, it is also possible to tie actual general ledger costs to actual activity-based costs together and compare actual activity-based costs to budgeted activity-based costs. With the financial statement software and budgeting system, it is also possible to calculate and report activity unit costs and using cost management software, it is possible to specify an activity for each item cost, enter the usage of it, and the software system calculates automatically the activity costs.

When using bills of material software application, it is possible to reference an activity for each operation resource in a routing. In practice, this makes it possible to calculate assembly activity costs for all levels of your bills of materials and routings. With the item cost inquiries and reports, it is also possible to see activity costs by assembly and the usage of the activity in the assembly. As well it is possible to specify a cost type for all of these inquiries and reports and compare traditional standard costing against activity-based costs.

Furthermore, Company A saw that using their software applications it is possible to evaluate profit margins, inventory valuation, and activity product costs, by specifying the activity cost type in the margin analysis, inventory valuation, and cost comparison reports.

Company A stated that their Activity-Based Management software system focuses on managing activities to improve customer value and product profit. After defined activities, cost drivers, performance measures, and activity costs, this software application makes possible process improvement and re-engineering initiatives. The primary benefits of using their Activity-Based Management application were:

- Improved profitability
- Identification of hidden profits or losses
- Reduction of waste and unnecessary costs
- Better pricing decisions
- Improved operations

Company A saw that using their general ledger for activity-based cost budget it is possible to implement performance measurement. Using budgeted activity unit costs, it is possible to compare actual activity performance against budgeted activity performance for products. In addition using the cost comparison reports makes it possible to compare actual activity-based item costs against budgeted activity-based item costs.

Using Company A’s reporting made it possible to report profit margins and inventory valuation with the "Budget ABC" cost type, and compare these results against reports, using the "Actual ABC" cost type. As well reporting made it possible to report work in process transactions by activity.

The most recent development in Company A was focused in profitability and cost management. Their new software application is a new performance management.
application that is a part of the enterprise performance management (EPM) system and provides actionable insights into costs and profitability. This software solution drives business performance by discovering drivers of cost and profitability, empowering users with visibility and flexibility, and improving resource alignment.

Unlike traditional Activity-Based Costing applications, this system was seen to offer a flexible allocations platform for ABC and time estimation purposes. The new developed application also supported both cost and revenue management. Traceability maps and audit trail capabilities provided better transparency and ease of use in application.

The technical advancement in the new solution based on the idea of using OLAP (Online Analytical Processing) server, for faster, easier, powerful multidimensional analysis. As an integrated solution application was deeply integrated to other Company A’s software systems enabling a single point of maintenance for reduced cost of administration and ownership versus non-integrated point solutions.

Company B

Company B saw that the “philosophy” Activity-Based Costing is a technique of costing based on activities. Traditionally in their applications this technique is used to allocate indirect or overhead costs to cost objects, products or customers in a more accurate way. Company B stated that Activity-Based Costing is more than a technique to allocate indirect cost more accurately. As a technique it can be used to provide a wide range of information that enables managers to achieve many important goals: improved customer and product profitability; cost reduction; process re-engineering; capacity management; continuous re-forecasting and budgeting.

In Company B’s software solution an ABC model identifies the activities and outputs of the overhead areas and estimates the resource needed to accomplish each one. The ABC model determines what influences the volumes of activities and outputs the overhead areas have to tackle.

In recent years their focus for new development had focused on Time-Driven ABC. Company V saw that their software applications already implements Time Driven costing for over a decade even it was still improving.

Company B saw also that traditionally ABC systems were hard to maintain and complex. In their opinion most ABC projects were done by assigning cost from resources to activities using percentage estimations based on interviews or time-reporting systems. This was complex due to the large number of activities reported. The next year all interviews and estimations had to be re-done to capture changes. The insight and comparisons were missing because calculations were based on estimated percentages which did not uncover changes in the real world.

According to their software development philosophy the Company B saw that their original ABC architecture is based on a manufacturing model that maps the flow of costs from financial objects, such as resources paid to perform work, to the activities they perform to accomplish the work, and then to the output(s) of work delivered to customers.

Traditionally the methodology used to implement this architecture started in the Company B’s idea with decomposing general ledger items into activities of the organization and then tracing the activities into the products and services ultimately consumed by third parties.

Company B justified that using their traditional approach helped organizations assign overhead costs to products and services more accurately than using previous costing methodologies. Traditional questions answered using their ABC architecture included customer profitability, true net margin of products, and the cost of activities performed in the organization.

Recently Company B had been improving their software solution. They saw that most ABC software applications are designed to support only the traditional approach and many organizations have struggled with this traditional model. In their opinion it presents improved information over regular cost accounting and it is limited in its ability to produce accurate costs of business processes.

Company B continued that a clear understanding of the different types of business processes and their cost is fundamental to making effective changes in the organization. Traditional models are unable to forecast the effects of proposed changes to products, to services, or to the processes used to produce the services delivered.

Company B saw as the only solution for this problem is an integrating planning with the budgeting process which had not been fulfilled by ABC modeling in the past. Therefore to be useful and effective for strategic budgeting, the methodology and supporting model needed to allow users to vary consumption-based processes. In practice ABC solutions needed to easily answer how the required resources would be affected in coming years. Linking budgets, performance reporting, and planning was a necessity that Company B saw as a need to be developed in their ABC and ABM systems.

Company B’s new ABC and ABM software system was designed to allow the model to forecast changes in the workload and in the productivity of the processes used to handle workload which had not been allowed earlier using traditional ABC architecture.
6 Conclusion

The purpose of this paper was to answer to the following questions:

- Can we build an innovative understanding of the most common development trends of the different ABC and ABM applications? What kind of innovative understanding is it going to be?
- What kind of development trends can we see in the ABC and ABM applications?
- How ought we build our particular innovative understanding?

Question 1: ABC has existed over more than two decades. Evolving from early experiments in costing, ABC emerged as a tool for profit improvement and ABM was adapted for use in the extended value chain and multiple industries, and enhanced for resource and capacity planning. In its most recent iteration, ABC bases on is a multi-faceted algorithm and use of integrated database with several other financial and organizational information systems. ABC supports performance management systems where business users can access ABC- information using several dimensions from products to activities and customers. The implementation of ABM has only improved the management aspects of activities using cost and performance information. Therefore it seems to be evident that when building an innovative understanding of the trends of the ABC and ABM these both need to be seen together as completing each other as well as IT should be seen as enabling technology to drive this development.

Question 2: There seems to be different kinds development generations in the ABC and ABM development. Generally during the early phases the development focus was on building accurate costing systems with enabling Activity-Based Management. The next development steps have highlighted the importance of process and value analysis abilities of ABC and ABM application and recently the need for having sustainable and integrated performance management has risen significantly. Therefore we can perhaps state that there are four different generations and trends of ABC and ABM systems:

- Generation 1: Aim for accurate costing systems, accurate cost and profit drivers and Activity-Based Management
- Generation 2: Aim for process analysis, predictive model and value chain analysis
- Generation 3: Aim for sustainable enterprise systems
- Generation 4: Aim for integrated performance management with architecture and improved analytics ability.

Question 3: This paper built its’ understanding using constructive theoretical discussion combined with multiple case studies which were cross-analyzed together. This methodological framework worked well as the theoretical discussion was able to build new understanding of existing phenomena by combining historical and present information of theoretical ABC and ABM development. The industrial case studies also only strengthened this development and showed that ABC and ABM vendors are well up to date with theoretical development and their customer needs.

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