The Activity-Based Costing Method: Development and Applications

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This paper analyzes the management accounting applications, which try to improve the Activity-Based Costing (ABC) method. First, the paper describes them using the Strategic Management Accounting (SMA) stream. Then it presents the main features of these applications. Second, the paper examines in detail two of these features: the widening of the analysis perimeter and the relevant level of details to analyze the costs. Subsequently, it analyzes several proposals, such as Customer-Driven ABC, Interorganizational Cost Management (IOCM), Resource Consumption Accounting (RCA) and Time-Driven ABC (TDABC). Finally, it describes an experience observed in the IT supply European division of an international group. This group experiments, what we call an 'Activity-Based Supply Chain Costing Tool' to manage its interorganizational relations.

Introduction

The Activity-Based Costing (ABC) method is the most well-known management accounting innovation in last 20 years. Since the early stages of this method, the Anglo-Saxon scholars have tried to develop specific applications and extensions. In France, the ABC method and its main managerial development, Activity-Based Management (ABM), are quite famous.[1] But the numerous developments based on the ABC method are neither very well-known nor discussed.

The ABC method was designed in the US during the 1980s (Cooper and Kaplan, 1988).[2] It is a refined cost system which enables classifying more costs as direct, to expend the number of indirect cost pools and to identify cost drivers. ABC favors better cost allocation using smaller cost pools called activities. Using cost drivers, the costs of these activities are the basis for assigning costs to other cost objects such as products or services.

Since, the work of Johnson and Kaplan (1987) on Management Accounting, the Anglo-Saxon scholars have been very dynamic. The majority of management accounting

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[1] Even if a recent study (Bhimani *et al.*, 2007, p. 16) shows that the lowest rate of ABC implementation is in France (10.8%) and that "... the French responding organizations revealed the highest rate of perceived usefulness".

[2] According to Bouquin (2006, pp. 85-86), General Electric experimented with a kind of ABC during the 1960s.

developments are based on the Strategic Management Accounting (SMA) stream.[3] With the historical research of Johnson and Kaplan, we understand the context from which ABC arose. Looking for management accounting methods which could clarify the decision-making process, Johnson and Kaplan suggest, first, to analyze more deeply the organization's activities and processes, and second, to link the strategic and the operational management together. These proposals announce the development of the Balanced Scorecard (Kaplan and Norton, 1996) and of a strategically-oriented ABC.

This paper presents the ABC method showing that it belongs to the SMA movement since its early stages and then describes a global panorama of ABC applications. Subsequently, the paper examines more closely several ABC developments which emphasize on two factors—the widening of the analysis perimeter and the relevant level of details to analyze the costs.

The Strategic Management Accounting Approach: A Theoretical Foundation for the ABC Method

Here, we want to show that the ABC developments are founded on the SMA stream. The conventional approach to management accounting (Johnson and Kaplan, 1987) discloses an opposition among the processes of strategic management, management control and operational control. There has been a growing interest in SMA[4] since the early 1980s (Simmonds, 1981). In a firm, an SMA instrument exists when it can connect strategic and marketing decisions to operational ones. Under the SMA concept, we put together studies insisting on marketing aspects (Roslender and Hart, 2003), and studies insisting on strategic dimensions (Shank and Govindarajan, 1989). For instance, Simmonds (1981) and Bromwich (1990) suggest to use qualitative and external measures with three dimensions of analysis: the products and customers dimension, the competitive and the environmental one.

According to the academic literature, the main reasons for implementing an SMA tool, lie in the evolution of the environment. This is described in successive stages—stable and predictable, unstable and difficult to anticipate, and finally, turbulent and unpredictable. As a consequence, scholars explain that management accounting tools like ABC, must take into account, strategic aspects and integrate them into the company's drive. In order to be an efficient decision tool, an SMA system must closely follow each step of implementation of the strategy and the achievement of predefined objectives. Tomkins and Carr (1996, p. 165) explain that "... there is still no agreed comprehensive conceptual framework for what SMA is ..., and it is still the case". Despite these limitations, SMA is a good way to analyze the ABC developments.

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[3] Organizations like the Cam-i (Consortium of Advanced Management, International (http://www.cam-i.org) and the (IMA Institute of Management Accountants) (http://www.imanet.org) support these investigations.

[4] According to us, SMA refers to various other expressions like strategic costing, strategic control (Bromwich, 1990) and strategic cost management (Shank and Govindarajan, 1989).

We specify that the SMA is based on a process approach of management accounting. In this context, the company is described as a network of horizontal, flat and transverse structures, where the activities are organized according to market imperatives. The development at the bottom of the process constitutes a fundamental driver to integration. In this context, the ABC method represents a competencies-based tool. There is a significant relationship between the processes and the competencies of an organization. The vast majority of new management accounting tools has gained strategic and marketing dimensions, so that they are in accordance with the SMA frame. Thus, the SMA theory leads us to focus on knowledge-based aspects of management accounting. Historically, contractual theories constitute the reference. They suggest a disciplinary approach to manage a firm (Agency and Transaction Costs Theories). Brickley *et al*. (1997) and Zimmerman (1997), for instance, used the contractual theories when developing a management accounting theory. From the contractual point of view (Jensen and Meckling, 1992), the objectives of the management accounting are:

- To reduce conflicts and provide control
- To link the strategy to resource allocation, and
- To facilitate the firm's internal coherence.

But some authors have proposed significant research using heterodox approaches that we call as knowledge-based theory—Organizational Learning Theory (Argyris and Schön, 1978), Resource-based View (Penrose, 1959) and Core-Competencies Approaches (Hamel and Prahalad, 1990). In this context, value creation is the result of an increase in knowledge and competencies. The SMA approach fits in with both the contractual and the knowledge theories. It aims at linking the strategy to resource allocation and also facilitating the creation of knowledge.

The ABC method was conceived in the mid-1980s (Cooper and Kaplan, 1988) mainly to correct misleading overhead allocations. At first, it was a response to the inaccurate standard costing American methods. But several scholars, like Lebas (1991) in France, explain that the ABC method has rapidly gained managerial (ABM) and strategic dimensions. For example, Shank and Govindarajan (1989) have developed an operational model using the Key Success Factors (KSFs), defined for undertaking a competitive analysis of the environment and of the internal processes of the company using the ABC method. It is integrated in an SMA system with value chain and Life Cycle Analysis (LCA) processes. So, the ABC applications clearly belong to the SMA stream.

The ABC Developments: A Synthesis

Many scholars and practitioners admit that ABC has several pitfalls. We can list the major criticisms as follows:

- A lot of practitioners explain that ABC systems are expensive to implement, time consuming and hard to adjust. For instance, Kaplan and Anderson (2007, p. 5)

described the ABC system of Hendee Enterprises, a Houston-based manufacturer of awnings. They explain that the ABC software took three days to calculate costs for the company's 150 activities, 10,000 orders and 45,000 line items.

- A lot of failures have been compiled, especially in the service industries.
- Finally, a lot of people think that the ABC method is too complex. As a consequence, it sometimes fails to clarify the decision-making process and the strategy of the firm.

This is why since its early stages, several specific applications based on the ABC method have been suggested. Table 1 shows a synthesis of these applications. Their objectives are:

- To diversify the costs objects (products, services, processes, customers, markets, etc.)
- To widen the analysis perimeter (spatial and temporal widening), and
- To determine the relevant level of details to analyze the costs.

Table 1: Synthesis of the ABC Developments

Technique	Main Features
First Group	
Customer-driven ABC **Market-driven** Benchmarking-driven ABC Environmental-driven ABC Interorganizational Cost Management	**Spatial widening** of the costs perimeter Customers, markets, consumers, society, etc.
Second Group	
ABB ABC and Life Cycle Costing Target ABC Feature Costing	**Temporal widening** of the costs perimeter: Analysis of future costs (one or several years, a life cycle, etc.)
Third Group	
RCA: Resource Consumption Accounting Process Costing and Lean Accounting **Time-driven ABC and other equivalence methods**	**Determination of the relevant level of details to analyze the costs** Relevant Level: The resource pool Relevant Level: The processes **Simplification** of the resource allocation process The level of analysis depends on the cases (department, activities or tasks)

These purposes display a common objective, that is, to direct the calculation of the costs towards the key value factors of the firm.

In Table 1, we distinguish the three groups of techniques.

- The first one gathers those which enable spatial widening of the costs perimeter. Some of them suggest to broaden the cost analysis to the customers (customer-driven ABC), others to the competitors (benchmarking-driven ABC), to the environment (environmental-driven ABC), or to the suppliers and partners (interorganizational cost management and open-book accounting). This list of solutions is not exhaustive.

- The second one brings together those which allow analysis of future costs (Activity-Based Budgeting (ABB), Antos and Brimson, 1999) and a temporal widening of the costs perimeter. These solutions consist of combining the ABC method to the life cycle costing or to the target costing (Horvath *et al.*, 1998). We can also associate the target costing to a specific version of ABC called feature costing (Cokins, 2002). The feature costing (Brimson, 1998) introduces another level of analysis in the ABC method—the products features.

  Several researchers have identified the links between the ABC and the target costing methods. Lebas (1999, pp. 506-507) explains that ABC implies taking into account the value that the customers attribute to the products. This is a principle of the target costing method and this has a strong impact on the firm's cost analytic structure.

- With the third one, we put together techniques which propose to determine the relevant levels to analyze the costs, depending on the features (strategic and organizational) of a firm. In some cases, the processes and strategy complexities are great. The ABC method is insufficient, so we need another approach to allocate the resources. The Resource Consumption Accounting (RCA) method (Keys and van der Merwe, 2002) complete the ABC with a deeper analysis of resources. In other situations, the complexity of the process is low and the ABC method is too detailed. So, we can bring together several activities to set up a 'meta-activity' or a process with a single cost driver. This is the assumption of the process costing (Horngren *et al.*, 2005) and the lean accounting methods.[5]

We also analyze the time-driven ABC (Kaplan and Anderson, 2007) which is an 'equivalence method'. It is the most recent ABC development. It is clearly a simplification of the ABC. With this technique, the activity cutting can be more simple (like with process costing and lean accounting). But it can also be more refined (like RCA). Next, we conduct a more precise analysis of several of these applications.

[5] *Cf.* http://www.Lean.org

Analysis of the Two Types of ABC Applications

Spatial Widening: From Customer-Driven ABC to the Interorganizational Cost Management

We have noticed that since the first proposal, the ABC has aimed to allow managers to make better decisions regarding customer relationship. Lebas (1991) explained that it is a suitable method to deal with marketing questions. More recently, he described (Lebas, 1999) the way to organize an ABC structure starting with the customers' features. Other French specialists insist on this ABC approach. For instance, Mevellec (2005) describes different versions of ABC relevant to organize the costs analysis around customers' questions (ABC011, pp. 228-239; ABC101, pp. 250-259; and ABC111; pp. 270-279).

But the original ABC has been designed for manufacturing companies. The activities describe the production processes (supply chain, manufacturing, adjustments, etc.), and the cost drivers mainly express the production concerns (labor and engine hours, batches and number of fabrication orders, adjustment minutes number, etc.). In a lot of cases, the value creation is made outside the production process, and sometimes, the customer relation is the key value factor. This explains the development of several Customer Profitability Analysis (CPA) models.

The CPA comprises reporting and analyzing the revenues earned from customers and the costs incurred to earn those revenues. With the CPA, we can describe customer-profitability profiles. The purpose of the managers is to ensure that the customers making large contributions to the operating income of a company, receive a level of attention from the company matching their contribution to the company's profitability.

The principle of the customer-driven ABC is to reorganize the ABC architecture, so that it deals with the commercial and marketing aspects of management. Kuchta and Troska (2007) explain that the ABC is a good method for profiling customer profitability. They believe that a customer-driven ABC "... can help determine which products and customers are the most profitable, which activities are customer-focused, whether processes are customer value-added or not, and where efforts towards customer-related improvements should be made" (Kuchta and Troska, 2007, p. 18).

Table 2 presents a customer-driven and distribution network-driven ABC illustration (Cooper and Kaplan, 1999, pp. 352-353).

Table 2: A Customer-Driven and Distribution Network-Driven ABC Illustration

	Customers Type A	...	Customers Type N	Distibution Network 1	...
Turnover	500,000	...	200,000	1,500,000	...
Costs Linked to Key Processes	**The Customers Relation**			**The Distribution Networks Relation**	
Customer output unit-level costs	200,000	...	80,000	750,000	...
Customer batch-level costs	5,000	...	30,000	60,000	...

(Contd...)

Table 2: A Customer-Driven and Distribution Network-Driven ABC Illustration *(...contd)*					
	Customers Type A	**...**	**Customers Type N**	**Distibution Network 1**	**...**
Customer-Sustaining Costs	10,000	...	50,000	80,000	...
Contribution	285,000	...	40,000	610,000	...
Marketing Costs	15,000	...	35,000	110,000	...
Customers/Distribution Networks Margins	270,000	...	5,000	500,000	...
Distribution-Channel Costs				150,000	...
Distribution Margin				350,000	...
Overhead Costs					
Corporate Sustaining Costs					
Results					
Source: Adapted from Cooper and Kaplan, 1999, pp. 352-353.					

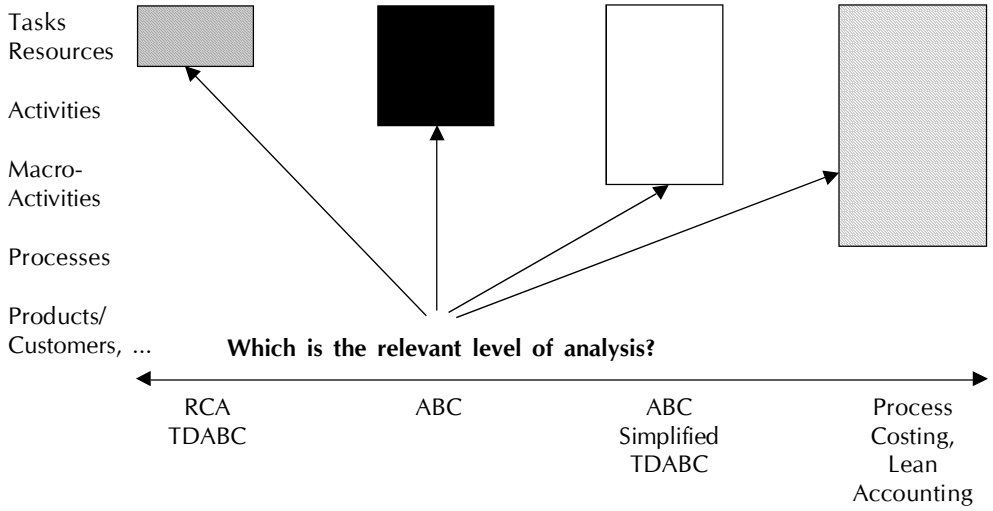
We can extend the cost analysis perimeter to suppliers and even to partners (in this case, we need an open-book accounting approach). Cooper and Slagmulder (2004) describe a methodology called Interorganizational Cost Management (IOCM), which originates from the observations of Japanese case studies. The costs analysis and reduction processes include at least two firms. The ABC method helps to describe the value chain between them. With target costing, the first firm can identify an estimated price that the customers are willing to pay and then, with the second firm, it computes a target cost to earn the desired profit. One important question is: What costs to include in the target-cost calculation? Frequently, cost-reduction efforts need to be extended to all parts of the value chain, from R&D to customer service, including seeking lower prices from suppliers for materials and components. The relevant costs are all future costs because in the long run, a company's prices and revenues must recover all its costs.

Then the ABC helps to determine which activities and costs fall into value-added or non-value-added categories. It helps to identify costs throughout the value chain and to summarize the effects that design changes will have on those costs. Cooper and Slagmulder call this process the 'Interorganizational Costs Investigation'.

What is the Relevant Level of Details to Analyze the Costs?

Figure 1 describes the different levels to analyze costs. The specialists of the concerned techniques explain that the resource allocation question represents a problem with the ABC method and must be examined strategically. In some circumstances, the activity involves an excessive level of details (standard processes, just-in-time approaches, specific sectors like the chemical industry, etc.), and ABC can lead to a useless and non-relevant analysis. This is why the process costing and the lean accounting supporters suggest to bring together the activities in processes, value chains or 'value streams'.

Figure 1: Different Levels to Analyze Costs



Conversely, with the RCA systems, we try to provide decision makers with more granular information about the operations. Figure 2 compares the ABC, RCA and process costing methods.

Figure 2: Comparison of ABC, RCA and Process Costing

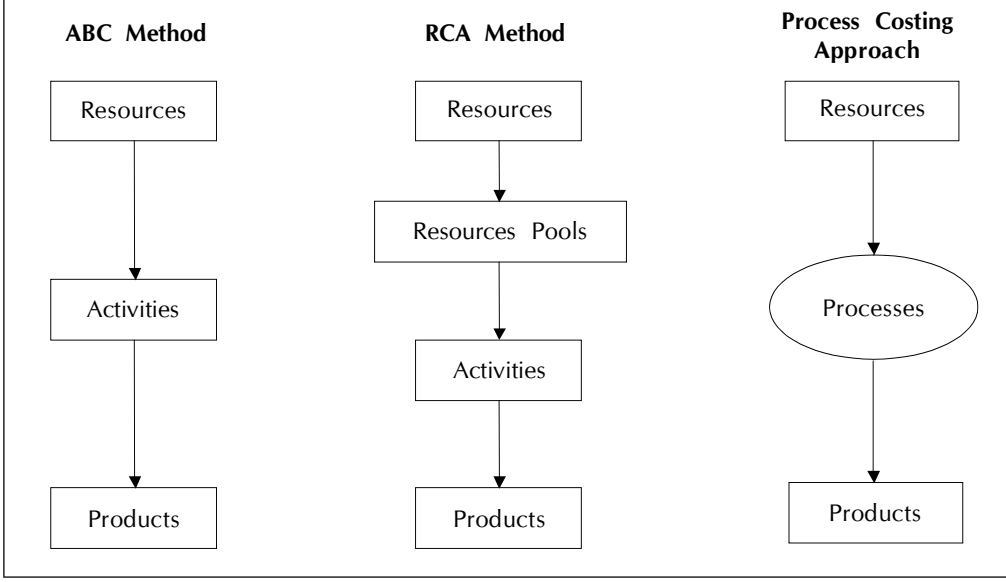


Figure 3 describes the ABC allocation process. Two steps can be clearly distinguished. The second step is not difficult to achieve, but the first step is quite tricky. Within complex organizations, the variety of resources is great, so that we need to multiply the number of

resources drivers and allocations. Thanks to the RCA method, resources originating from different departments of an organization are classified in several resources pools (Figure 4). In this way, it becomes easier to allocate the resources to the activities.

Figure 3: The ABC Allocation Process and Its Weak Points

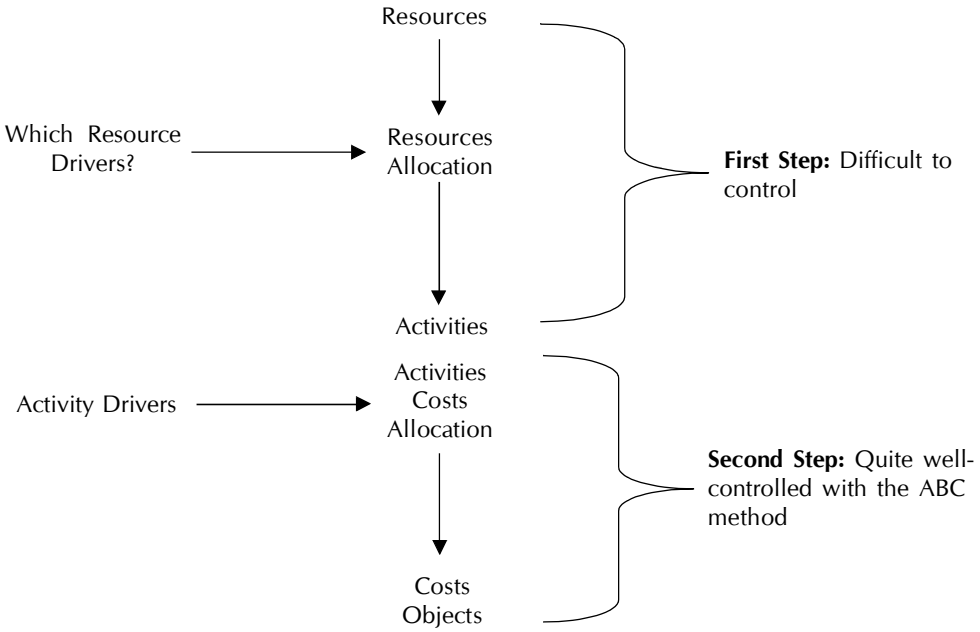
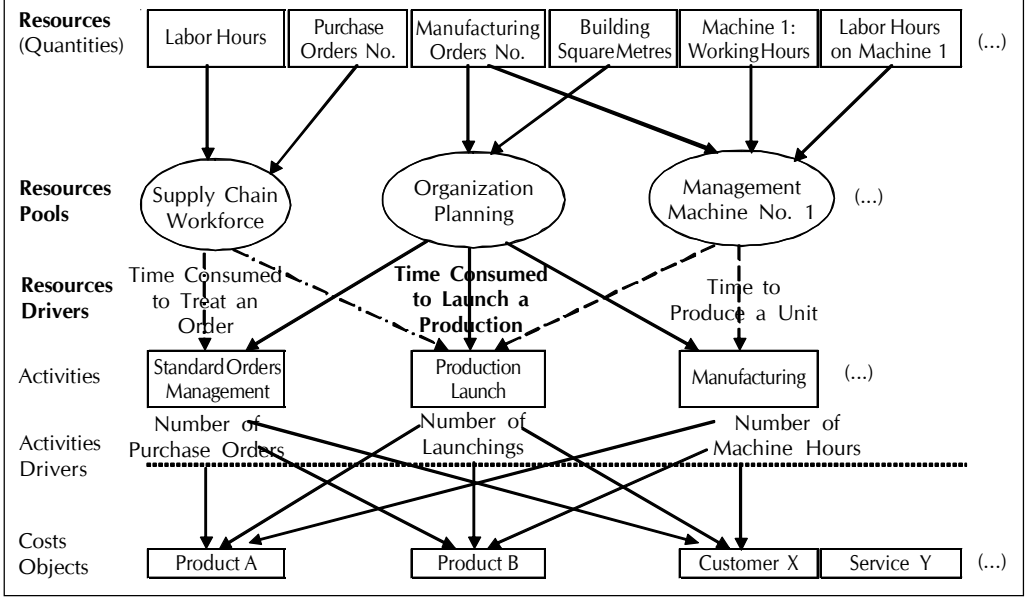


Figure 4: The RCA Process: An Illustration



The more recent technique was designed by Kaplan and Anderson (2004 and 2007). It is an equivalence approach, which consists of using equivalent-time cost drivers.[6] The principle of the Time-Driven ABC (TDABC) is to translate the costs drivers in time-equivalents (standards of working hours). The standards can be revised when the production conditions change. The TDABC is a way to reintroduce the standard costing approach into the ABC methodology. With the TDABC, we can highlight the sub-activity costs.

According to Kaplan and Anderson, the TDABC simplifies the ABC method for three reasons:

- The number of activities is reduced and the analysis is made at the level of the departments or of the processes. Kaplan and Anderson (2004) present a case study, where some 1,200 activities have been reduced in 200 processes.
- The need to collect information from different services is limited because of the use of standards.
- The different types of drivers are expressed in only one equivalent-time driver.

Let's take the example of a sales department, where these three activities—the management of sales orders, complaints and payment—are performed. Instead of cutting the department into three distinct activities and allocating their costs with relevant costs drivers, we construct a time equation based on standards as follows:

$$T = 8\ mn \times X_1 + 44\ mn \times X_2 + 2\ mn \times X_3$$

where,

mn = Minutes,

X_1 = The number of orders to manage,

X_2 = The number of complaints, and

X_3 = The number of invoices.

But if we go deeper into the analysis, a second version of the TDABC method has to be mentioned. It refines the ABC method in analyzing the tasks. Using equivalent-time measures, the activities are divided into tasks, so that the method gains accuracy. Everaert and Bruggeman (2007) describe a TDABC experiment in an European company, where the value chain management is a key value factor. In this case, the activities are divided into tasks and expressed with a time equation. For example, they decompose the activity 'administration of the customers' orders' into three tasks: the input of an order line, of a new customer and of an express order. They formulate the time equation as follows:

$$T = 3mn + 2mn \times X_1 + 15mn \times X_2 + 10mn \times X_3$$

[6] For a presentation of the French equivalence method called (GP), read La Villarmois (de) and Levant (2004).

where,

X_1 = The number of orders lines,

X_2 = The number of new customers, and

X_3 = The number of express orders.

The TDABC is founded on a strong hypothesis. The cost generation is based on time consumption. This is only the case in certain circumstances, such as supply chain management, some standardized production processes, call centres, hospital management, and some consulting activities. But this is not the case for R&D process, the marketing one and some complex productions. In addition, some mistakes are possible while establishing the standards. Moreover, the TDABC depends on internal time consumption measures. It deals with an internal constraints approach. It may be useful to extend the TDABC methodology to some customer variables (like spending time when phoning for a request, distance to the first shop, etc.).

Case Study: ABC in IT Supply Services

The different types of ABC described fit according to the kinds of the firms observed, their competitive environment and their organizational structure. For instance, industrial firms with complex technologies and processes need to clearly analyze their resources. A refined ABC (like the RCA method) with a strong level of details of the analytical framework could be useful (Figure 1). Differently, services could use a more simplified framework and TDABC and process costing approaches could be relevant. Moreover, the customer could be a more relevant cost object than the product (Table 2). Now, we examine those general premises with a case study that takes place in a computing services context. We insist on the interorganizational dimension of the ABC method in a supply chain management context.

General Presentation

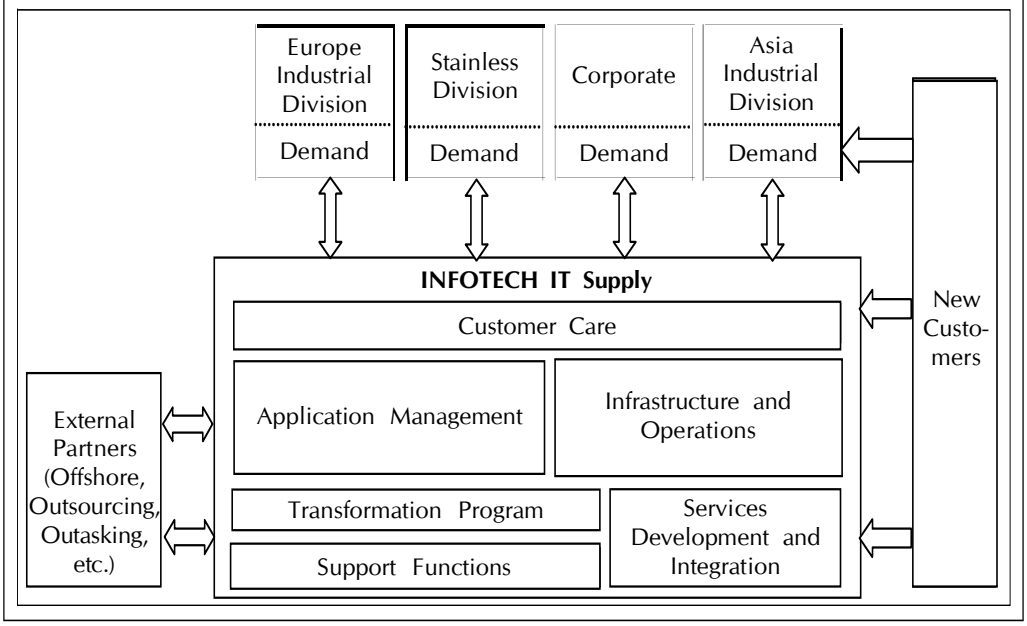
We have deeply studied the ABC implementation in an IT supply division of an international and diversified industrial group. We call this division Infotech. Figure 5 presents the links between Infotech and the other divisions of the group. Infotech is a profit center and sell computing services in and outside the group. So, inside the group, we have a supply chain process concerning the different kinds of computing activities like hardware, software and services (hotline, etc.). To make the supply chain process more relevant, the staff decided to implement an ABC system dedicated to this process.

The analytic model was based on cost centers Profit and Loss (P&L) reporting of costs, that implies:

- It does not easily report global Infotech figures for the same activity,
- It does not explain relationship between costs and activity, and
- Projects reporting are not managed.

Thus, in order to establish the link between costs of resources given by SAP and services defined by commercial team, a new tool is required.

Figure 5: Infotech Organization



Two years ago, the financial controller of Infotech decided to develop the ABC method, so that he could calculate more accurately the costs of the different activities of his division. The objective is to define relevant prices depending on the computing services asked for.

The ABC Project

The ABC project lasted one year with six steps:

1. At the beginning: diagnostic, planning and project team constitution,
2. Activities identification with interviews of managers,
3. Calculation of the activities costs with the elaboration of a timesheet,
4. Definition and collection of the activity drivers and calculation of full costing,
5. Calculation of the profitability, and
6. Validation, corrections and results analysis.

This methodology allows:

- The allocation of dedicated and shared resources to activities,
- To manage activities as basic components of processes,
- To track costs of services that are aggregation of all components of its nomenclature of activities,

- To be definitively focused on process improvements rather than structure improvements,
- To facilitate benchmarking, and
- To monitor the performance of partnership by improvements in processes.

Figure 6 shows an extraction of some analytic accounts, site costs centers, activities proposal and catalogue services. In fact, around 50 activities were designed.

Figure 7 describes some resource drivers and the activities reassignment logic.

Figure 6: Extraction of Analytic Accounts, Site Cost Centers, Activities Proposal and Catalogue Services

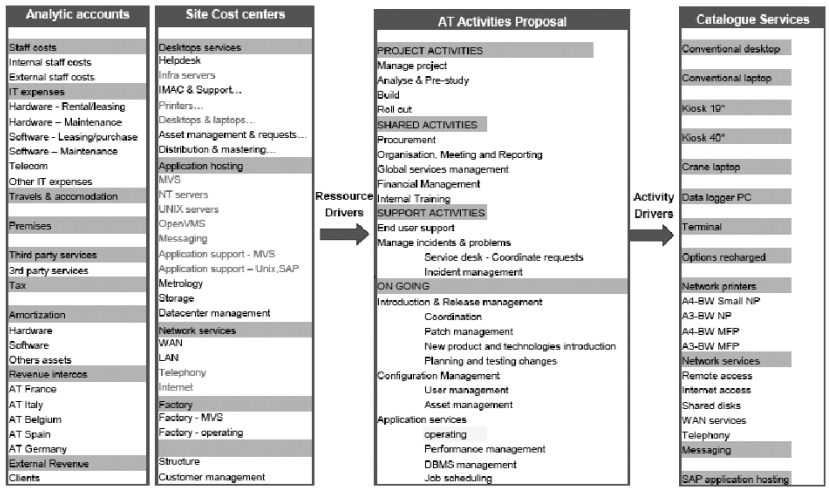
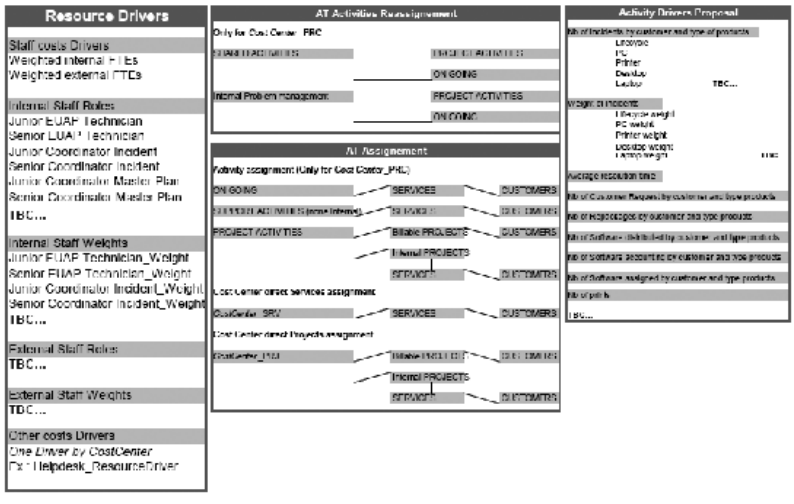
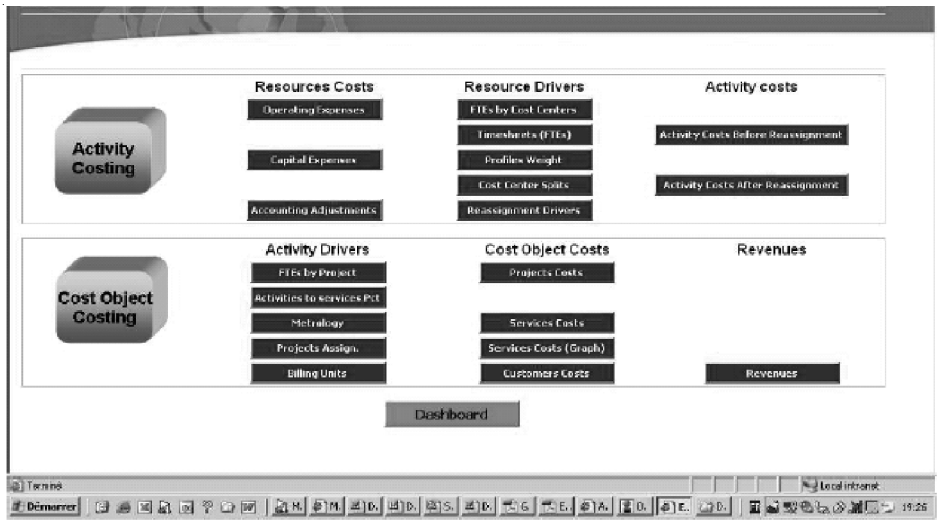


Figure 7: Resource Drivers and Activities Reassignment



To implement the ABC, Infotech chose ALG software and an instrument called Enterprise Performance Optimization (EPO). Figure 8 presents the EPO synthetic dashboard. With the EPO, the financial controller extracts P&L statements by customer, region, and type of the service.

Figure 8: The EPO Dashboard



Conclusion

In this paper, we have analyzed several ABC applications. According to us these developments reveal the research of multidimensional accounting systems. Today, managers want specific applications with a high degree of modularity: a process costing system for a standard production, combined with a customer-driven ABC and a time-driven ABC for very complex activities. Modern software makes it possible.

Moreover, the type of ABC used depends on firms' specificities. With the help of a case study, we show that an IT supply division favors an ABC which combine three dimensions:

- A Customer Profitability Analysis (CPA) approach that is to say that the customers are the more important cost objects,
- A TDABC logic with the building of a timesheet used for the majority of resource drivers, and
- A simplified ABC (between a process costing approach and a complex ABC), which implies a number of activities around 50. ■

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