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## **The activity-based costing method developments: state-of-the art and case study**

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### **Abstract:**

This paper analyses the management accounting applications which try to improve the Activity-based Costing method. In the first part, we describe them using the Strategic Management Accounting stream. Then, we present the main features of these applications. In the second part, we examine in details two of these features: The widening of the analysis perimeter and the relevant level of details to analyse the costs. Then, we analyse several proposals: Customer Profitability Analysis (CPA), Interorganizational Cost Management (IOCM), Resource Consumption Accounting (RCA) and Time-driven ABC (TDABC). Finally, we describe an experience observed in the IT supply European division of an international group. This group experiments what we call at the end a supply chain ABC tool to manage its interorganizational relations.

### **Key words:**

Activity-based Costing, Strategic Management Accounting, Time-driven ABC, Case study.

The Activity-based Costing (now ABC) method is the most well known management accounting innovation of the last twenty years. Since the early stages of the 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<sup>1</sup>. But the numerous developments based on the ABC method are not very well known and nor discussed. This is our research project.

The ABC method was designed in the United-States during the 80's (Cooper and Kaplan, 1988)<sup>2</sup>. 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 favours 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 the "Relevance Lost" of Management Accounting, the Anglo-Saxon scholars have been very dynamic. The majority of management accounting developments are based on the Strategic Management Accounting stream<sup>3</sup>. 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 analyse more deeply the organization activities and processes and second, to link together the strategic and the operational management. These proposals announce the development of the Balanced Scorecard (Kaplan and Norton, 1996) and of a strategically oriented ABC.

In the first section, we present the ABC method showing that since its early stages, it belongs to the Strategic Management Accounting (now SMA) movement. Then, we describe a global panorama of the ABC applications. In the second section we shall examine more closely several ABC developments which emphasize two questions: The widening of the analysis perimeter and the relevant level of details to analyse the costs.

## **1. Strategic Management Accounting stream and panorama of the ABC applications**

### **1.1 The Strategic Management Accounting approach: A theoretical foundation for the ABC method**

In this paragraph, we want to show that the ABC developments are founded on the strategic management accounting stream.

The conventional approach to management accounting (Johnson & Kaplan 1987) discloses an opposition among the processes of strategic management, management control and operational control. There has been a growing interest in SMA<sup>4</sup> since the early 80's (Simmonds, 1981). In a firm, a SMA instrument exists when it can connect strategic and marketing decisions to operational ones. Under the SMA concept, we put together work insisting on marketing aspects (Roslender and Hart, 2003) and work insisting on strategic

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

<sup>2</sup> According to Bouquin (p. 85-86, 2006), General Electric experimented with a kind of ABC during the 60's.

<sup>3</sup> 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.

<sup>4</sup> In our meaning, SMA refers to various other expressions like Strategic Costing, Strategic Control (Bromwich, 1990) and Strategic Cost Management (Shank and Govindarajan, 1989).

dimensions (Shank and Govindarajan, 1989). For instance, Simmonds (1981) & Bromwich (1990) suggest using qualitative and external measures with three dimensions of analysis: the products & customers dimension, the competitive and the environmental one.

The main reasons for implementing a SMA tool, according to the academic literature, 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, a SMA system must closely follow each step of the implementation of the strategy and the achievement of pre-defined objectives. Tomkins and Carr (p. 165, 1996) explain that "...there is still no agreed comprehensive conceptual framework for what SMA is..., and it is still the case". Despite these limitations, the SMA is a good way to analyse the ABC developments.

We specify that 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.

So, 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 use the Contractual Theories when developing a management accounting theory. From a contractual point of view (Jensen and Meckling, 1992), the objectives of the management accounting are:

- To reduce conflicts and provide control,
- To tie the strategy to resources allocation,
- And to facilitate the firm's internal coherence.

But some authors have proposed significant research using heterodox approaches that we call the Knowledge-based Theories: Organizational Learning Theory (Argyris and Schön, 1978), Resource-based View (Penrose, 1959) and Core-Competencies (Hamel and Prahalad, 1990) approaches. In this context, the value creation is the result of an increase of knowledge and competencies. The SMA approach fits in with both the Contractual and the Knowledge Theories. It aims to tie the strategy to resources allocation and also to facilitate the creation of knowledge.

The ABC method was conceived in the mid-80's (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 rapidly, the ABC method has gained managerial (ABM) and strategic dimensions. For example, Shank & Govindarajan (1989) have developed an operational model with the definition of Key Success Factors, determined in using a competitive analysis of the environment and an analysis of the internal processes of the company, with the help of the ABC method. It is integrated in a SMA system with Life-Cycle and Value Chain analyses processes. So the ABC applications clearly belong to the SMA stream.

## 1.2 The ABC developments: A synthesis

Many scholars and practitioners admit that ABC has several pitfalls (Anderson and Young, 1999; Datar and Gupta, 1994; Foster and Swenson, 1997; Malmi, 1997). We can make a list of the major criticisms as follow:

- A lot of practitioners explain that ABC systems are expensive to implement, time consuming and hard to adjust.

For instance, Kaplan and Anderson (p. 5, 2007) describe 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, ...),

- To widen the analysis perimeter (spatial and temporal widening),

- And to determine the relevant level of details to analyse the costs.

These purposes display a common objective: to direct the costs calculations towards the key value factors of the firm.

**Table 1. SYNTHESIS OF THE ABC DEVELOPMENTS**

Techniques	Main features
First group: <b>Customers-driven ABC,</b> <b>Markets-driven, ...</b> Benchmarking-driven ABC Environmental-driven ABC, ... Interorganizational Cost Management	<b>Spatial widening</b> of the costs perimeter:  Customers, markets, consumers, society, ...
Second group:  ABB ABC & Life Cycle Costing Target ABC Feature Costing	<b>Temporal widening</b> of the costs perimeter: analyse of future costs (one or several years, a life cycle, ...)
Third group:  <b>RCA: Resource Consumption</b> Accounting Process Costing & Lean Accounting <b>Time-driven ABC and other</b> <b>equivalence methods</b>	<b>Determination of the relevant level of</b> <b>details to analyse the costs</b> <u>Relevant level:</u> The resources pools  <u>Relevant level:</u> The processes <b>Simplification</b> of the resources allocation process The level of analysis depends on the cases (department, activities or tasks)

In this table, we distinguish three groups of techniques.

- The first one gathers those which enable a spatial widening of the costs perimeter. Some of them suggest to broaden the costs analysis to the customers (Customer Profitability Analysis), 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 an analyse of future costs (ABB, Activity-based Budgeting, Antos and Brimson, 1999) and a temporal widening of the costs perimeter. These solutions consist in 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 (p. 506-507, 1999) 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 costs analytic structure.

- With the third one, we put together techniques which propose to determine the relevant level to analyse the costs, depending on the features (strategic and organizational) of a firm. In some cases, the processes and strategy complexity is great. The ABC method is insufficient so we need another approach to allocate the resources. The Resource Consumption Accounting method (now RCA, Keys and van der Merwe, 2002) complete the ABC with a deeper analysis of resources. In other situations, the processes complexity 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., p. 594 s., 2005) and the Lean Accounting methods<sup>5</sup>. We also analyse the Time-driven ABC (Anderson and Kaplan, 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 the Process Costing and Lean Accounting). But it can also be more refined (like with RCA).

Now, we conduct a more precise analysis on several of these applications.

## II Analysis of two types of the ABC applications

### II.1 Spatial widening: from the Customer Profitability Analysis to the Interorganizational Cost Management

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

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

The CPA consists in reporting and analysing the revenues earned from customers and the costs incurred to earn those revenues. With the CPA, we can describe customer-profitability profiles. The purpose for managers is to ensure that 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 CPA 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 toward customer-related improvements should be made” (p. 18).

Table 2 presents a CPA and Distribution Network-driven ABC illustration (Cooper and Kaplan, p. 352-353, 1999).

**Table 2 – A CPA AND DISTRIBUTION NETWORK-DRIVEN ABC EXAMPLE**  
(Adapted from Cooper and Kaplan, p. 352-353, 1999)

	<b>Customers type A</b>	<b>...</b>	<b>Customers type N</b>	<b>Distribution Network 1</b>	<b>...</b>
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<sup>5</sup> Cf. <http://www.Lean.org>

<b>Turnover</b>	500000	...	200000	1500000	...
<b>Costs linked to (key processes)</b>	<b>The customers relation</b>			<b>The distribution networks relation</b>	
Customer output unit-level costs	200000	...	80000	750000	...
Customer batch-level costs	5000	...	30000	60000	...
Customer-sustaining costs	10000	...	50000	80000	...
Contribution	285000	...	40000	610000	...
Marketing costs	15000	...	35000	110000	...
<b>Customers/distribution networks margins</b>	270000	...	5000	500000	...
Distribution-channel costs				150000	...
<b>Distribution margin</b>				350000	...
Overhead costs					
Corporate sustaining costs					
<b>Results</b>					

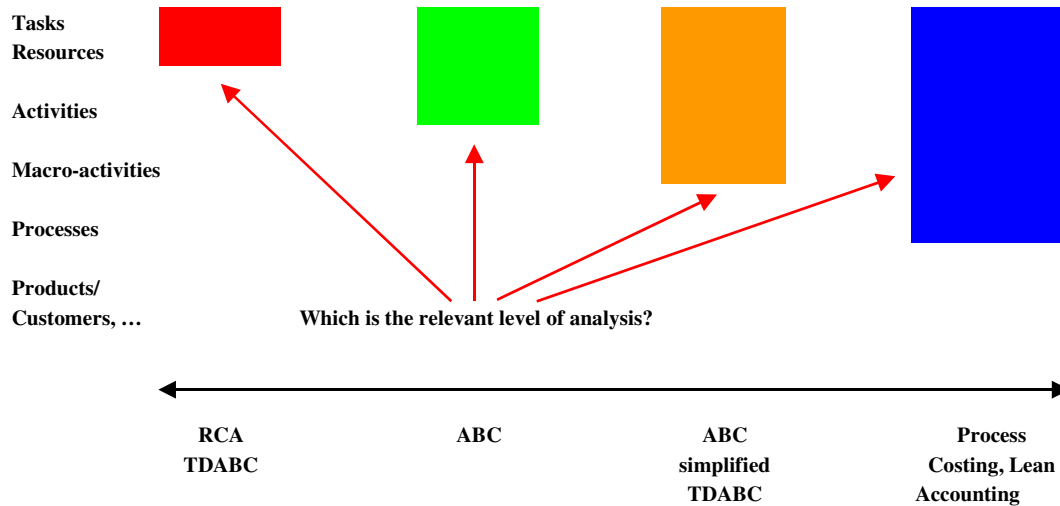
We can extend the cost analysis perimeter to suppliers and even to partners (in this case, we need an Open-book Accounting approach). Cooper and Slagmulder (2004) describe a methodology called Interorganizational Cost Management (IOCM) which originates from the observation of Japanese case studies. The costs analysis and reduction processes include at least two firms. The ABC method helps to describe the value chain between them. With Target Costing, a first firm can identify an estimated price customers are willing to pay and then, with a second firm, it computes a target cost to earn the desired profit. One important question is: what costs to include in the target-cost calculations? Frequently, cost-reduction efforts need to extend 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".

## II.2 What is the relevant level of details to analyse the costs?

The first figure describes the different levels to analyse the costs.

**Figure 1. DIFFERENT LEVELS TO ANALYSE THE COSTS**



The specialists of the techniques concerned explain that the resources allocation question represents a problem with the ABC method and must be examined strategically. In some circumstances, the activity is an excessive level of detail (standard processes, just-in-time approaches, specific sectors like the chemical industry,...) and the ABC can lead to a useless and non relevant analysis. It is why the Process Costing and the Lean Accounting supporters suggest bringing together the activities in processes, value chains or “value streams”.

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 ABC/RCA/PROCESS COSTING COMPARISON**

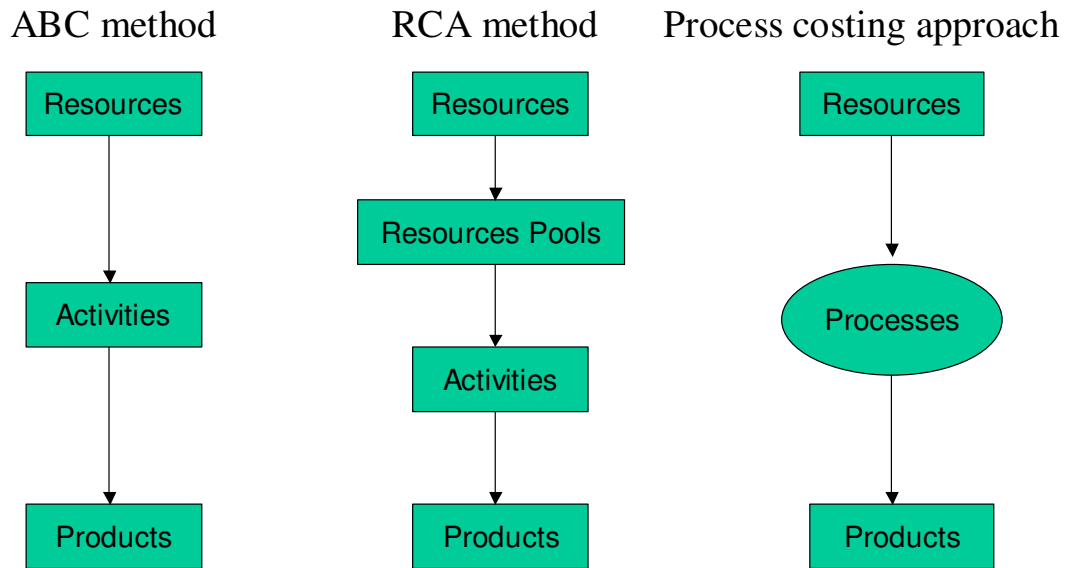
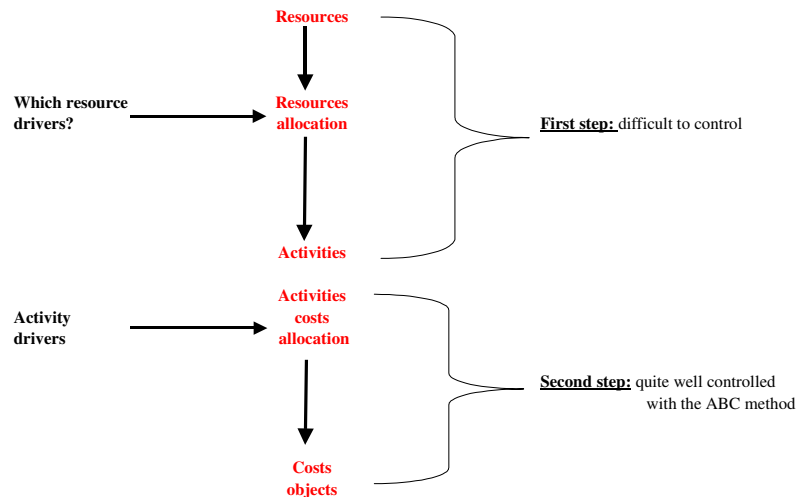
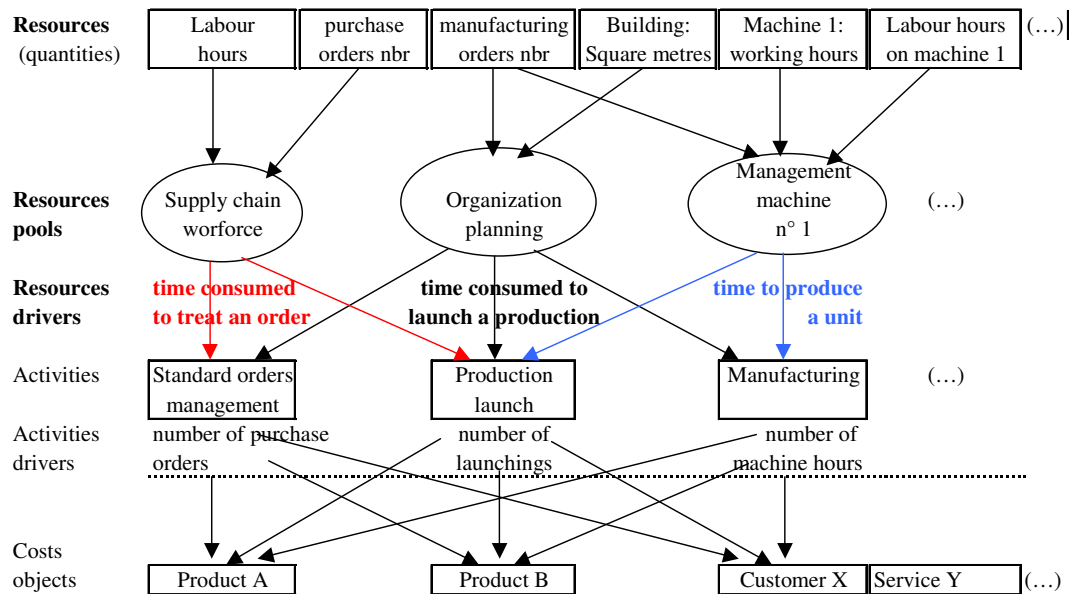


Figure 3 describes the ABC allocation process. Two steps can be distinguished. The second step is not difficult to achieve but the first step is quite tricky. Within complex organizations, the variety of resources is great so that we need to multiply the number of resources drivers and allocations. Thanks to the RCA method, resources originated from different departments of an organization are classified in several resources pools (see figure 4). In this way, it becomes easier to allocate the resources to the activities.

**Figure 3. THE ABC ALLOCATION PROCESS AND ITS WEAK POINT**



**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 in using equivalent-time cost drivers<sup>6</sup>. The principle of the Time-driven ABC (now 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 re-introduce the standard costing approach into the ABC methodology. With the TDABC, we can highlight 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 1200 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 three activities are performed: the management of sales orders, complaints and payment. 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.

$$T = 8 \text{ mn} \times X1 + 44 \text{ mn} \times X2 + 2\text{mn} \times X3$$

With:

Mn = minutes,

X1 = number of orders to manage,

X2 = number of complaints,

<sup>6</sup> For a presentation of a French equivalence method called (GP), read La Villarmois (de) and Levant (2004).

X3 = 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 analysing the tasks. Using equivalent-time measures, the activities are divided into tasks so that the method gains accuracy. Bruggeman et al. (in Kaplan and Anderson, p. 165-178, 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 in this way:

$$T = 3mn + 2mn \times X1 + 15 mn \times X2 + 10 mn \times X3$$

With:

X1 = number of orders lines,

X2 = number of new customers,

X3 = number of express orders.

The TDABC is founded on a strong hypothesis. The cost generation is based on the time consumption. This is the case only in certain circumstances. It is the case for supply chain management, some standardised production processes, call centres, hospitals, some consulting activities, ... But it is not the case for the research and development process, the marketing one, some complex productions, ... In addition, some mistakes are possible when establishing the standards. Moreover, the TDABC depends on internal time consumption measures. It deals with an internal constraints approach. Maybe it would be useful to extend the TDABC methodology to some customer variables (spending time when phoning for a request, distance to the first shop, ...)

### **III. Case study: ABC in IT supply services as a tool of supply chain management**

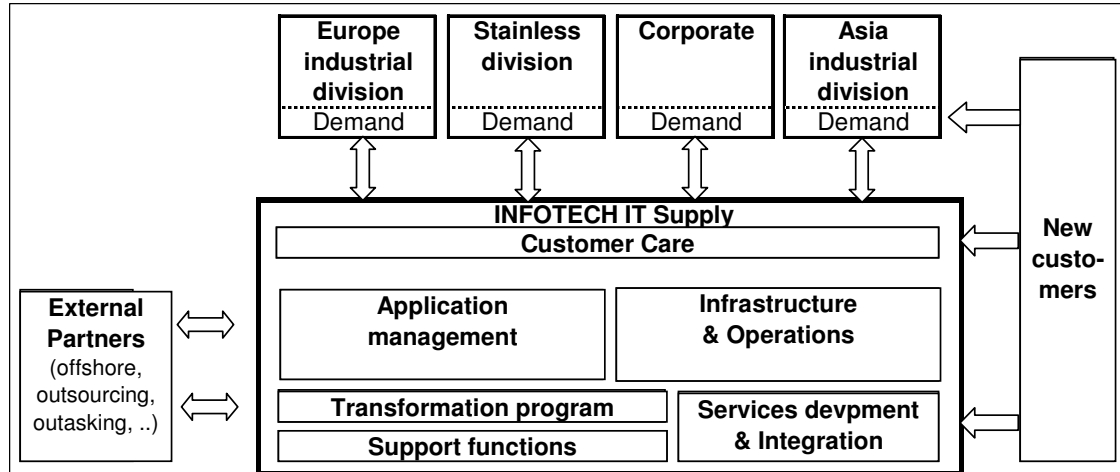
The different types of ABC described fit according to the kinds of firms observed, their competitive environment and their organizational structure. For instance, industrial firms with complex technologies and processes need to clearly analyse their resources. A refined ABC (like the RCA method) with a strong level of details of the analytical framework could be useful (see figure 1). Differently, services could use a more simplified framework and Time-driven ABC and Process costing approaches could be relevant. Moreover, the customer could be a more relevant cost object than the product (see table 2). It is the case in the hospitality management field where we observe a lot of CPA applications (Noone and Griffin, 1999; Krakhmal, 2006). Now, we examine those 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.

#### **III.1 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. The figure 5 presents the links between INFOTECH and the other divisions of the group. INFOTECH is a profit center and sell computing services into and outside the group. So, inside the group, we have a

supply chain process concerning the different kinds of computing activities: hardware, software and services (hotline, ...) So that the supply chain process would be more relevant, the staff decided to implement an ABC system dedicated to this process.

**Figure 5. INFOTECH ORGANIZATION**



The old analytic model was based on cost centers P&L (profit and loss) reporting of costs, that means:

- It did not easily report global INFOTECH figures for the same activity,
- It did not explain relationship between costs and activities,
- Projects reporting were not managed.

So, in order to make the links between costs of resources given by the SAP system and services defined by the commercial teams, a new tool is required.

Two years ago, the financial controller of INFOTECH decided to develop the ABC method to 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.

### III.2 The ABC project

The ABC project lasted 1 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 the full costing,
5. Calculation of the profitability,
6. Validation, corrections and results analysis.

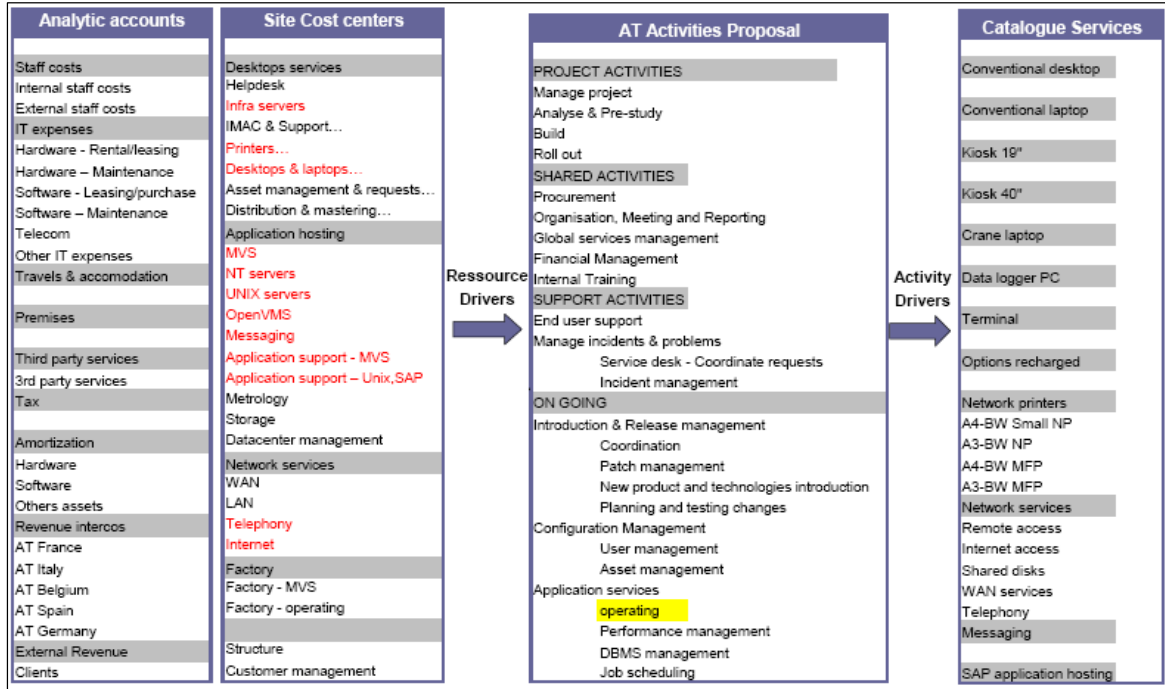
This methodology allows:

- The allocation of dedicated and shared resources to activities,
- To manage activities as basic components of processes,
- To track costs of services which are aggregation of all components of the nomenclature of activities,
- To be definitively focused on process improvements rather than structure improvements,
- To facilitate benchmarking,

- To monitor the performance of partnership by improvements in processes.

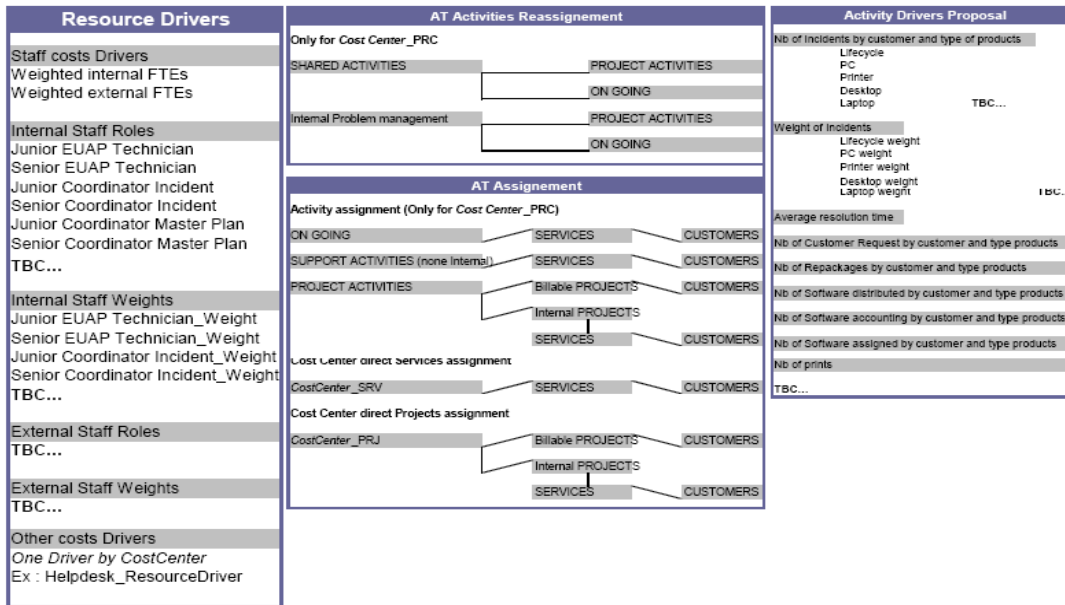
The figure 6 shows an extraction of some analytic accounts, site costs centers, activities proposal and catalog services. In fact, around fifty activities were designed.

**Figure 6. EXTRACTION OF ANALYTIC ACCOUNTS, SITE COST CENTERS, ACTIVITIES PROPOSAL AND CATALOG SERVICES**



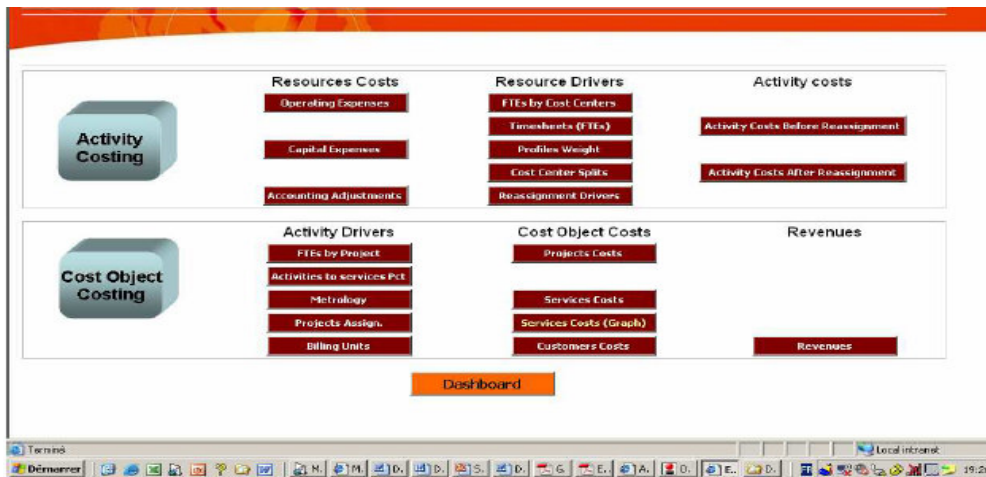
The figure 7 describes some resource drivers and the activities reassignment logic.

**Figure 7. RESSOURCE DRIVERS AND ACTIVITIES REASSIGNMENT**



To implement the ABC system, INFOTECH chose ALG software and an instrument called EPO (Enterprise Performance Optimization). The figure 8 presents the EPO synthetic dashboard.

**Table 8. THE EPO DASHBOARD**



With the EPO, the financial controller extracts P&L statements by customer, by region, by type of service, ...

**Conclusion**

In this paper, we have analysed several ABC applications. 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, eventually combined with a CPA and a TDABC for very complex activities, ... A modern software makes it possible.

Moreover, the type of ABC used depends on firms' specificities. With the case study, we explain the interest for an IT supply division to favour an ABC which combines four features:

- A CPA one that is to say that the "customers" (internal and external) are the more important cost objects,
- A TDABC logic with the build of a timesheet used to define a great part of resource drivers,
- A simplified ABC with a number of activities around fifty,
- An IOCM dimension with the integration of the internal customers in a supply chain ABC so that the IT services could be more efficient.

For a futur research, we would like to develop several case studies that put in evidence the supply chain ABC dimension. A futur research could also be more quantitative with a typology analysis (contingency theory) that puts in evidence the relations between the different types of ABC described in the paper and firms' features.

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