
Time Driven ABC as a new approach for allocating costs in the Egyptian manufacturing companies - Case Study

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Abstract: *This research aims to Identifying problems related to the application of Activity Based Costing, and Demonstrating steps of applying Time Driven Activity Based Costing according to the Egyptian manufacturing environment. This paper explores some of the weaknesses of traditional ABC and demonstrates how the new Time-Driven activity-based costing overcomes many of these problems. Through a case study, we show how to perform a time-driven activity-based costing and provide evidence of the benefits of such an analysis. The results indicate that the time-driven activity-based costing is easier and faster to build an accurate model than activity-based costing.*

Keywords: *Activity Based Costing, Time Driven Activity Based Costing, Case study, manufacturing, Egypt.*

1. Introduction

The increase in automation had resulted in increasing the percentage of indirect costs to total manufacturing costs and in decreasing direct labor costs due to the diversification of products and complexity of transactions, which in turn causes the traditional costing systems to be less relevant in allocating these costs. Such a failure to allocate these costs accurately will cause the costs of these products or services to misrepresent the real consumption of the resources needed to produce these goods or services.

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This has motivated Kaplan in the eighties of the past century to develop a new system for the allocation of indirect costs known as the Activity Based Costing System (ABC) that aims to measure and link the enterprise costs to its products and services. This activity Based Costing System has solved the problem of inaccurate allocation of costs through allocating indirect manufacturing costs based on activities before allocating these costs to the cost objects (orders, products, services, customers,...etc.)

With the passage of time, different problems related to the Activity Based Costing system had emerged which had caused many firms to terminate its application or to stop its development till it became obsolete. Kaplan and Anderson (2007) had noticed that these problems are related to the costs associated with meeting the employees and the time spent in this process, costs related to data storage, processing and reporting. This is in addition to the difficulties related to adjusting the system. Also, the Activity Based Costing System is theoretically incorrect because it ignores the unused capacity.

As a result, Kaplan and Anderson (2003) developed a new system more accurate in allocating the indirect costs called Time-Driven Activity Based Costing. This new system provides managers with correct costing and profitability information. Also it does not require meeting and counting employees and it takes in consideration the change in time needed to perform the service. This Time Driven Activity Based Costing System allocate indirect costs of resources to cost objects through a framework that require two groups of estimations which are the determination the costs needed to provide resource capacity and the rate of providing resource capacity costs. Bruggeman and Everaert (2007) found that this system provide many advantages through designing accurate cost models relevant to the enterprises working in environments characterized by sophisticated activities.

This system also allows for adjusting the costing system with the introduction of new products or services or when redesigning existing

production or service transactions. Accordingly, the Time Driven Activity Based Costing System is suitable in rapidly changing environments. This research aims to Identifying problems related to the application of Activity Based Costing system, and Demonstrating steps of applying Time Driven Activity Based Costing system according to the Egyptian manufacturing environment. The remainder of this paper is organized as follows: Section 2 covers the theoretical foundation of the Activity Based Costing. The theoretical foundation of Time-driven Activity Based Costing is described in Section 3. Case study is presented in Section 4. Finally, Section 5 includes concluding remarks.

2. the theoretical foundation of Activity Based Costing:

“According to Argyris and Kaplan (1994), activity-based costing (ABC) is a costing model created in the mid-1980s that provides more accurate information to

Managers about the cost and profitability of their business processes, products, services, and customers” Lelkes, (2009). “The objective of cost systems is to make an accurate estimation of product costs of different cost objects (customers, representatives, products ...) in order to provide the management relevant information to make decisions, to improve business processes and to manage departments” Putteman, (2009).

“Activity Based Costing gives a more accurate view on reality. ABC recognizes that some costs do not vary with a volume measure but with some other measures. It’s a more sophisticated approach to attributing indirect costs (resources ...), first to activities and then to cost objects which create demand for these indirect costs. As a result, better decisions are made. The system is able to provide more accurate information on costs so that management can focus its attention on products and processes accounting for more profit” Putteman, (2009).

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The Activity Based Costing system can be applied through the following stages according to Bruggeman and Everaert, (2006); Putteman, (2009):

1. Identify activities.
2. Determine the costs of the activities.
3. Determine the cost drivers of the activities.
4. Determine the volume of cost drivers.
5. Determine unit cost per cost driver for each activity.
6. Calculate the unit cost per product or service.

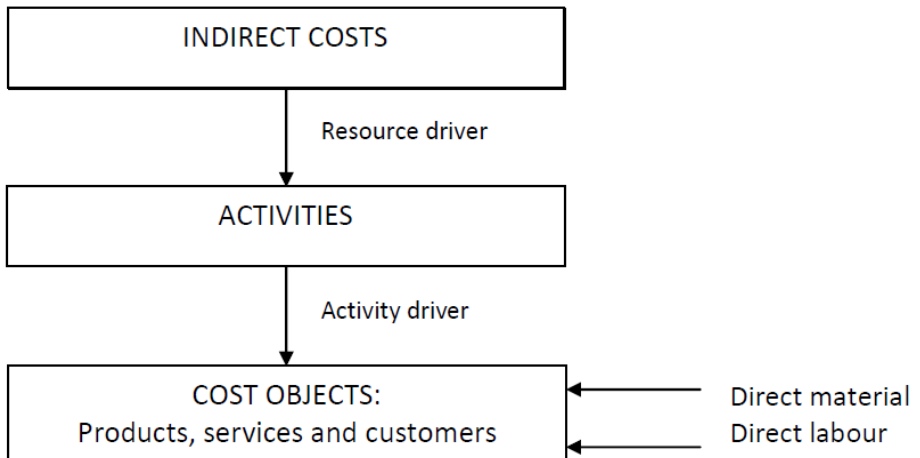


Figure 1: Activity based costing (Source: Putteman, 2009)

On the other hand, Wegmann, (2007) showed The Activity Based Costing allocation process and its weak point

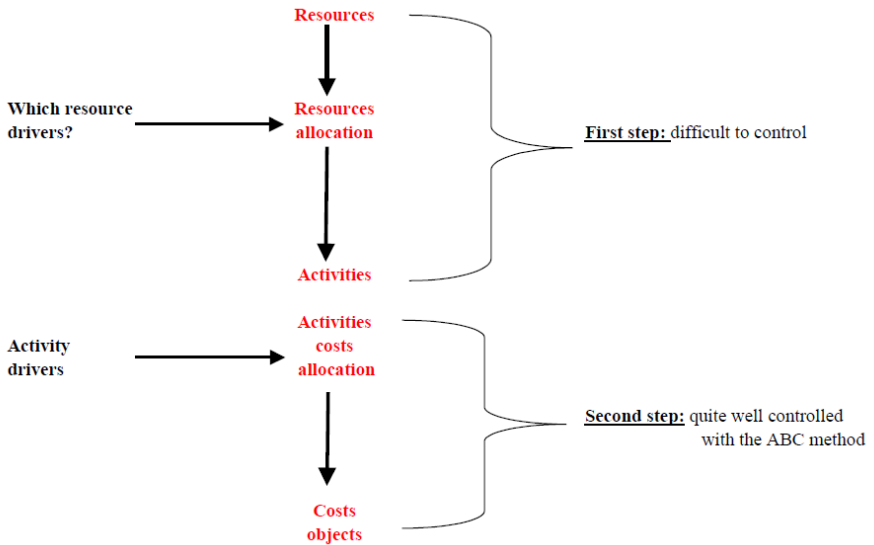


Figure 2: Activity based costing process (Source: Wegmann, 2007)

In summary, implementing conventional Activity Based Costing encountered the following problems:

- The interviewing and surveying process was time -consuming and costly.
- The data for the ABC model were subjective and difficult to valid ate.

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- The data were expensive to store, process, and report.
- Most ABC models were local and did not provide an integrated view of enterprise - wide profitability opportunities.
- The ABC model could not be easily updated to accommodate changing circumstances.
- The model was theoretically incorrect when it ignored the potential for unused capacity.

3. the theoretical foundation of Time-driven Activity Based Costing:

“In the complex and dynamic environment of today, it is very important for companies to know the exact product costs and profitability of products, services and strategies. Cost systems must be able to quickly adapt to changing circumstances. Ever increasing competition and globalization result in high risks when wrong decisions have been made based on wrong figures. As a response to these circumstances, time-driven activity based costing (TD-ABC) was developed. This system provides accurate cost and profitability information at a low cost manner” Putteman, (2009).

Time-driven activity-based costing (TDABC) was introduced by Robert Kaplan in 2004 in an article in the Harvard Business Review Kaplan and Anderson, (2004), followed in 2007 by a book Kaplan and Anderson, (2007b). As such, this is the most recent innovation we consider. While the book details several adoptions, objective survey evidence about the extent of use has, to our knowledge, not been published.

Conceptually, TDABC is a logical application of the notion that the supply and consumption of resources are distinct. The resulting concept of time equations represents a fundamental departure from two-stage allocation systems such as ABC and RCA Kaplan and Anderson (2007a, 2007b);

Everaert et al. [2008] illustrate an application in customer profitability analysis).

“A time-driven ABC model identifies the capacity of each department or process and assigns the cost of this capacity to the volume and mix of work performed. If, through continuous improvement or rationalization of product lines, orders and customers, the company reduces the demand for work in these different departments and processes, the time-driven ABC model estimates the quantity of resources no longer needed so that managers can take steps to redeploy these resources or manage them out of the company” (Kaplan, 2006).

The time-driven approach consists of six steps (Bruggeman et al., 2007):

1. Identify resource groups and the activities for which they are used
2. Determine the costs of each group.
3. Estimate the practical capacity of each group.
4. Calculate the cost per time unit.
5. Determine the required time units for each activity.
6. Calculate the cost per transaction.

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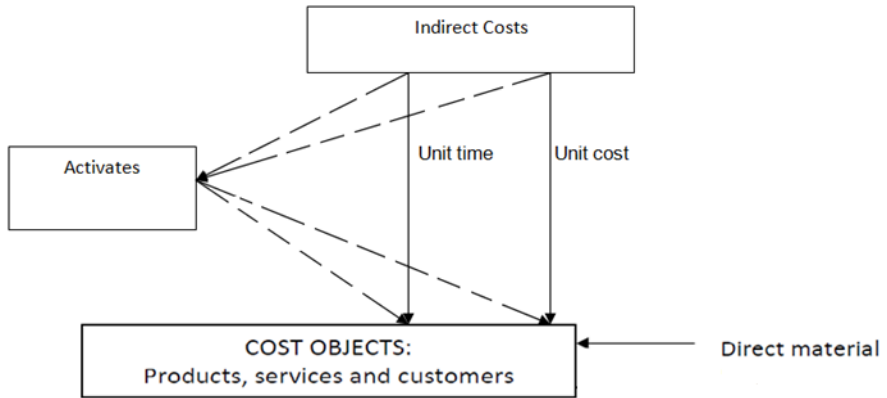


Figure 3: Time-driven activity-based costing (Prepared by the researcher)

To capture these complexities, TD-ABC uses time equations. Such an equation expresses the time which is consumed by a certain event of an activity in function of different characteristics, the so-called time drivers. The need for new material and the need for a special box are both examples of time drivers Balakrishnan et al, (2012).

This equation is generally represented as follows (Bruggeman et al., 2007):

$$t_{j,k} = \beta_0 + \beta_1.X_1 + \beta_2.X_2 + \dots + \beta_p.X_p$$

With $t_{j,k}$ = time required for event k of activity j.

β_0 = constant amount of time for activity j, independent of the Characteristics of event k.

β_i = consumption of time for 1 unit of time driver i (i = 1 ... p)

X_i = time driver i (i = 1 ... p)

p = number of time drivers which determine the time required to perform activity j

“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” Wegmann, (2007).

(Kaplan and Anderson (2007); Namazi (2009); Max, (2007); Lambino, (2007); Everaert et al, (2008)) showed The Time-driven activity based costing approach overcomes these difficulties and has the following advantages:

1. Easier and faster to build an accurate model.
2. Integrates well with data now available from ERP and customer relationship management systems (this makes the System more dynamic and less people -intensive).
3. Drives cost s to transactions and orders using specific characteristics of particular orders, processes, suppliers, and customers.
4. Can be run monthly to capture the economics of the most recent operations
5. Provides visibility to process efficiencies and capacity utilization.

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6. Forecasts resource demands, allowing companies to budget for resource capacity on the basis of predicted order quantities and complexity.
7. is easily scalable to enterprise wide Models via enterprise scalable applications soft ware and database technologies.
8. Enables fast and inexpensive model maintenance.
9. Supplies granular information to assist users with identifying the root cause of problems.
10. Can be used in any industry or company with complexity in customers, products, channels, segments, and processes and large amounts of people and capital expenditures.

On the other hand, Terzioglu and Chan, (2013) showed successful implantation of time-driven activity based costing for both manufacturing and services industry.

4. Case study:

A case study conducted to selected An Egyptian Company to implement the proposed model and examine the information that may reveal by it in helping to achieve the research objectives, The Company working in the field of pharmaceutical industry that implementing the Activity Based Costing system.

Data gathered from the accounting department especially from cost manager and cost accounting members, also production manager provided helpful support in the defining of activities in the manufacturing area.

4-1 calculates Practical capacity:

The average practical hours performed are calculated by subtracted the average break and stoppage time from the maximum capacity:

Table (1)

Department	Employee/ machines numbers	Actual work hours	Actual work day through the year	Practical capacity through the year	Practical capacity through quarter of the year
Tablets	245 Employee	7 hours	288 day	493920 hour	123480 hour
Veterinary powders	3 machines	7 hours	288 day	6048 hour	1512 hour
Funnel	48 machine	7 hours	288 day	96768 hour	24192 hour
Ointments	26 machine	7 hours	288 day	52416 hour	13104 hour
Capsule	5 machines	7 hours	288 day	10080 hour	2520 hour
Drink	95 Employee	7 hours	288 day	191520 hour	47880 hour
Droplets	80 Employee	7 hours	288 day	161280 hour	40320 hour

4-2 calculates the practical rate:

To calculates the practical rate for each Department divided indirect costs assigned to each department or the cost of supplying capacity by the practical time calculated through quarter of the year for each department:

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Table (2)

Department	Indirect costs	Practical capacity through quarter of the year	the practical cost rate
Tablets	4368621 pound	123480 hour	35.379 pound/hour
Veterinary powders	40451 pound	1512 hour	26.753 pound/hour
funnel	823643 pound	24192 hour	34.046 pound/hour
Ointments	405897 pound	13104 hour	30.975 pound/hour
Capsule	78420 pound	2520 hour	31.119 pound/hour
Drink	1406601 pound	47880 hour	29.378 pound/hour
Droplets	1290873 pound	40320 hour	32.016 pound/hour

4-3 Results of allocating indirect costs to cost objects according to the Activity Based costing and Time-Driven Activity Based Costing:

The following table shows the Results of allocating Indirect costs to cost objects according to the Activity Based Costing and Time-Driven Activity Based Costing:

Table (3)

Department	Activity Based Costing	Time-driven Activity Based Costing	Unused costs
Tablets	4368621	4251848.22	116772.78
Veterinary powders	40451	37721.73	2729.27
funnel	823643	800319.322	23323.678
Ointments	405897	401219.175	4677.825
Capsule	254112	239828.259	14283.741
Drink	1406601	1364314.32	42286.68
Droplets	1290873	1105640.544	185232.456

5. Conclusion

The literature review for Activity Based Costing reveals that the model implementation encountered a problem which may affects on its diffusion rate hence the interest in the accounting community as low publication rate of its topics.

On the other hand, the time-driven activity-based costing system is easier and faster to build an accurate model than activity-based costing system. In addition to provide cost and profitability information more accurate compared to activity-based costing system. Finally it provides visibility to process efficiencies and capacity utilization.

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