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Activity Based Costing (ABC) as a tool for Lean Transformation: The Case of the Greek Power Public Corporation (PPC)

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Abstract

This research highlights the malfunctions and the inaccurate information of the conventional cost methods that are used nowadays in most Greek public companies. It poses as a research topic the resolution of the above mentioned problem with the development of a reliable and accurately informative cost system based on the ABC method, which will offer support to those companies concerning the amelioration of their total performance and function.

This paper also shows the ability of the ABC costing method as a tool which contributes to the transition from a traditional public corporation to a lean corporation after the fulfillment of three fundamental points. First prevents distortions of the cost of activities of a company with the provision of exact measure of the cost of those activities then defines the non value added activities so it limits the wastefulness in a corporation and final introduces the mentality of lean thinking to the employees of the corporation, since each employee knows the flow of the action he performs, its cost and value.

This paper includes a contrast on a theoretical basis of the traditional cost systems and the ABC method, presents an application of ABC and a case study of applying ABC to a Greek Public Company investigating its use as a lean tool that helps the saving of resources and the transition to a lean production model.

Keywords: ABC costing method, costing systems, accounting systems, Lean, Lean management

1. Introduction

1.1 The financial environment and the existent state of Greek Public Corporations

Greek economy is currently going through a prolonged period of deep and unprecedented crisis. Its main traits are the continuous reduction of economic activity and the recession that continues for eighth consecutive year, a fact that has immediate impact on the function and performance of all (private and public) Greek Corporations. The deterioration is now present in all aspects of commercial activities its main characteristics being a decline in the activity cycle, an overturn in profit and the shrinking of the commercial capital base (Annual Report on Greek Commerce, 2011).

When it comes to Greek Public Corporations in particular, according to Vazakidis et al. (2010), even though a lot of positive steps have been made in recent years, mainly by using new technologies, Greek Public Corporations continue to be characterized by bureaucracy, absence of strategic action and wastefulness of public resources management.

However, there is the capacity of improving the quality of the labor aiming to a better and faster service of the citizen/customer, offering additional reward to the staff and ameliorating the efficiency and productivity of the services that public corporations are offering. And if possible all these to be carried out/ accomplished without painful restructures, financial reinforcements or massive new investments in structures and information systems, but implementing the principals of lean thinking to the services of the public corporations/ organization.

1.2 ABC costing system and Lean Thinking

James Womack and Daniel Jones define five basic principles for lean systems and organizations. To the services that public companies offer, the approach of lean thinking based on these five principles is possible: Specification of the value from the point of view of the final customer; Determination of the value stream, eliminating as far as possible those steps that do not produce value; The steps that create value must be

evolved without interruption, so that the product flows smoothly to the customer; Attraction: the products and the services are produced from the customers to the customers; Aiming to perfection through incessant amelioration.

The implementation of ABC can function as a lean tool as it helps significantly a public organization to the fulfillment of the principles of lean thinking particularly:

To the determination of the value of a product with the greatest possible accuracy measurement of target-cost, based on the quantity of the resources and the effort demanded (Womack and Jones, 2003).

To the mapping of the value stream that constitutes the most widespread principle of lean thinking. With this tool are defined in graph all the activities that occur at the length of a value stream of a product or service. With the mapping of the value stream there is the ability of defining both the current situation as well as the future ideal one. The way the activities will be improved and perfection will be sought are also depicted, after these activities are defined accurately, analyzed and connected one to another (Womack and Jones, 2003).

To the push for reorganization of the structure of an organization in teams based on the type of the provided products/services, ensuring their smooth “flow” to the citizen (customer).

The constant improvement of the procedures, with the removal of those activities based on the value stream-mapping that create “muda” by absorbing resources without producing any value.

This paper targets in showing if the installation and usage of the ABC can be considered as a tool that aids the transition of the function of the public corporations to a lean function. The questions posed are: What’s the difference that the ABC method gives in the measurement of the cost of the final product/service that is produced in comparison to the traditional costing system and which one is more trustworthy and accurate? How does the implementation of ABC help in the designing, analysis and connection of the activities of an organization (value-stream mapping)? How the reorganization of the

producing procedure and consequently that of the organization based on the provided teams of products/services is accomplished? Which are the most important stages in the implementation of the ABC system? Which is the most appropriate ABC model to apply to Public Corporations?

The reason ABC is important is that it is impossible to manage something, if it is not measured correctly. ABC contributes to more effective decision making by providing timely and accurate cost-related feedback that extends to all business functions (Shields, 1995; Estrin et al., 1994).

1.3 Justification for the research (including aims)

Traditional economic justification models are based on savings in immediate expenses such as materials or labor. However, advanced manufacturing and IT technologies have reduced the proportion of these costs on the overall unit product/ service costs. Overheads represent up to 500% of direct costs for some manufacturing corporations, while direct material costs represent as little as 5% of total product/service costs (IMA, 2006). Thus, it is unacceptable to neglect overhead-related costs when performing cost and benefit analysis for advanced manufacturing systems. These systems do not facilitate accurate reporting of true cost distributions due to outdated overhead allocation methods. Traditional volume-based systems elements merely allocate in an –occasionally- ad hoc and unsuitable fashion costs to individual products (Ioannou and Sullivan, 1999).

Additionally, the aim that led to the emergence of ABC costing system as well was the general dissatisfaction among strategy researchers on the suitability of industrial organization economics to offer adequate feedback and input on competition in terms beyond price and cost; how resources are related to a firm's competitive position and how management of activities influences a firm's performance (Zubac et al, 2010).

As mentioned before the ABC approach is based on costs the activities require. As a quantitative technique, ABC measures the cost of activities, resources, cost objects and cost units based on cost drivers. ABC captures organisational costs for the factors - production and overheads - and applies them to each activity in a well-defined structure.

It also helps direct the resources towards activities that yield the maximum profit and improve the way work is performed (No and Kleiner, 1997).

It is necessary for Public Corporations to minimize non-value adding activities in order to decrease the cost of their products/ services and augment their competitive place in the market without affecting the value, quality and performance of said product/ service to the customer (Jiambalvo, 2001). The ABC system has this ability to reduce cost drivers and eliminate non-value adding activities, supporting the conversion of a public corporation with its common function to a lean public corporation.

It is essential for Public Corporations in Greece adopting the ABC to take into account their advanced technological character and their competitiveness in the global market.

The main aim of this research is to determine whether the ABC system is applicable and if its usage helps the introduction of Lean Thinking to Greek Public Corporations. To achieve this overall aim this research first contrasts the traditional cost accounting system with that of the ABC system, by determining the correct cost drivers for ABC implementation and second develops a framework for implementing ABC within the context of Greek Public Corporations. After investigates how activity-based costing aids an organization reduce costs, eliminate non-value activities and become more efficient assisting in this way to its transition to a Lean organization and finally, develops a case study in the TRSC Department of Public Power Corporation S.A. (PPC) to compare and contrast the efficiency of implementing the ABC vs. the Traditional Costing System.

1.4 Methodology

The approach which taken was an experimental application (case study) of the implementation of an ABC model to the Testing Research Standards Center (TRSC) of PPC. So, an analysis of the activities executed per section of the TRSC Department and the appropriate cost drivers were picked according to a special guide then an ABC algorithmic model which calculates the cost of every activity and every product/service of the TRSC Department of the PPC was developed (Cokins, 1996; Groot and Lukka, 2000; Kaplan and Cooper, 1998) and finally there was a comparison of the results of the

traditional cost accounting model used by the PPC as a greatest Greek Public Corporation and the ABC model developed by the researcher

2. Literature Review

2.1 Brief background of Traditional and ABC costing systems

The principle of the function of traditional standard cost systems is the assumption that it is the production of products/ services that causes the costs. Therefore, clean costs for materials, work-related and other direct costs are assigned to products/ services whereas all other expenses are grouped as indirect and are allocated to products/ services, usually based on some production volume measure. There is a silent assumption that the indirect costs that must be allocated to products are essential or they would not exist. Since the costs are necessary, every product/ service unit must carry the part of the expenses that corresponds to it.

Thus, traditional standard cost systems initially trace costs to cost centers and not to activities or processes. And when calculating product/ service costs for inventory evaluation or for measuring short-term incremental costs, traditional volume-based cost drivers such as labor and machine hours are used. Therefore, these systems cannot report precisely the costs of resources used by activities, business processes, products, services and customers. To overcome these limitations of inaccurate costing acts, enterprises need to use activity-based cost models (Kaplan and Cooper, 1998).

Secondly, traditional cost systems used by the Public Corporations of Greece focus on responsibility accounting and accurate tracing of costs to cost centers. In today's environment, however, such reports falls to provide the correct, timely, functional and process-focused team-based measurements needed to drive continuous amelioration in quality and actual expenses (Kaplan and Cooper, 1998).

Fundamentally, traditional costing systems try to assign cost directly to products, rather than assigning it to activities first and from then on to product units. The typical cost report gives information on what is spent, but not why it is spent.

Many traditional cost accounting systems often allot overheads in proportion to direct labor (Nachtmann and Needy, 2001). Inaccurate cost information can result in incorrect decisions because not all consequences are taken into account.

The distortion of product/ service cost happens especially under two conditions firstly, indirect and supporting expenses are elevated and secondly, product/ service diversity is high: the company produces both high-volume and low-volume products/ services, basic and custom products/ services as well as complicated and simple products/ services (Egidauskas, 2013).

Furthermore, due to the distorted cost information, an insufficient allotment of overhead costs can cause the appearance of overpriced high-volume products and under priced “special” products (Helberg et al., 1994). If pricing follows costing, the more complex product/ service can drive the less complex product out of business. Since product/ service costing is used as a decision tool for management, controlling the process from production to marketing, it is vital to have an accurate proportioning of contributing production/ service costs.

Also, when overhead costs are cut in order to reduce total costs it is the symptoms that are treated, not the cause. In many cases the cutting of overheads is more likely to cause a decrease in the quality of the products than to the long term reduction of the cost (Marx, 2009).

Therefore, traditional accounting practices favor quick fixes in order to reduce costs, either by reducing resources or by forcing suppliers and vendors to cut costs (No and Kleiner, 1997). The traditional product costing approach is based on the costs consumed by the product or by the service. Hence, costing per service is a static rather than a dynamic problem.

The outcomes from this method of approach are: Public Corporations visualize the costing of their services as a whole; they do not provide sufficient non-financial yield; a clear definition of the activities that constitute a service does not exist; the activities per

service cannot be calculated and that presents an issue for management; many activities may be useless (non-value added) while others could be important and must be included; targets were limited to material production and direct labor productivity; there was no measuring of the opportunity to control and manage a number of other manufacturing costs and overheads better and finally, there is lack of encouragement when it comes to making improvements (Kaplan and Cooper, 1998; Damanpour and Evan, 1984; Gunasekaran et al., 2005; Jiambalvo, 2001).

It is an undeniable fact that traditional costing systems are keeping up with bureaucracy and the austere hierarchical structure that rule public corporations.

As a response to the afore-mentioned outcomes of traditional costing systems there is an effort to transition to an ABC system in order to meet the need for accurate information about the cost of a product or a service. In the case of ABC, the practical problem is to transform a static and hidden costing problem in a real dynamic situation with costing accuracy and transparency by adopting the ABC method. This transition will provide a company with the opportunity to start functioning in a Lean thinking environment after it starts acquiring the philosophy of the continuous improvement of its processes and an ability to increase its performance.

The analysis of initial activity is clearly the most difficult part of ABC. Activity analysis is the method of identifying the correct cost drivers and their influence on the costs of products or services (Edwards, 2008).

The ABC type costing systems believe that activities cause the cost and that the reasons behind the performance of these activities are the services and customers. An ABC costing system tries to detect the cost of every activity along with the reason why each of them consumes business resources. That is, it creates the mechanism needed to detect the consumption of resources in anything that caused costs during the acquisition of resources.

According to Kaplan and Cooper (1998) ABC systems are developed in four steps. First step is the identification of the activities being performed. The second step is to determining the expenses of each activity. In this step the ABC uses resource cost drivers,

these drivers link spending and expenses to the activities being performed, there is no equivalent step in a traditional costing approach. The third step is the identification of the cost objects of corporations (products, customers, services) and finally, is the selection activity cost drivers that link activity cost to the corporations cost objects.

The agents that cause activities to happen are called cost drivers. The identification, measurement and control of cost drivers are vital to ABC (No and Kleiner, 1997).

The ABC costing system is used as a management tool and especially as a Lean management tool because it gives the appropriate quality of a company's cost information which is highly related to the improvement of the overall business efficiency, achieving in this way greater "pull" to the citizen (customer)

In general, when a costing system provides more reliable information on expenses, the results for an organization are better managerial decision making and the enablement of its position in the competitive market (Roztock, 2001).

So, the objective of the implementation of ABC method is to create a flexible business model of company operations. This model must be capable of using data from the accounts give accurate feedback about the necessity of business sources and their allocation to the appropriate product/ service (Bajus and Stasova, 2014).

Additional, ABC gives organizations the opportunity to move on to a dynamic budgeting. Instead of authorizing the supply of resources in forthcoming periods based on historical spending patterns, managers can supply resources based on anticipated demands per activities performed. It is more than obvious that with the ABC the ability of a public corporation to put in the centre of its function the citizen (customer) is reinforced.

Finally, when ABC is used proactively in the budgeting process, it blows away conventional thinking about fixed and variable costs. The time spent on most resources has an effect on the budget. During the traditional budgeting process, once spending is authorized, most organizational expenses seem to be indeed fixed. However, the ABC system gives managers the information they need to make almost all organizational

expenses variable; in the following years, they can acquire, supply and keep only the resources they need to satisfy specific demands (Kaplan and Cooper, 1998).

In today's economic situation, it is most important that Greek Public Corporations measure their actual cost and improve it.

2.2 Difficulties of ABC costing system

Nevertheless, the use of ABC models for both strategic costing and the improvement of the process are often problematic for many reasons.

First, ABC does not typically identify activities in terms of the process to which they belong. Generally, if a product requires the consumption of a given activity, it also consumes all the activities supporting it and preceding it in the process. For instance, when analyzing the effect of an operational alteration has on costs, e.g. a change in production volume, it is essential to identify all the activities that would be influenced by it (Sievanen and Tornberg, 2002).

Second, in contrast to the aggregation of activities, ABC systems can be designed to be too complex, with activities being defined in too much detail. That is, these systems offer the necessary feedback, though they have a tendency to be too complicated and expensive to be supported due to an excessive number of details (Foster and Swenson, 1997; Cokins, 1996). Determining the appropriate activities and assimilating the data needed is an intricate process (Bagur et al., 2006).

Third, the implementation of ABC systems requires a major change that involves disrupting and committing resources over a substantial period of time (Innes and Mitchell, 1995). The costs of ABC may be quite high; therefore the advantages have to be substantial in order for it to be worth using (Staubus, 1990; Bagur et al., 2006).

Fourth, the existing accounting information system may not be in a suitable form for ABC analysis.

Fifth, there are issues of acceptance from the employees concerning the ABC implementation such as the lack of commitment from many top management officials of

the Greek Public Corporations. This sends the wrong signal that the ABC system is not of importance. The lack of focus of senior managers and the implementation team on specific business problems may lead to project failure (Bagur et al., 2006).

Another is the adoption of this system without any clearly perceived need may encounter negative results. If the company is not ready for the implementation its staff believes that the new system is being forced on them so they do not show any commitment to it (Friedman and Lyne, 1995; Bagur et al., 2006).

Additional sometimes there is a need for an ABC system, yet senior management does not express this properly to the managers and the staff of the company (Friedman and Lyne, 1995; Bagur et al., 2006).

Finally, employee resistance is a major obstacle in the application of ABC. This reaction can be natural in the private sector because an ABC implementation signifies reduction of overhead costs, therefore a highly possible reduction in staff numbers.

However, in Greek Public Corporations, where lay-offs rarely occur, it means something much more difficult: a general culture change. This change may include the re-examination of all subsequent processes, the collaboration with other sectors of the business, knowing what is produced and what it costs, the definition of increase in the output margin and the termination on non-value activities (Bagur et al., 2006).

2.3 The implementation framework of ABC in Greek Public Corporations

The theoretical description of the ABC costing system implementation problem in Greek Public Corporations can be described by a framework which provide the interaction between the ABC costing system and the organizations structure (management of behavior change), how to design and apply an ABC costing system, how to make sure of the sustainability of an ABC system, also how to evaluate the ABC software and final the role of ABC in the decision making process (IMA, 2006).

This framework was selected by this research for several reasons:

First, “change” is a major feature of today's economic environment, especially in Greece. This highlights the importance of investigating how an ABC system can help a Public Organization identify its needs for change and how changes in the environment affect the information required for effective management. As with any new management technique or tool, an effective change management process must be installed before implementing an ABC system. The aim of this process should be to ensure that the system is backed by all levels of an organization (IMA, 2006).

Second, it demonstrates that organizations alter their structure as part of their management change strategy. Changing structures implies changes in the information needed, and the way information is used to measure performance.

An ABC system can be viewed in two different ways of information: the cost assignment view and the process view. The cost assignment view provides feedback regarding resources, activities, and cost objects. The process view provides operational (often nonfinancial) feedback on the processes and subsequent activities of a business. These two views of ABC are depicted in Figure 2.3 (IMA, 2006).

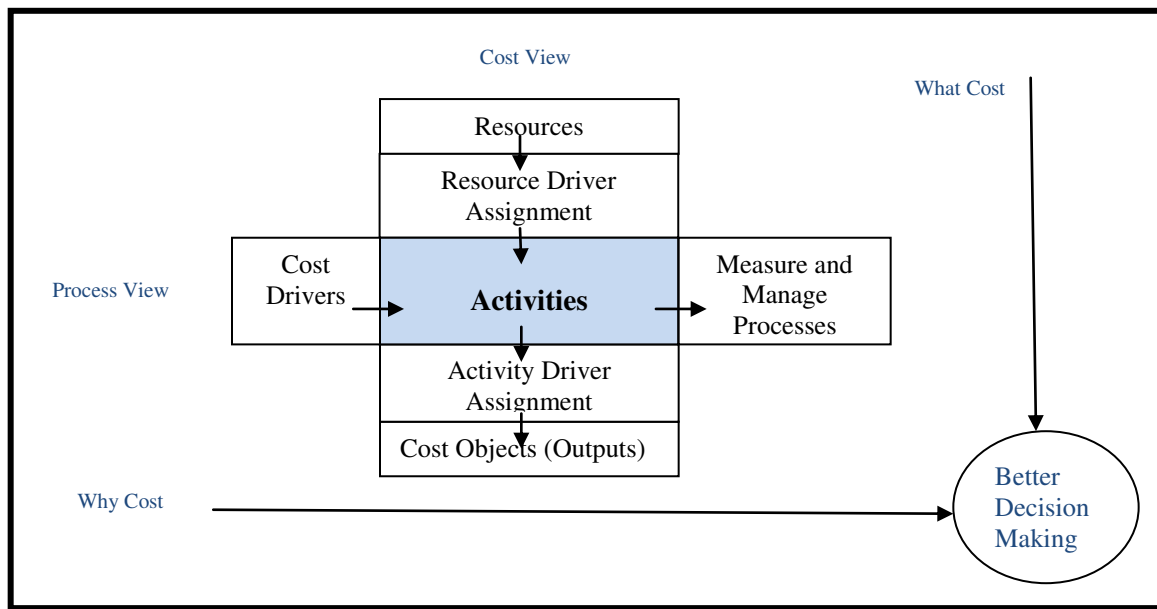


Figure 2.3: The Activity - Based Cost Management Framework

[Source: IMA, 2006(p.9, Exhibit-2)]

It is obvious that the *Cost View* transforms the expenses of resources (e.g. salaries, supplies) into the costs of the work activities (for both people and assets) and eventually into the final cost objects (e.g. products, customers) and the *Process View* timely places the work activities one after the other, to a smooth «flow», and accumulates the build-up of activity costs from the beginning of a corporation's process until its end (IMA, 2006).

Third, this research shows that organizational changes imply changes in the type of information needed for decision making.

There are two broad goals for using management accounting feedback, the *Strategic Cost Management* which used to determine the correct things to do, i.e. choosing the correct processes, suppliers, goods, channels, and customers and the *Operational Cost Management* which used to do a good job on those things identified as strategic, ameliorate productivity, performance and cut waste (IMA, 2006).

In particular, the analytic research underlines the trade-offs among the different feedback uses (e.g. contracting vs. decision support) and feedback users (e.g. capital vs. product market) most emphatically. (Atkinson and Balakrishanan, 1997).

3. Methodology

3.1 Justification for the methodology

The methodology aims at the presentation of the current traditional cost allocation practice that most Greek public corporations use and secondly, the following method has as a purpose the examination of the overhead cost allocation practices which were followed by ABC. Initially with this procedure the different ways of allocation of the overheads costs between traditional and ABC costing methods are explained and then evaluated.

So, long before the dawn of computerized era, the conventional process of allocating overhead costs was mainly based on a sole volume-based allocation base or cost driver. Sadly, volume-based costing allocated overhead utilizing only one allocation base might

or might not have had a 'cause and effect' link to the expenses allocated to the product or service.

The allocation of expenses such as personnel or janitorial costs on the basis of the time machines function would be really ineffective. In the same way, apportioning costs of maintenance and construction to products or services based on direct labor costs would be equally imprecise (Wilkinson, 2013).

Thankfully not only for clients but also for firms, an improved process of cost allocation has evolved: Activity Based Costing (ABC) in this way permitting overhead costs to be more precisely distributed to products. In the past the aim of allocation was simply to put a price on inventory for reporting reasons. (Wilkinson, 2013).

The allocation of costs by ABC is based on numerous cost pools (production areas) each with relation to its cost drivers. This has as a result further accuracy in costing and ameliorated control concerning overhead costs. ABC effectiveness can be augmented in cases where there is high diversity or heterogeneity of the product or service mix and when overhead costs account for a big part of the total costs. (Wilkinson, 2013)

In many cases, usage, either real or estimated, is the chosen cost driver for central services. Though, usage is not considered to be an economically feasible way of allocating costs. Moreover, a lot of central costs, such as top corporate-management and expenses related to this sector, public relations, marketing, human resources administration, legal services, tax planning revenue, company's advertising campaign, and basic research, can be rather laborious to apportion on the basis of cause and effect. Therefore, the income of each sector, the value of goods sold by each sector, the aggregation of each sector's assets, or the total costs of each division (before allocating central costs) are used as cost drivers by some companies in order to allocate central costs. (Jiambalvo, 2001).

The ABC approach, which was chosen for this research, incorporates process based in Lean thinking. The activities are now linked end-to-end as a flow-process chain network. The cost assignment paths will more closely mirror the business process flowchart, and

employees in operations will recognize this distinction compared to the earlier approaches. The process flow network can decompose work activities to lower levels of detailed work tasks while the costing of segmented diversity can remain at a higher level. Depending on where the activity cost driver is attached to its final cost objects, all of the resource costs flow (with an understanding of why they flow) to reach a product or service.

This alternative ABC calculation method starts with the cost objects and, working in the opposite direction, ask which production activities are consumed and how much. The Lean principle «pull» its implementation since as it has already been notified customer demand is the driving force. Support activities are similarly consumed by the products activities (Shields, 1995).

An accounting system for Public Corporations should capture competitive environment and economic impacts of the product in order to provide useful feedback to designers, engineers, managers and customers. (Palmer and Krupnick, 1995) To achieve such an approach, the research will attempt to prove that the use of an Activity-Based Costing system may overcome some of the difficulties associated with conventional tools e.g., the cumbersome amount of work involved, the usage of non-comparable units and the lack of common standards. In this approach, the following will be provided a compare and contrast the traditional accounting system vs. ABC costing system, a framework for ABC implementation in a Greek Public Corporation and a study about the applicability of ABC.

3.2 Case Study at TRSC of PPC S.A

The research procedure is to implement the ABC method in the Public Power Corporation S.A (PPC) in Greece. The PPC was established in 1950 with the aim to map out and implement a national energy policy, which through the intense exploitation of domestic resources would make electrical power property and right of all Greek citizens.

As a case study selected the implementation of ABC at the Testing Research & Standards Center (TRSC). TRSC has the Executive Office and 9 Sections with 96 employees. TRSC has been chosen due to its autonomy and the great differentiation of the services it

offers. TRSC operates as a subsidiary although it is a distinctive department of PPC'S Support Operations Divisions. Its structure is vertical and it consists of both productive (laboratories and inspection bodies) and of administrative operations' sections.

TRSC's basic target is to support main operations of PPC as a quality control department. Its basic activities are testing, calibration and inspection of materials and equipment that are acquired and used by PPC. Same services are also offered to Greek energy industry.

So, the purpose of this research is to examine the applicability of the ABC system in the TRSC of PPC. Greek laboratories' market is very competitive so, PPC must reduce its costs to keep its margins up. In the past, competition was based on technological innovation, the quality of the products and the efficiency of the resellers. Now it is important to control and reduce costs and for this reason to improve its traditional cost accounting system. The new management accounting system would provide information to help conceptualize new products at low costs and to make decisions about the administration of company.

The ABC implementation steps which are established by the research at the TRSC of PPC (Cokins, 1996; Atril and McLaney, 2002; Jiambalvo, 2001) presented below in Table 3.2 and as a graph in Figure 3.2.

STEPS	ACTIONS
1	Clarify of cost objects (products, services)
2	Identify support and production sections
3	Identify and determine the activities of support and production sections
4	Identify the type costs of each activity (direct and indirect costs)
5	Clarify the purpose of the allocation, defining why the need to allocate these costs exists and defining the benefit of doing so
6	Select an allocation base or cost drivers for each support/ production activity based on a cause-and-effect relationship between this support activity (first-stage cost drivers) and the cost pool (production area)
7	Once the allocation of support/ production activities to cost pools is complete, choose and apply a method for allocating these costs with appropriate cost drivers which called second-stage cost drivers to cost objects (products, services). In this research, for this allocation, selected a combination of the direct method (for production activities) and the reciprocal method (for support activities) (Wilkinson, 2013)

Table 3.2 Steps of ABC Implementation in TRSC Center

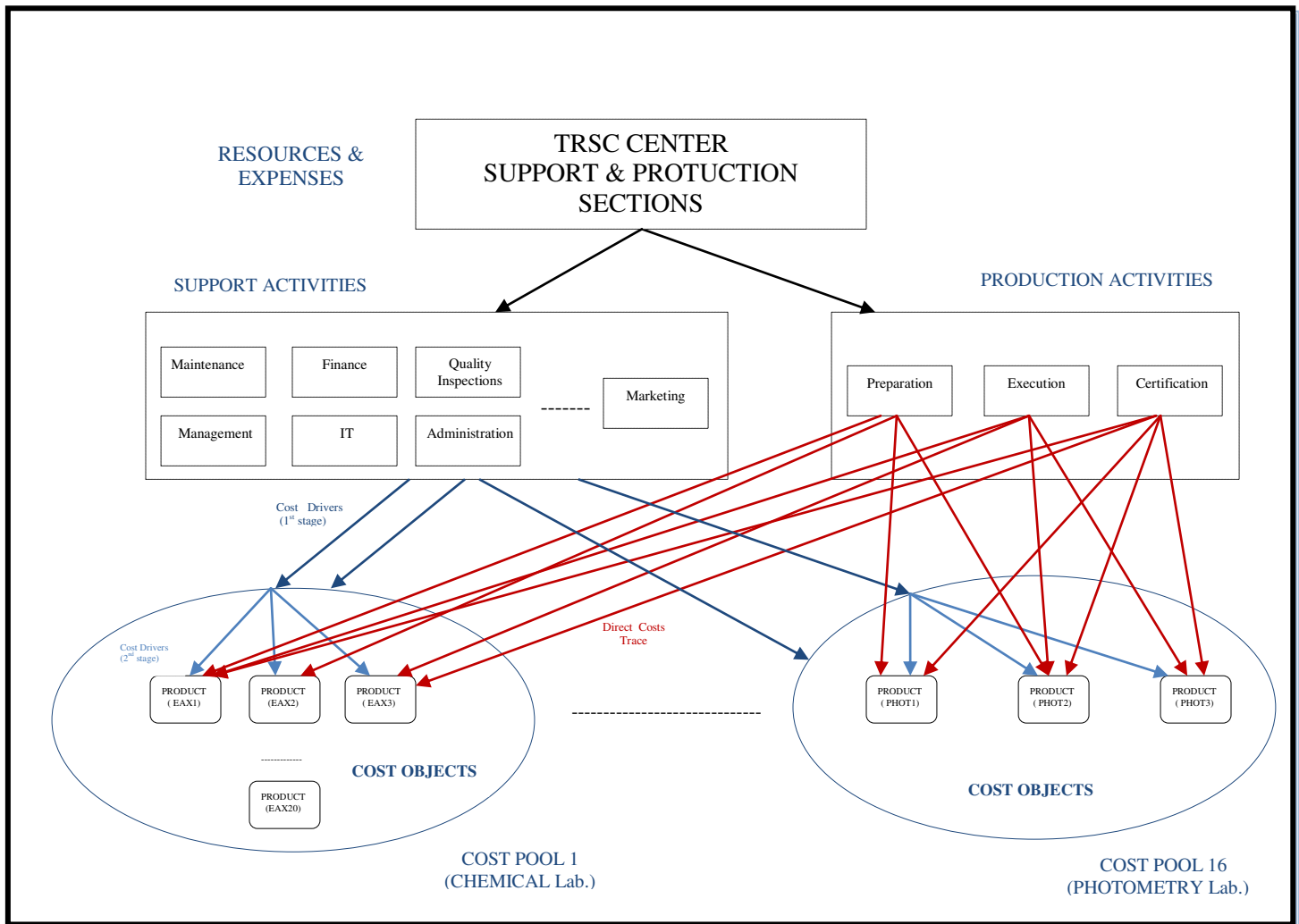


Figure 3.2 Chart of ABC Implementation in TRSC Center

The next attempt of the method is to give a satisfactory answer about to develop for ABC costing system an appropriate algorithmic and mathematical frame most applicable in Public Corporations.

The ABC system must initially assign resource costs to activities. The assignment of these activities can be done: by direct charging, using existing measurements (e.g. charging repairs via a work order), by estimation.

The selection of activity cost driver is tricky because it must be quantifiable and link each of the individual cost objects to the upstream activity or activities the cost object causes

to exist. Guidelines included for their evaluation and the choice of the correct one (Atrill and McLaney, 2002). The majors of them are: Avoid activity cost drivers for immaterial activity costs; Pick activity cost drivers that match the type of activity; Pick drivers that have a high correlation to the actual consumption rate of its activity; Minimize the number of unique activity cost drivers because there will be diminishing returns in accuracy; Find activity drivers that encourage performance improvements; Pick activity drivers that are economical to measure, and avoid activity drivers that require new methods of measurement.

4. ABC Analysis and Results

4.1 Introduction

The research is focused on the collection of elements from the economic section of the TRSC of the PPC, according to the current traditional cost accounting system and the results of usage that derive from it.

The second fact of the investigation was the introduction of the ABC cost accounting model in practice.

A sequence of procedures was described below in Table 4.1

No.	PROCEDURES
1	Analysis of the activities per section of TRSC Department
2	Determination of the appropriate cost drivers in order to achieve the measurement of the right costing data
3	Observation and measurement
4	Development of an algorithmic model for the calculation of the cost based on the data deriving from the application of the ABC method

Table 4.1 Costing Data at TRSC of PPC SA (General Ledger)

The difficulties in the introduction of the ABC model refer to the applicability of ABC installation in relation to the “intercoverage” of the activities, to the difficulty of personnel distribution per particular activity to measure the productivity, to the coverage in some situations of the responsibilities of sections in order to execute a project, to the

difficulty of the PPC Administration in obtaining the exact costing data of the TRSC Center due to the concentrated data collection and the increased bureaucracy and to the resistance of some employee to change the culture of their work in light of the new costing method.

4.2 Traditional Accounting System

The TRSC is one of PPC units. The costing system, which is used, is the traditional system (General Ledger). This system involves 8 cost categories, the data are separated into general categories, which are: Salary, Third Party Fees, Maintenance-Repairs & Subcontract Facilities ,Taxes & Town Taxes, Other Expenses, Materials & Supplies, Depreciations, Financial Expenses.

These categories' costs are analyzed in the following Table 4.2:

TRSC COST CATEGORY ANALYSIS				2015 (x 1000€)
1			Salary	
	1.1		Regular Staff	3,448.11
		1.1.1	Electrical Laboratories Section	504.87
		1.1.2	Chemical Laboratories Section	188.19
		1.1.3	Mechanical Laboratories Section	869.61
		1.1.4	Civil Laboratories Section	200.29
		1.1.5	Material Inspections Section	112.82
		1.1.6	Quality Assurance Section	77.46
		1.1.7	Planning & Financial Section	263.42
		1.1.8	Admin. & Technical Support Section	520.05
		1.1.9	Marketing & Customer Support Section	148.18
		1.1.10	Director's Office	117.75
		1.1.11	General TRSC	445.47
	1.2		Temporary Staff	67,20
	1.3		Ancillary Employee Benefits	20,72
	1.4		Daily Allowances Away	17,54
			Sub-total 1	3553,57
2			Third Party Fees	
	2.1		Training	45
	2.2		Consulting	40,8
	2.3		Contractor Fees	20,34

			Sub-total 2	106,14
3			Maintenance – Repairs & Subcontractor Facilities	
	3.1		Maintenance – Repairs	
		3.1.1	Equipment Maintenance/ Repair	51,52
		3.1.2	Building Maintenance	3,23
		3.1.3	Car Maintenance/ Repair	4,73
	3.2		Subcontractor Facilities	
		3.2.1	Electricity	9,31
		3.2.2	Telecommunications	7,89
		3.2.3	Water Supply	1,17
		3.2.4	Post Services	2,50
			Sub-total 3	80,35
4			Taxes & Town Taxes	
			Sub-total 4	28,36
5			Other Expenses	
	5.1		Spare Equipment other Devices	101,53
	5.2		Supplies	
		5.2.1	Toner for Printers, Fax	7,91
		5.2.2	Chemical Reagents	37,8
		5.2.3	Filters	3,3
		5.2.4	Books, Specs Standards	3
		5.2.5	Cleaning	15
	5.3		Other	6,1
			Sub-total 5	174,64
6			Materials	
	6.1		Paper	5,11
	6.2		Furniture	4,33
	6.3		Telephone Devices	0,51
	6.4		Printers, Fax,...	3,44
	6.5		Other	0,79
			Sub-total 6	14,18
7			Depreciations	
	7.1		Buildings	202
	7.2		Cars	23,50
	7.3		Laboratories Equipment	191,63
	7.4		PCs	15,62
	7.5		Other	4,37
			Sub-total 7	465,12
8			Financial Expenses	
			Sub-total 8	0
TOTAL EXPENSES				4.422,36

Table 4.2 Costing Data at TRSC of PPC SA (General Ledger)

The traditional accounting system was not adapted to calculate the costs of delivering a service to customers. Departments did not know how they contributed to the customer service. They just know which activity they worked, but not on which activity. Managers

and employees needed to understand the cost of delivering a service to a customer (Argyris and Kaplan, 1994).

1.3 Implementation of ABC at TRSC of PPC

This investigation focuses on the applicability of ABC in the TRSC Center. The objectives were to find the links between sections, activities and final product/ service (Test/ Calibration or External Controls/Inspections), to measure the efficiency of each activity and to compare the results between ABC and traditional costing method

A. Determination of TRSC's activities

The meaning of the word activity refers to one or a number of activities that happen in order to achieve a common purpose within the framework of the business. The selection of said activities is based on criteria such as their ability to fulfill the purpose and work of the corporation, their ability to offer a strategic advantage to the corporation, their necessity for provision of products or services to the customers, their volume and data availability for the allocation of their expenses, the existence of the best available practices and methods for their correct execution.

B. Determination of TRSC's cost drivers

In order to calculate the cost of activities, there is a collection of data depicting the allocation of work hours, to activities and the appropriate cost drivers (1st stage) are selected for the allocation of costs and resources used in them. The cost drivers of activities (2nd stage) are very important as they determine the allocation of indirect cost in products/ services (Items).

In TRSC case study the cost drivers which used are described in the Table 4.3.1

The Table below illustrates the mapping between Activities and 15 different Cost Drivers as described in two stages:

TRSC				
a.	Category	Activity	Cost Driver 1	Cost Driver 2
1	Supporting	Accounting Activities	Number of Invoices (per Cost Pool)	Number of Sales (per Item)
2	Supporting	Financial reports & Statistics	Number of Cost Pools	Number of Sales (per Item)
3	Supporting	Liquidation Away Movements	Number of Handlings (Financial Statements per Cost Pool)	Number of Sales (per Item)
4	Supporting	Costing	Number of Items	Number of Sales (per Item)
5	Supporting	External Audits (ESYD)	Audit Hours (per Cost Pool)	Number of Accredited Items
6	Supporting	Quality Management System's (QMS) Documentation	Number of Accredited Items	Number of Accredited Items
7	Supporting	Quality Control (Internal audits)	Number of Cost Pools	Number of Items
8	Supporting	Laboratory's Equipment Calibration	-	Number of Specific Items (direct)
9	Supporting	Management	Number of Cost Pools	Number of Sales (per Item)
10	Supporting	Human Resources (HR)	Number of Personnel	Number of Sales (per Item)
11	Supporting	Other Administrative Activities	Number of Cost Pools	-
12	Supporting	Maintenance and Cleaning of TRSC's facilities	m ² (per Cost Pool)	Number of Sales (per Item)
13	Supporting	Laboratories' Equipment Maintenance	-	Number of Specific Items (direct)
14	Supporting	Information Technology Services (IT)	Number of PCs (per Cost Pool)	Number of Sales (per Item)
15	Supporting	Marketing Activities	Value of Sales (per Cost Pool)	Value of Sales (per Item)
16	Supporting	Customer Care Services	Number of Sales (per Cost Pool)	Number of Sales (per Item)
17	Supporting	Purchasing	Number of Invoices (per Cost Pool)	Number of Sales (per Item)
18	Supporting	R & D activities	Number of Cost Pools	Number of Items
19	Production	External Equipment Inspections according ISO 17025	-	Hours (direct driver in Item)
20	Production	Inspections for approval Equipment & Materials	-	Hours (direct driver in Item)
21	Production	Preparation of Test/ Calibration	-	Hours (direct driver in Item)
22	Production	Execution of Test/ Calibration	-	Hours (direct driver in Item)
23	Production	Issuing of Test / Calibration Certification	-	Hours (direct driver in Item)
24	Production	External Testing Activities	Hours (direct driver in Item)	-

Table 4.3.1 Activities and Cost Drivers of ABC Model at TRSC of PPC

Note: where:

Item (I) = all types of Products or End Services (Test or Calibration or
Inspections or Audits);

Cost Pool (W) = Laboratory;

Accredited Item = accredited Product or End Service by the National
Accreditation System (ESYD);

Specific Item = Product or End Service using specific equipment.

C. Assignment of costs to activities

This happens with the development of the appropriate algorithm and the compulsory correspondence of every cost to an activity. The assignment can occur in one or more activities by using percentages. The department heads have a responsibility over the correspondences mentioned above. Their realization takes place with the use of special software. Each cost assignments, at will, to a Cost Pool or to one or more specific Items too. Therefore, each cost finds correspondence based on the following Table 4.3.2:

Assigning Expenditure on	Obligatory	Optionally (direct)
Activity	√	
Cost Pool (Laboratory)		√
Item (Product or End Service)		√

Table 4.3.2 Assignment of Expenditure

D. Assignment of activities costs to products/ services

At the TRSC Corporation there are similar products that are produced by differentiated productive departments, known as Laboratories (Cost Pools). In order for the costing on the final product/ service (Item) to be more accurate it is considered advisable for it to happen in 2 stages. The connection between activities by using costing objects (products or services) occurs by basically charging them with the cost of human hours and their charge with the selected costs (e.g. resources expenditure) that are necessary for the execution of each activity.

Wherever the Cost Drivers of the 2 stages coincide, the computer processing is the same, whether stage 1 is calculated first and stage 2 follows or whether there is an immediate estimation on a united stage. That is:

First, transfer of the cost per activity to Cost Pools (Cost Driver 1) and then transfer of the Cost Pools cost to Items (products/ services) (Cost Driver 2)

4.4 Development of ABC model - Cost calculations formulas

Step1: Collection of expenditures per Cost Category

Collecting resources and expenses from Table 4.2. Next, dividing cost data into direct allocation to products and allocation to activities

Step2: Determination of supporting and production activities and cost drivers

Their definition happens in a systematic way, so as to ensure that all the important activities and cost drivers of the company will be recorded. The ensuing result is depicted on Table 4.3.1

The number of cost drivers of activities (2nd stage) is particularly critical since, as mention above, these drivers define the allocation of indirect cost on products. If the aim of the ABC system is product costing, then the cost driver numbers can be smaller than if it is destined to be used for the improvement of cost and performance, In addition, the competitive environment in which a corporation comes into play affects the number of cost drivers.

Step3: Assignment of every TRSC employee's expenses in activities

The creation of the correspondence is based on Table 4.3.1. The TRSC employee's expenses in activities collected by the completion of a daily form, in MS – Excel format for easier collection and processing of its data.

Step4. Cost Calculation per Activity per Cost Pool

In this step, one estimates the cost $CW(w, a)$ of each activity in each Cost Pool (Laboratory), as it is graphical presented in Figure 3.2.

The CW also contains if exists the direct cost that is directly channeled to the Item (Product or End Service) as described in Step1.

$$CW(w, a) = f [\text{CostDriver1}(a), TC(a) - DCW(w, a) - DCI(w, a)] + DCW(w, a) + DCI(w, a) \quad (4.1)$$

where:

Item (I): all types of Products or End Services (Test or Calibration or Audits Or Inspections);

W: the Cost Pool (Laboratory);

w: 1 to number of Cost Pools (counter of Cost Pools);

a: 1 to number of Activities (counter of Activities);

CW: the Cost of Cost Pools of Items;

f: Function specific to Cost Driver (in this case Cost Driver 1 as defined in Table 4.3.1);

TC: Total Cost the sum Direct Cost plus Indirect Cost (TC= DC+IC);

DCI: Direct Cost of Item;

DCW: Direct Cost of Cost Pool;

DC: Direct Cost;

IC: Indirect Cost;

C: Cost

Note: The form of cost function f is described by the following equation:

$$f(\text{Cost Driver1}, C) = \text{—————} * C \quad (4.2)$$

where:

M(w): size with which the Cost Driver (w) depends each time (e.g. number of sales, number of m²...);

w: 1 to number of Cost Pools (counter of Cost Pools);

M_w: Cost Driver number which this particular w- Cost Pool is dependent with;

Max(w): maximum number of Cost Pools;

C: Cost in this case C= TC(a) - DCW(w , a) - DCI(w , a)

Step5. Cost calculation per Activity per Item

In this last step, there is an estimation of the CI(i, a) cost of each TRSC-based i- Item (that is each i-product/ service) that depended from each activity a. One observes that any direct cost to the Item (Product or End Service), as defined in Step1, is added directly to the function of the cost.

$$CI(i, a) = f[CostDriver2(a), C(W-DI)(Cost Pool of (i), a) - DCI(i, a)] + DCI(i) \quad (4.3)$$

where:

Item (I): all types of Products or End Services (Test or Calibration or Audits or Inspections);

W: the Cost Pool (Laboratory);

i = 1 to number of Items (counter of Items);

a = 1 to number of Activities (counter of Activities);

CI: Cost of Item;

f: Function specific to Cost Driver (in this case Cost Driver 2 as defined in Table 4.3.1);

C(W-DI): Cost of Cost Pools of Items (without direct cost of Items);

Cost Pool of (i): the Cost Pool which includes the i- Item;

DCI: Direct Cost of Item;

C: Cost

Note:

The form of the cost function f is described by the following equation:

$$f(Cost Driver2, C) = \frac{Cost Driver2}{Max(i)} * C \quad (4.4)$$

where:

M: the size which each Cost Driver is dependent with each time:

(e.g. number of sales, number of accredited items...);

i: 1 to number of Items (counter of items);

Mi: the Cost Driver number which the specific i-Item is dependent with;

Max (i): the maximum number of Items;

C: the Cost in this case C= C(W-DI) (Cost Pool of (i), a) - DCI(i, a)

4.5 Compare Traditional costing data and ABC costing data

The implementation of ABC costing in the TRSC happened in 2015. At the same time, the function of Traditional costing was still going on so, it is possible to compare the results that the two methods produced. However, the most important result achieved was

that, with the ABC method, there was a participation of the entire TRSC staff and an improvement of the Center's business culture, since everybody know the cost of the processes they perform and the cost of the products they produce.

The method and the calculations of the cost followed by the Traditional costing system at TRSC are first, the allocation of the Supportive Sections' payroll, which corresponds to about 30% of the total TRSC payroll, as well as the distribution of the Center's overheads, which corresponds to approximately 20% (that is outside the payroll and the material expenditure during the production of Items) happens in the Productive Sections, based on each Section's number of employees and, from then on, it is allocated to products and end services based on the Sales number for each of them. And second, the production times as well as the consumed resources that concern the production activities (Preparation of Test/ Calibration, Execution of Test/ Calibration, Issuing of Test/ Calibration Certification), when it comes to the creation of Item (product/ service), were invariable and fixed in accordance to the initial specifications of each productive process.

By implementing the ABC cost accounting model that this research proposes there was a more accurate allocation of the total payroll cost and the overheads of the TRSC with the use of cost drivers, as they are imprinted on Table 4.3.1, and with the daily MS Excel form which recording of times and resources each employee consumes per activity. In addition, with the ABC method, the TRSC acquired the important ability to not only cost its products/ services more precisely but also cost, for the first time, the total amount of its supportive and productive activities.

As presented, the TRSC has 9 Sections 5 out of which are Productive (the rest are Supportive) and include 16 Laboratories (Cost Pools according to ABC algorithmic) with 563 Products or End Services (Items according to ABC algorithmic) produced in total and with the final allocation of TRSC cost occurring on said Products or End Services.

At this point, due to the PPC SA policy and since the aim of this paper is to shows the differences in costing between the two methods it has been decided on to provide data from 2 Laboratories: that of the Chemistry Section and that of the Civil Section (see Table 4.5.1).

It must also be stressed that in order to produce each separate i- Product or End Service all 3 productive activities mentioned before are required (Preparation – Execution – Certification). Finally, since we are referring to a Public Corporation, the payroll should be regarded as a fixed cost and it is TRSC's aim to increase the number of Sales of Products/ Services in order to lower the corresponding cost of produced product.

CIVIL LABORATORIES SECTION				
CODE OF PRODUCT (ITEM)	SALES (\$)	TRADITIONAL	ABC	DEVIATION TRADITIONAL vs. ABC
EEA-01	572	185,04	149,50	-23,77%
EEA-02	139	46,26	40,13	-15,28%
EEA-03	123	185,04	175,50	-5,44%
EEA-04	103	231,30	233,63	1,00%
EEA-05	107	92,53	96,25	3,86%
EEA-06	94	154,35	160,56	3,87%
EEA-07	107	185,05	190,50	2,86%
EEA-08	107	92,52	94,25	1,84%
EEA-09	12	832,70	1174,26	29,09%
EΣK-01	70	309,94	334,51	7,35%
EΣK-02	12	309,94	384,51	19,39%
EΣK-03	18	309,94	346,51	10,55%
EΣK-04	12	206,62	239,34	13,67%
EΣK-05	14	516,56	670,84	23,00%
EΣK-06	12	206,62	250,34	17,46%
EΣK-07	14	516,56	690,84	25,23%
EΣK-10	18	516,56	674,84	23,45%
EΣK-11	12	309,94	384,51	19,39%
EΣK-13	3	86,09	138,41	37,83%
EΣK-14	3	361,59	533,59	32,23%
EΣK-15	12	206,62	276,34	25,23%
EΣK-16	12	206,62	282,34	26,82%
EΣK-17	12	206,62	476,42	56,63%
EΣK-18	3	34,44	89,39	61,47%
EΣK-19	18	103,31	148,17	30,28%
EΣK-29	107	206,62	192,34	-7,42%
EΣK-30	315	17,22	14,69	-17,22%
EΣK-31	108	34,44	30,39	-13,33%
EΣK-32	114	34,44	29,36	-17,30%
EΣK-33	288	34,44	28,51	-20,80%
EΣK-34	156	34,44	30,39	-13,33%
EΣK-35	240	51,66	43,08	-19,92%
EΣK-36	486	103,31	88,17	-17,17%
EΣK-37	49	154,99	167,28	7,35%
EΣK-38	42	51,66	56,08	7,88%
EΣK-39	8	159,93	214,21	25,34%
EΣK-40	8	103,61	138,47	25,18%
EΣK-41	4	206,67	296,36	30,26%
EΣK-42	4	34,44	49,39	30,27%
EΣK-43	2	413,60	703,03	41,17%
EΣK-45	8	51,66	79,08	34,67%
EΣK-46	25	206,62	246,34	16,12%

CHEMICAL LABORATORIES SECTION				
CODE OF PRODUCT	SALES (S)	TRADITIONAL	ABC	DEVIATION TRADITIONAL vs. ABC
EAX-01	354	127,96	101,88	-25,60%
EAX-02	22	238,45	230,11	-3,62%
EAX-06	22	109,68	105,58	-3,88%
EAX-07	813	182,81	142,64	-28,16%
EAX-08	55	255,93	227,70	-12,40%
EAX-09	13	293,29	284,73	-3,01%
EAX-10	201	511,86	425,39	-20,33%
EAX-12	143	548,42	497,92	-10,14%
EAX-13	18	147,04	140,92	-4,34%
EAX-14	88	183,61	173,45	-5,86%
EAX-15	44	146,24	139,11	-5,13%
EAX-16	19	182,81	176,64	-3,49%
EAX-17	74	201,89	179,71	-12,34%
EAX-18	162	804,34	685,62	-17,32%
EKA-01	156	31,39	26,89	-16,73%
EKA-02	127	41,85	37,10	-12,80%
EKA-03	885	31,39	23,87	-31,50%
EKA-04	213	52,63	43,66	-20,55%
EKA-05	595	52,31	41,25	-26,81%
EKA-06	285	52,31	42,95	-21,79%
EKA-07	171	87,88	74,72	-17,61%
EKA-08	273	52,31	43,35	-20,67%
EKA-09	267	58,59	48,60	-20,56%
EKA-10	324	31,39	25,07	-25,21%
EKA-11	159	31,39	26,87	-16,82%
EKA-12	263	35,48	29,25	-21,30%
EKA-12A	226	35,48	29,35	-20,89%
EKA-12B	54	35,48	33,55	-5,75%
EKA-13	3	41,85	41,13	-1,75%
EKA-14	129	20,92	18,54	-12,84%
EKA-15	38	31,99	30,51	-4,85%
EKA-16	45	39,39	37,39	-5,35%
EKA-17	93	95,14	89,03	-6,86%
EKA-18	101	52,31	48,35	-8,19%
EKA-19	96	62,77	58,66	-7,01%
EKA-20	112	104,62	95,82	-9,18%

Table 4.5.1 Compare of Traditional and ABC Results

The first column of Table 4.5.1 has the code of each Product/ Service (Item) as they are registered in the SAP system of PPC.

The ensuing conclusions show important deviations in the cost prices provided by the two costing methods in both Sections. In particular, in the Civil Engineering Laboratories Section, in contrast to the ABC method, the traditional costing method significantly undervalues 33 out of the 42 produced Items at a percentage between 10% and 41%. This is due to two main reasons:

The first reason is the inaccurate allocation of general payroll and TRSC overheads of the TRSC to the products/ end services of the Section, since it occurs, as already mentioned before, on the basis of the number of employees and it “favors” Sections with few employees such Civil Laboratories that employ 7 employees in comparison to e.g. Chemical Section that has 15. The fact that a Section has fewer people does not necessarily mean that it costs less or that it uses supportive functions and overheads in a smaller percentage, in comparison to other Sections with more employees. First, based on the examined case study, if one draws data from Table 4.2, one observes that the payroll of the Civil Laboratories Section is 12,000 Euros more expensive than that of the Chemical Laboratories Sections and this happens because the Chemical Section has younger employees who are paid less. Furthermore, with regard to the use of TRSC’s supportive functions, the Civil Section has 18 accredited products/ end services whereas the Chemical Section has 12. Consequently, the supportive services the Civil Section receives from the Quality Assurance Section are of a -approximately 1.5 times- bigger cost. The number of square meters (m^2) that the Civil Section’s facilities occupy is roughly twice that of the Chemical Section so, it has a much bigger share in the payment costs. Last, the cost of the technological equipment it keeps, along with its necessary maintenance, is higher than Chemical Section’s corresponding cost.

Based on the previous lines, the basic admission of the traditional costing method concerning the allocation of the general payroll expenses and overheads that is based on the staff of each Section is refuted.

The second reason behind the undervaluing of the Civil Laboratories Section’s products, as provided by the Traditional method (in comparison to the ABC one) is that the production of the Items it takes into consideration is roughly 7% less than the actual time required.

Finally, from the Table 4.5.1, in the case of the 9 Items of the Civil Laboratories Section that were achieved bigger sales ABC worked better in the depreciation of cost and, compared to the Traditional method, the cost results it gave were lower by 5.5% to 23.8%. It is, therefore, obvious that in this case also the Traditional method provided seriously inaccurate results.

Unlike the Civil Laboratories Section and compare to ABC, the traditional costing method overvalued the entirety of the provided Items of the Chemical Laboratories Section. The overvaluing provided by the traditional costing method is caused by the same exact afore-mentioned reasons, only this time they are reversed.

For example, due to its double staff, the Chemical Laboratories, with the use of the traditional costing, paid twice as much in general expenses and overheads, in comparison to the Civil Laboratories Section and, in general, paid more than other Laboratories Sections too since it is the second largest section in terms of manpower after the Mechanical Laboratories Section (with 23 employees and an ABC-based results picture that is completely proportional to that of the Chemical Section).

So, as proven after the implementation of ABC, the use of the Traditional method caused its overall product cost to rise significantly more than the actual percentage (from 12 to 31.50%, in 20 out of the 36 Items no less).

According to the previous lines, the Traditional costing method's approach proved to be sketchy and its costing results inaccurate as opposed to the more detailed approach and with actual results which the ABC costing method provides. What is more, through the two examined cases, one noticed the important role played by the rise in sales in the cost compression. In the case of larger scale sales, the ABC worked better than the Traditional method since it imprinted the actual cost of Items better and this fluctuation of the deviation is clearly presented in the last column of Table 4.5.1.

Last, as presented in the previous paragraph, with the ABC implementation and the help of the algorithmic model and of the program installed it also It also became possible in connection with the traditional costing systems the calculation of the cost of all the TRSC's activities (production and supporting) giving the following results:

TRSC ACTIVITIES COST			
a.	Category	Activity	Cost (x 1000€)
1	Supporting	Accounting Activities	111,87
2	Supporting	Financial reports & Statistics	59,18
3	Supporting	Liquidation Away Movements	24,83
4	Supporting	Costing	34,82
5	Supporting	External Audits (ESYD)	39,31
6	Supporting	Quality Mgmt System's (QMS) Documentation	34,65
7	Supporting	Quality Control (Internal audits)	31,22
8	Supporting	Laboratory's Equipment Calibration	27,21
9	Supporting	Management	193,52
10	Supporting	Human Resources (HR)	291,13
11	Supporting	Other Administrative Activities	227,04
12	Supporting	Maintenance and Cleaning of TRSC's facilities	202,44
13	Supporting	Laboratories' Equipment Maintenance	95,32
14	Supporting	Information Technology Services (IT)	92,42
15	Supporting	Marketing Activities	82,38
16	Supporting	Customer Care Services	91,11
17	Supporting	Purchasing	93,50
18	Supporting	R & D activities	111,23
19	Production	Ext. Equipment Inspections according ISO 17025	152,34
20	Production	Inspections for approval Equipment & Materials	182,34
21	Production	Preparation of Test/ Calibration	294,28
22	Production	Execution of Test/ Calibration	1454,1
23	Production	Issuing of Test / Calibration Certification	263,69
24	Production	External Testing Activities	232,43
Total Cost			4422,36

Table 4.5.2 Activities Costs by ABC

4.6 The findings

The ABC method expands the traditional cost accounting systems by connecting the expenses for the requisite resources with the variety and the complexity of the products and not with the total volume of production.

In the ABC costing method the allocation of cost is realized in two stages. The expenses made are initially attributed to the activities. Next, each activity is analyzed in order to determine its relation to the final product/ service (Item). Finally, the costs of the product ensue, based on these activities.

The experience acquired at the TRSC from the implementation of ABC betrayed a difficulty in applying it due to the engagement of the Center's personnel with many activities. It was, therefore, difficult to define the hours they spent working on each activity, particularly when this time is not the same for the products or services that are provided each time. For a service-providing corporation, such as TRSC the correct

measurement of the human personnel's work hours is of pivotal importance since it comprises about 80% of its overall cost of function. The implementation of an average number of work hours in each activity, an idea use by the Traditional accounting system, does not constitute the accurate method needed to approach the existing cost with. After a persistent and grueling interaction with TRSC' executives, this problem was dealt with the help of the ABC method by implementing a procedure of daily recording of the work hours per activity and, when possible, per product and service. Furthermore, by implementing this procedure, it was possible to clearly define the kind and quantity of the materials consumed during the execution of the activities needed for the production of products and services. In this way it is additionally achieved better monitoring of reserves to be hold.

As it is obvious, by accurately defining the cost of the products/ services it is possible to reach conclusions about the costing policy the TRSC must follow in order to face the challenges of the business environment that is shaped differently each time. By knowing, with the help of the ABC method, the real cost of end products/ services and by applying not only management decisions, that are somewhat limited by its public nature, but also an appropriate policy about invoices, which will follow the conditions of the market, the TRSC can calculate with accuracy the actual number of sales that must be achieved in order to cover all its costs (break-event point) and which Profit Center must be built on.

Another finding is that, unlike the traditional accounting system, the methodological framework of the implementation of ABC offers the opportunity to calculate additionally the cost of supportive activities of the corporation. The ABC system agrees that the supportive activities of a corporation must be subject to improvement just like the productive ones are and that the achievement of cost reduction is closely linked to the correct allocation of the overheads (Watson, 1994). In all other cases, the expenses are allotted based on more arbitrary indicators or they remain unallocated.

By concentrating the cost on activities and by allocating them correctly to the produced products/ services, it is possible to evaluate them based on the percentage of the overall

cost that is attributed to them and to locate any non-value activities, products/ services (Tsai, 1998).

5. Conclusions

The conclusions of this research are summarized below:

The costing method per activity is closely associated with the strategic management. It allocates the cost to the products/services proportionally to the recourses consumed. It depicts that the activities use the resources and that the products/services are the reasons for the activities' existence. The cost management with ABC is of strategic importance for a company in order to accomplish a competitive advantage as with this method the main activities, the reasons of cost and the ways for the amelioration of the procedures for the cost reduction are detected.

The introduction of an organization to a lean thinking through the implementation of a tool such as the ABC is a rather difficult matter, as the employees have to understand and support it. It is for sure that will change the flow and the culture of their work, which is why particular attention and support is required from the top management of the organization itself. In spite of these limitations the benefits to be derived from implementing an ABC system far outweigh the costs. The key profits are related to heightened awareness of activities, the costs they create, and improved decision making. ABC also provides a strong link between organization's operational performance and actual financial performance; can unveil how an organization's activities align with its strategic goals and objectives; enhances financial management; provides better cost control and cost management; provide better comprehension of cost reduction opportunities; improves managerial decision making; and provides more accurate information (Oseifuah, 2014).

The biggest profit that occurs from the implementation of the ABC is that a cumbersome public corporation starts thinking and acting as a lean organization as are supported the exact determination of the cost and afterwards the value for the citizen (customer) of a

product/service; the introduction of the meaning of activity; the mapping of all the value added and non-value added activities in order to produce a product/ service; the creation of a process flow of activities from the initial to the final stage of production of a product/service; the principal that demand, that means the customer, defines which products/services will be produced; to manage its activities through a process of continuous improvement. This involves a constant search for improvement opportunities. This, in turn, means a careful and methodical study of all activities with appropriate feedback.

Finally, by the application of the ABC cost accounting model to an industrial environment such as the TRSC of Greek Public Power Corporation was clearly determine the superiority of the ABC model to the traditional cost accounting system. It is a powerful technique that can be used to determine the productivity of an activity or a company as whole and extended to analyze this in the options of efficiency and effectiveness (Namazi, 2009).

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