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Using ABC costing method within a KPI- based framework to a Lean transformation of a Greek Public Company

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Abstract

This research paper deals with the investigation, whether from the results of the implementation of the ABC costing method to a public company, a suitable KPI framework can be created so that it functions as a useful tool which will contribute to the company's transition to a lean function.

The subject of accurate measurement cost for the transition of a traditional Public Company to a lean Company has received little attention within management costing, since little empirical research has been performed on this subject. It seems that the reluctance to change an entrenched traditional costing system is fed by a lack of empirical evidence of the value the change may bring (Fullerton and Kennedy 2009).

The aim of the study is thus to contribute to the overall knowledge on Lean thinking.

1. Introduction

1.1 Definition and description of KPIs

The 'Key Performance Indicators' (hereafter KPIs) are tools for the measurement of performance of specific people and activities within a company or an organization or even the organization in total in relation with the accomplishment of quantitative, strategic and operational targets that have been set.

They are mainly used for the evaluation of the performance of individual sectors. Through this evaluation a faster, deeper, and more complete comprehension of the basic operational functions as well as the amplification of the control performed by the members can be also achieved.

They are also often mentioned as “Key Success Indicators” (KSIs). Mainly operational success is interpreted as the progress of a company based on set strategic financial objectives. However, frequently success also includes the sense of the degree of fulfillment, on a periodical basis, of the rest of the objectives that are parallel with the financial ones and strongly related with the operational culture, such as the degree of satisfaction of clients and of the employed staff.

Though in order to evaluate the productivity (success) of a company based on the accomplishment of operational objectives, it is understandable that the precedent link in the process chain is setting goals. Different goal strategies of each company, the right comprehension of the goal’s importance, but also the readjustment of the strategy as the accomplishment of the goal becomes more feasible, play a vital role in the determination of the Key Success Indicators, which each company chooses to implement. A crucial factor in the equation of the determination process and the selection of the appropriate Indicator is its measurability, because at it was also mentioned in previous chapters anything impossible to be measured it’s impossible to be evaluated. On the other hand we have to bear in mind that many measurable data, are not pivotal for a company’s success.

1.2 Process of determination and selection of KPIs

Hierarchically the development steps of a KPI are described in the following Table 1.2:

STEPS	PROCEDURES
1	Determination of predefined process (business process) for the performance of a basic operational function;
2	Explicit goal setting as a result of the previously mentioned process;
3	Reliable quantitative and qualitative measurements of the results, as well as their comparison with the predefined goals
4	Examination of possible divergence from the goals and conduction of the necessary alterations in the execution of the process, for the goals to be achieved

Table 1.2 Development Steps of a KPI

One of the problems closely related with several KPIs regards the tendency to include complex and wide information, so a considerable time of training is demanded for their evaluation.

Many companies of the same field look similar, but in reality they can be entirely different, consequently they have to develop KPIs that will have the desired results by taking into consideration their individuality. (Pantazi, 2014)

The objective must be the development of specific and limited in number indicators, which on a periodical base will give to the executives the primary control of the functions they wish to evaluate. After that the discussion and the constructive inquiries will be centered to the reduction of the problems or the reinforcement of the successful actions.

The correct and efficient utilization of the KPIs entails the notification of the measurements and of their results to the superior and inferior in hierarchy executive teams they concern. The substantial divergences from the goals must awaken constructive puzzling but also improvement motives. Additionally, any excess of the objectives in combination with rewarding can strengthen the moral of the employees, as they will know that the compass of setting goals and of success, points to the right direction (Pantazi, 2014).

A KPI in order to be 'key' for the success of a company must meet specific criteria such as to have a specific objective for the company and to be simple, to be measurable, to be achievable, to be relevant with the company's success also to be time phased and its measurements and results must refer to a defined time period, which must be matching with the period the objectives have been predefined.

1.3 Research Questions

This paper attempts to answer to the research question concerning the ability to create a framework of KPIs that is based on the results of the implementation of the ABC costing method and to function as a useful lean tool supporting the attempt of transforming a transitional public company to a lean public company.

Specifically, it investigates the question whether in these indicators can be included indicators that concern the cost of the activities, the productivity and the responsiveness, as these originate after implementing the ABC costing system to a public company.

2. Methodology

2.1 Introduction

The approach taken is a case study based on the results of ABC costing system at the Testing Research Standards Center (TRSC) of Greek Public Power Corporation S.A (PPC).

In this way, research developed a framework focus on a few KPIs in relation to the measurement of the cost, the productivity and the responsiveness in order to provide the management with the appropriate feedback and support concerning the Lean transition of PPC Company.

2.2 Case Study at TRSC of PPC S.A

The Public Power Corporation S.A. (PPC) of Greece was established in 1950 and is the largest electric power producer and supplier in Greece. PPC owns and operates lignite mines and has an installed power capacity of 12,500 MW throughout Greece (including steam electric plants using lignite, natural gas and diesel as fuel, hydroelectric power plants, wind parks, photovoltaic parks and other clean energy production methods like biomass, geothermal energy etc), with almost 11,000 employees, 7.5 million connections (which correspond to more than 10 million customers) and an annual turnover of almost 6 billion Euro and estimated total assets of 17 billion € (PPC, 2015).

The Testing Research and Standards Centre (TRSC) is a Department of the Public Power Corporation S.A. (PPC) of Greece. TRSC houses the central laboratories and research centre of PPC. The main laboratories of TRSC include the concrete lab, soil mechanics lab, high power lab, high voltage and dielectric testing lab, electrical tests and measurements lab, metrology lab, analytic chemistry lab, fuels lubricants lab, laboratory of environmental chemistry and special materials, metallography lab, applied physics lab, Nondestructive evaluation (NDE) tests lab, the laboratory of mechanical testing, and temperature raise lab.

The costing system, which is used for many years, 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 2.2.1:

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 2.2.1 Costing Data at TRSC of PPC SA (General Ledger)

By implementing the ABC cost accounting model that this research uses there was a more accurate allocation of the total payroll cost and the overheads of the TRSC with the use of two stages cost drivers, as they are imprinted and with the daily recording of times and resources each employee consumes per activity (Angelopoulos and Pollalis, 2017). 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 (Angelopoulos and Pollalis, 2017).

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

The below table provides data of Products/ End Services (Items) from Chemistry Laboratories Section and Civil Laboratories Section (Angelopoulos and Pollalis, 2017).

CIVIL LABORATORIES SECTION					CHEMICAL LABORATORIES SECTION				
CODE OF PRODUCT(ITEM)	SALES (S)		ABC		CODE OF PRODUCT(ITEM)	SALES (S)		ABC	
EEΔ-01	572		149,50		EAX-01	354		101,88	
EEΔ-02	139		40,13		EAX-02	22		230,11	
EEΔ-03	123		175,50		EAX-06	22		105,58	
EEΔ-04	103		233,63		EAX-07	813		142,64	
EEΔ-05	107		96,25		EAX-08	55		227,70	
EEΔ-06	94		160,56		EAX-09	13		284,73	
EEΔ-07	107		190,50		EAX-10	201		425,39	
EEΔ-08	107		94,25		EAX-12	143		497,92	
EEΔ-09	12		1174,26		EAX-13	18		140,92	
EΣK-01	70		334,51		EAX-14	88		173,45	
EΣK-02	12		384,51		EAX-15	44		139,11	
EΣK-03	18		346,51		EAX-16	19		176,64	
EΣK-04	12		239,34		EAX-17	74		179,71	
EΣK-05	14		670,84		EAX-18	162		685,62	
EΣK-06	12		250,34		EKΛ-01	156		26,89	
EΣK-07	14		690,84		EKΛ-02	127		37,10	
EΣK-10	18		674,84		EKΛ-03	885		23,87	
EΣK-11	12		384,51		EKΛ-04	213		43,66	
EΣK-13	3		138,41		EKΛ-05	595		41,25	
EΣK-14	3		533,59		EKΛ-06	285		42,95	
EΣK-15	12		276,34		EKΛ-07	171		74,72	
EΣK-16	12		282,34		EKΛ-08	273		43,35	
EΣK-17	12		476,42		EKΛ-09	267		48,60	
EΣK-18	3		89,39		EKΛ-10	324		25,07	
EΣK-19	18		148,17		EKΛ-11	159		26,87	
EΣK-29	107		192,34		EKΛ-12	263		29,25	
EΣK-30	315		14,69		EKΛ-12 ^A	226		29,35	
EΣK-31	108		30,39		EKΛ-12B	54		33,55	
EΣK-32	114		29,36		EKΛ-13	3		41,13	
EΣK-33	288		28,51		EKΛ-14	129		18,54	
EΣK-34	156		30,39		EKΛ-15	38		30,51	
EΣK-35	240		43,08		EKΛ-16	45		37,39	
EΣK-36	486		88,17		EKΛ-17	93		89,03	
EΣK-37	49		167,28		EKΛ-18	101		48,35	
EΣK-38	42		56,08		EKΛ-19	96		58,66	
EΣK-39	8		214,21		EKΛ-20	112		95,82	
EΣK-40	8		138,47						
EΣK-41	4		296,36						
EΣK-42	4		49,39						
EΣK-43	2		703,03						
EΣK-45	8		79,08						
EΣK-46	25		246,34						

Table 2.2.2 Sales and ABC Results per Product

It must also be stressed that in order to produce each separate Product or End Service (Item), three (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 (Items) in order to lower the corresponding cost of produced product. With the ABC implementation (Angelopoulos and Pollalis, 2017) it also became possible, in relation with the traditional costing systems, the evaluation of the cost of all the TRSC's activities (production and supporting) giving the following results of the Table 2.2.3:

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 Management 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	External 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 2.2.3 Activities Costs by ABC

3. The ABC in developing a KPIs framework

In order the KPIs to be effective they must deduce their data from the financial registers of the organization. They must be brief and inclusive and not sacrifice the attachment to the true benefits from the evaluation to the altar of excessive information, which would have as a result the consumption of valuable time. It becomes comprehensible that the costing method of the activities of an organization can be of prime importance in the measurement of its performance and of its management. (Pantazi, 2014)

Within this research a KPIs framework is developed which links the consequences of the implementation of ABC to TRSC. This becomes feasible with appropriate KPIs that measure the Center's performance per activity and per laboratory.

This KPIs framework for the Centre's management constitutes a lean management tool which combined with the results of ABC costing system. The construction of this framework is analyzed in the following Table 3.1 (Cokins, 1996):

STEPS	PROCEDURES
1	Identify core business processes by creating enterprise wide diagrams (relationship maps)
2	Develop a SWOT analysis of company
3	Identify the activities central to the core business processes
4	Organize to collect the resource cost consumption data for activities
5	Add new activities as needed to capture 100 percent of the resource time being consumed
6	Measure or estimate labour costs
7	Measure or estimate purchased material and service costs
8	Trace activity costs to intermediate and to final cost objects
9	Reconfigure the cost data and visualize the business processes
10	Select the appropriate KPIs to represent the activities and aspects of the organization
11	Analyze costs for insights and take actions

Table 3.1 Construction Steps of a KPI Framework

As we can notice the last two steps of the KPIs framework constitute the base of the effort done for the detection of suitable strategies that can lead the company to long term success. It gives to the management the opportunity to give emphasis on those company's activities that greatly influence the augmentation of its total value and that can be controlled more easily. For this to be accomplished attention must be focused on the choice of the appropriate KPIs and on the performance's increase of the suitable cost

drivers that are associated with the corresponding activities of the company (Rappaport, 1998).

This paper, thus, create a table based on the ABC method with n_i lines and n_j columns, where each line will include a main cost category, C_i ($i = 1,2,3,4,5,\dots,n_i$) for each and every activity A_j ($j = 1,2,3,4,5,\dots,n_j$) as these are presented in the table's columns. The activities have to be exactly as many as it's necessary for a company to function effectively.

Applying the above mentioned design on the case study of TRSC of PPC, there are 8 main cost categories C_i ($i = 1,2,\dots,8$) and 24 activities A_j ($j = 1,2,3,4,5,\dots,24$). Specifically we have categories of costs C_1 : Salary, C_2 : Third Party Benefits C_3 : Maintenance, C_4 : Taxes, C_5 : Other Expenses, C_6 : Depreciations, C_7 : Materials & Supplies, C_8 : Financial Expenses and activities e.g. A_1 = Accounting Activities, A_2 = Financial Reports & Statistics, A_3 = Liquidation Away Moves, A_4 = Costing, A_5 = External Audits (ESYD) etc.

Therefore the Table 3.2 will be formed as follows:

Activities $j=1,2,\dots,n_j$	A_1	A_2	A_3	A_4	$A_5\dots$	A_{n_j}	Total Cost
Total Cost $i=1,2,\dots,8$							
C_1 : Salary	C_{11}	C_{12}	C_{13}	C_{14}	C_{15}	C_{1n_j}	$\sum C_{1j}$
C_2 : Third Party Benefits	C_{21}	C_{22}	C_{23}	C_{24}	C_{25}	C_{2n_j}	$\sum C_{2j}$
C_3 : Maintenance	C_{31}	C_{32}	C_{33}	C_{34}	C_{35}	C_{3n_j}	$\sum C_{3j}$
C_4 : Taxes	C_{41}	C_{42}	C_{43}	C_{44}	C_{45}	C_{4n_j}	$\sum C_{4j}$
C_5 : Other Expenses	C_{51}	C_{52}	C_{53}	C_{54}	C_{55}	C_{5n_j}	$\sum C_{5j}$
C_6 : Depreciations	C_{61}	C_{62}	C_{63}	C_{64}	C_{65}	C_{6n_j}	$\sum C_{6j}$
C_7 : Materials & Supplies	C_{71}	C_{72}	C_{73}	C_{74}	C_{75}	C_{7n_j}	$\sum C_{7j}$
C_8 : Financial Expenses	C_{81}	C_{82}	C_{83}	C_{84}	C_{85}	C_{8n_j}	$\sum C_{8j}$
Total Cost	$\sum C_{i1}$	$\sum C_{i2}$	$\sum C_{i3}$	$\sum C_{i4}$	$\sum C_{i5}$	$\sum C_{in_j}$	$\sum C_{ij}$

Table 3.2 Cost Analysis and Activities

It is evident that with the above table according to the ABC analysis the total cost of each product is divided into separate activities (production and support activities). The costs

are allocated to the corresponding activities which are performed. The salary costs, for example, can be allocated to each activity performed. An important KPI is formed that defines the expenditure intensity that each activity causes on laboratory and company level (NDC, 2015). This expenditure intensity can be analyzed per cost category of the activity and we can have the effect of each cost category to the total activity expenditure.

According to what mentioned above we develop the following KPIs applied to the currently examined case study:

1. For Intensity Expenditure of j-Activity (j=1,2,3,...,24) to Total Expenditures of Company (IEA_{ijTEC}) for example for 1- Activity of Table 2.2.3:

$$IEA_{i1TEC} = \frac{1}{8} \quad \text{where } i=1,2,\dots,8 \text{ and } j=1 \text{ for every } j \quad (3.1)$$

So, from Tables 2.2.1, 2.2.3 and 3.2, the effect of the Accounting Activities to Total Cost for the year 2015 of TRSC is:

$$IEA_{i1TEC} = \frac{1}{8} = 0,125 \quad \text{or}$$

Accounting Activities holds 2.5% of total cost of TRSC.

2. For Intensity Expenditure of j-Activity's i- Cost Category to Total Expenditures of j-Activity (j=1,2,3,...,24) (IEACC_{ijTEA}) for example for 1- Activity of Table 2.2.3:

$$IEACC_{i1TEA} = \frac{1}{8} \quad \text{where } i=1,2,\dots,8, \text{ and } j=1 \quad (3.2)$$

So, from Tables 2.2.3 and 3.2 the effect of paying wages to the total cost of the Accounting Activities (1- Activity) for the year 2015 is:

$$IEACC_{i1TEA} = \frac{1}{8} = 0,125$$

or paying wages holds 29,7% of Total Expenditures of Accounting Activities of TRSC.

In this way, it is possible for a company to be better informed with reference to the changes of the Total Cost of Company in a time period t (e.g. a month) if it keeps up with the rest of the changes of Total Cost Category of each Individual Activity (as depicted in the last column of Table 3.3)

For instance, if the salary cost on an annual base, 0, was $C_{1j(0)}$ and the next year was $C_{1j(t)}$, then we would have the following changes in each individual activity

Cost \ Activities j=1,2,...,nj	A ₁	A ₂	A ₃	A ₄	A _{5...}	A _{nj}	Whole of Company
C ₁ : Salary on time t=0	C _{1.1.(0)}	C _{1.2.(0)}	C _{1.3.(0)}	C _{1.4.(0)}	C _{1.5.(0)}	C _{1.nj.(0)}	$\sum C_{1.j.(0)}$
C ₁ : Salary on time t	C _{1.1.(t)}	C _{1.2.(t)}	C _{1.3.(t)}	C _{1.4.(t)}	C _{1.5.(t)}	C _{1.nj.(t)}	$\sum C_{1.j.(t)}$

Table 3.3 Category Cost Analysis and Activities by Time

In detail:

$$dC_{1.1.(0,t)} = C_{1.1.(0)} / C_{1.1.(t)}$$

$$dC_{1.2.(0,t)} = C_{1.2.(0)} / C_{1.2.(t)}$$

$$dC_{1.3.(0,t)} = C_{1.3.(0)} / C_{1.3.(t)}$$

$$dC_{1.4.(0,t)} = C_{1.4.(0)} / C_{1.4.(t)}$$

$$dC_{1.5.(0,t)} = C_{1.5.(0)} / C_{1.5.(t)}$$

.....

$$dC_{1.nj.(0,t)} = C_{1.nj.(0)} / C_{1.nj.(t)} \quad (\text{where in our example } nj = 24)$$

Consequently, the total change e.g. in salary cost (C₁), I symbolize it with $d\sum C_{1.j.(0,t)}$, from the year base, 0, to the next year t, so the KPI is developed:

3. Total Change Intensity of Cost Category of each Individual Activity based on time t with the type:

$$d\sum C_{1.j.(0,t)} = \text{—————} \tag{3.3}$$

Generalizing the above, in this way the company can check: a) what effect the increase or the reduction of the cost has in its total performance and b) the extend of the contribution of each activity to the increase of the labor cost (which is probably the most vital factor of cost creation in service provision companies) and consequently to the reduction of the total profit.

From the moment that the above model with the defined KPIs provides us with information for each main category of creating cost C, can easily be combined on the basis of a framework ‘income – costs’, which uses every main cost category Ci, for the calculation of the partial and total productivity (equations 3.4 and 3.5 correspondingly) as follows:

4. For the measurement of (Pi) Performance a item-i at level Revenues – Costs a KPI is developed that uses as numerator the sales’ volume VS_i (where VS_i: sales’ volume of an i – item multiplied by the corresponding price in the invoice as each time defined by the company) and as a denominator the indicator CT_{isales} that calculates the volume of the coefficients of cost production of the total number of sales of i-item so the mathematical type is formed as follows:

$$P_i = \frac{VS_i}{CT_{isales}} \quad (3.4)$$

where: i =i-item, i-sales= i-item depended for number of sales

e.g. $P_{EAX1} = \frac{VS_{EAX1}}{CT_{EAX1\ sales}}$

where: i=EAX1, Price of EAX1=150 from TRSC’s price list and

$$CT_{(EAX1\ sales)} = 101,88 * 354 = 36065,62 \text{ cost production depended for number of sales}=354 \text{ (Table 2.2.2).}$$

The increase on sales of an i-item produced in TRSC leads automatically to the reduction of the production cost of CT_{isales} and vice versa. This occurs as by increasing the sales there is greater depreciation of the labor cost that consists from Table 2.2.1 a major cost factor (————— ———— 0,803 or 80.3%) of TRSC. It has to be pointed out that due to the public character of PPC the labor cost of the employees is stable.

5. While for the measurement of the Total Performance (P) of Company the mathematical type (equation 3.4) is expanded to the total of the sale’s volume of all items to the total cost of production of all items so:

$$P = \frac{\dots}{\dots} \tag{3.5}$$

where:

i =i-item, i-sales= i-item depended for number of sales

6. For the measurement of the difference Performance of Item at Revenues - Costs Level of Company in connection with the time t (we see the profit margin of product/ test), a KPI is developed, that has as a numerator the ratio volume type Laspeyres for the calculation of the variation of the sales' volume dVS_i , and as a denominator the ratio of volume type Paasche, for the estimation of the variation of the volume of the production contributors (total items' cost), dCT_{isales} (Therios, 2002):

$$dP_i = \frac{\dots}{\dots} \tag{3.6}$$

where:

dP_i : Variation of partial productivity item-i between current period t and base year 0.

dVS_i : Volume ratio type Laspeyres for the estimation of the variation of the sales' volume of item-i between current period t and base year 0.

dCT_{isales} : Volume ratio type Paasche for the estimation of the variation of the volume of the cost production contributors of item-i between current period t and base year 0.

7. While for the measurement of the difference in Total Performance (P) of Company in time t having as a base the time 0 the above mathematical type is extended to the difference that is presented in the total of the sales' volume of all items to the total production cost of all items so the following KPI is created:

$$dP = \frac{\dots}{\dots} \tag{3.7}$$

where:

i =i-item, i-sales= i-item depended for number of sales

8. Average Time Responsiveness, (ATR) (in days) to the customers' demands

ATR/ YEAR	2013	2014	2015 (after ABC implementation)
ATR _{CIV} (CIVIL SECTION)	35 days	33 days	19 days
ATR _{CHEM} (CHEMICAL SECTION)	17 days	16 days	5 days

Table 3.4 Average Time Responsiveness by Section

4 KPIs with ABC results as lean management tool

The above mentioned KPIs, as developed in this unit set the performance framework which by receiving its costing data from the ABC method has the necessary accuracy and integrity to be used as a reliable management tool of the company.

This model gives the ability to a company to check better the structure and attitude of the formed cost per activity and its effect on the total of its performance. Also, it gives the opportunity to support managers in decision making by the use of ABC costing system results as a primary source for decision making and control, and to accomplish the need for a costing system to support significant management changes in order to introduce a Lean business strategy in a Public Company.

The paper proves Porter (1985) once more, who characteristically mentions “The comparison of the cost of different activities in different time periods can reveal to the company the influence they have posed to it the changes that stem from the implementation of a new strategy, as well as the deeper comprehension of the entire function of the cost and its profitability”.

The main objective of the developed performance framework is the contribution of the utilization of ABC costing as lean measurement tool of cost, performance (or even profitability) and, responsiveness on operational level.

The implementation of the KPIs performance framework based on ABC costing results, supports the transformation of the traditional way a conventional public corporation functions such as the TRSC Center, to a lean company function, as it gives the

opportunity to the company first, to control more efficiently the structure and the attitude of the formed cost of each category per separate activity and its effect on its total performance, second to define by eliminating waste the ‘value’ which as a matter of fact consists the factor that influences and forms the cost of each ‘activity value’, consequently that of the total cost of the company and third to measure its Responsiveness (On Time Delivery).

As a result it is accomplished, from the management a pyramidal control of the objectives and performance’s fulfillment in all the company levels according to the following figure (Wardhaugh, 2004; Lifetime_Reliability_Solutions, 2015):

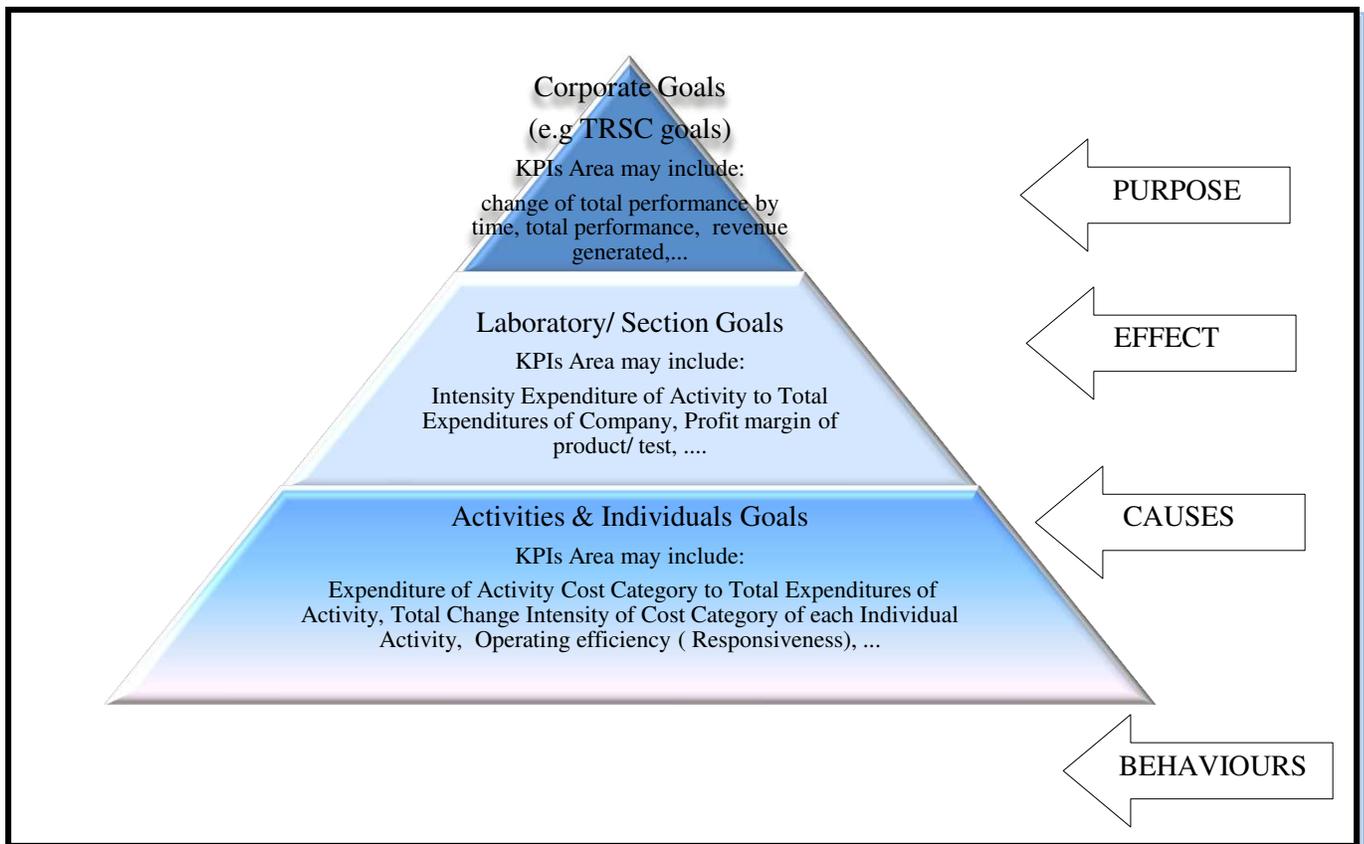


Figure 4.1 Control Pyramid of Corporate Objectives
 [Source: Lifetime_Reliability_Solutions, 2015 (p.2, Figure-1)]

The decomposition of work (business process) as presented in the case study of TRSC on level of j – Activities and i-Item (product) and the KPIs used have proven that the

measurement and the control of their performance improve the operational strategy and support the business aims of the company.

In Figure 4.1, the pyramid of objectives is matched to core business goals with created KPI pathways from top to bottom of the organization which connects activities (relationships maps) across the operation together with a corporate purpose. At this point, an important notification must be made that applies to every success in any business, that the best KPI pathways can be build top-down, but the corporate goals are achieved bottom-up. Operational success actually starts on the shop floor behavior by doing those causes that bring success.

5 Conclusions

The current paper vividly depicts, that the creation of a framework of KPIs based on the results of the implementation of an accurate costing method such as ABC can constitute a useful tool that can assist to a more efficient way of making decisions concerning the transition of a cumbersome public company with various hierarchical levels of function, to a lean company focused on the client's desires and on the reduction of the cost of the produced products/services.

Through this research it is confirmed that a company which implements the principals of Lean Management system operates on a continuous improvement philosophy, based on the removal of waste such as non-value added activities and on the maximization of the responsiveness of delivering a customer's requirement. (Singh, 2012)

The utilization of ABC has also improved significantly the responsiveness of the center since due to the abolishment of the non-value activities valuable resources have been unshackled and have been allotted to value (profitable) activities. The TRSC following a lean thinking function and the lean principal of 'pull' the customer has proceeded indirectly to the restructuring of its structure orientating the produced goods/services to the demands of the market and of the customers.

So, from this research seems that Lean does not have a single model of tools or practices and standards for services in Public Companies. It can be noticed that each Company's management may use a "mix" of tools and practices e.g. ABC with KPIs which in their opinion best serves specific needs of the company and its line of services (Leite and Vieira, 2015)

Future researches shall study in more detail the public sector where lean has been (or can be) applied. These areas can be health, government (public administration), education, and others which have been applying lean practices.

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