

## Contribution of activity based costing: a case study of Tunisian company 'CPG Gafsa'

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### **Abstract**

The purpose of this article is to show how the ABC method is more relevant than the traditional methods of calculation of the costs. We conducted a case study of the 'Gafsa phosphate company' as it is the operator of sector-based phosphate which occupies a place of extreme importance in the strategy of economic development in Tunisia. Empirical results gave a clarification on the reliability and relevance of the ABC method compared to the conventional methods of calculating cost of returns. On the other hand they highlighted the formal applicability of this innovative method and maintained the full cost method as a reference in the strategic decision making. Our research restricts the generalization, as the case of the Gafsa phosphate company cannot be invoked to represent all Tunisian companies. Also results are restricted to financial role of ABC approach. In a positive sense, our research provides an overview on the integration of the accounting practices of innovative management within developing countries.

**Keywords:** Activity based costing, traditional methods, Calculation of the returns cost, Gafsa Phosphate Company;

### **Introduction**

The quest for information allows the organization to take a decisive advantage in the competitive struggle. To maintain competitiveness, the company runs into tools of traditional management which are judged to be incapable of providing relevant management information (Eiler, R.G and al, 1982; Kaplan, R. S, 1983, 1984, 1985; Johnson, H. T., Kaplan, R. S. (1987)). In the past three decades, many innovative techniques of management accounting have been developed for example activity-based costing. This method has been the subject of several particular studies in developed countries: United States of America (KRUMWIEDE, K. R. (1998); KIANI, M. and SANGELADJI, M. (2003); (etc.), France (DE LA VILLARMOIS, O. et TONDEUR, H. (1996), Gueye, M. (1997); Bescos, P-L. and Cauvin, E (2000); Alcouffe, S. (2002)...etc.), United Kingdom (INNES, J. and MITCHELL, F. (2000) ; TAYLES, M. and DRURY, C. (2001)... etc.), Sweden (Dahlgren, J., Holmström, M. and Nehler H. (2001)), Norway (Bjornenak, T. (1997)), Ireland (PIERCE, B. and BROWN, R. (2004).), Australia (Chenhall, R. H. and Langfield-Smith, K. (1998)). However, this type of research is still absent in the developing countries, in particular in the Arab regions. This article examines the contributions of activity-based costing in the good management of companies in developing countries as Tunisia. The Gafsa phosphate company as a competitive business is the subject of our empirical research.

This document is structured as follows. The following section provides an overview of the previous research on the methods of calculation of the cost. The methodology used in the study is described followed by analysis and discussion of the data. Finally, conclusions, limitations, and future research directions are presented.

### **Review of literatures**

Until the 1980s, accounting had focused on the income on which it had operated a few adjustments to highlight the profitability of different centers of profit of any company. In the first half of 1980s, Eiler, R.G and al, (1982), Kaplan, R. S, (1983), (1984), (1985), Howell, R. A, and al, (1987) identified the defect and the obsolescence of existing cost and performance measurement systems.

As a consequence the next two decades were characterized by innovation in management accounting practices such as activity-based costing (Otley, D., 2008). It is a transversal vision which breaks categorically with the teachings of traditional cost accounting (products consume resources) in order to have a double principle: products consume activities and activities consume resources. In this context Boubaker, M (2000) proved that activity-based costing which is at the origin of a new era in management accounting reveals a new image of the company which is presented as a set of activities rather than a set of administrative units. It calls into question the approach based on the full costs by taking account of the concept of activity. At the same sense, Mevellec, P. (1995), has provided that Activity based costing is an approach to the analysis of the functioning of the company leading to a new architecture of the calculation of costs by activities. Bescos, P.L., C. Mendoza (1995) pointed out that 'activities-based approach' does not merely offer a different methodology for calculating the costs.

She suggested extending the scope of intent of analysis of costs by integrating the latter into a coherent system of strategic management; the ABC method offers an approach to integrate a cost analysis in strategic thinking. ZAIDI J, (2000) proved that activity is the basis of two models, on the one hand the system of calculating the cost of returns through the ABC method ,and on the other hand the identification, consolidation and improvement of the competitive advantage across the value chain.

This reputation is justified by a higher adoption rate in developed countries such as 52% in the United States in 2003 (Kiani, M. and Sangeladji, M. (2003)) and 33.33% in France in 2008 (RAHMOUNI, A. F. (2008)). Whereas for the adoption and implementation of the ABC method in developing countries, Tunisia had an adoption rate equal to 24% in 2007 (MOALLA, H. (2007),) and Morocco had 12.9% in 2012 (ELHAMMA, A. (2012))

### **Methodology**

This study is based on a case study of a Tunisian company 'Gafsa Phosphate Company'. It is the operator of the phosphate sector which occupies a place of extreme importance in the strategy of economic development of Tunisia. It is a large company with the following characteristics: legal form: anonymous society, social capital: 227903603 Dinars in 2004, a staff of 6198 agents at the end of the year 2004 including 480 managerial staff, 287 Assistant Engineers, 3677 employees and 1754 workers. This case study is divided into three sections. The first deals with the calculation of the cost of returns through the method of full cost within the CPG Company. The second involves the calculation of the cost of returns by the ABC method, the third deals with the analysis of the differences between the two methods.

### **Results**

From the perspective of management control, it is important to identify the influence of the new ABC method on the costs of extraction, production and returns on one hand and the profitability of the Gafsa phosphate company (GPC) on the other hand.

*Calculation of cost by the full-cost method*

**Table 1<sup>1</sup>: Cost of extraction of crude phosphate (year: 2004). Moularès sector (Unit: in Dinar)**

designations	career Moularès	Kef Eddour west	total sector
Tons mined	685 636	907 639	1 593 275
<b>Direct costs</b>			
Personnel costs	1 930 240	1 882 643	3 812 883
consumable materials	1 066 558	1 909 119	2 975 677
industrial electricity	0	4 117	4 117
Outsourced extraction	0	0	0
crude and sterile Transport	315 925	500 126	816 051
Other external services	46 492	68 580	115 072
Taxes	234	209	443
Work of workshops	709 933	576 694	1 286 627
Amortization	740 800	758 515	1 499 315
Total	4 810 182	5 700 003	10 510 185
<b>indirect charges</b>			
Quotas overhead	284 657	694 622	979 297
Quotas directions	2 359 597	2 838 911	5 198 508
finance costs Quotas	110626	136458	247084
Total	2 754 880	3 669 991	6 424 889
extraction cost	7 565 062	9 369 994	16 935 056
unit extraction cost	11 .034	10.323	10.629

**Table 2: Movement of crude phosphate (year: (2004)). Moularès sector (Unit: in Dinar)**

Designations	Quantity	Cost per unit	Value
Initial stock	51 650	11.179	577 403
Extraction	1 593 275	10.629	16 935056
Transport phosphates inter-siege (value).			2 390 187
Phosphate implemented	1 354 549	12.099*	16 389263
final Stock	290 376	12.099*	3 513 383

\*Unit cost (WACU)

**Table 3: Production cost of filtered phosphate. Moularès sector (year: 2004) (Unit Dinar)**

Designations	amounts
tonnage produced	862848
Tonnage carried out	1354549
Efficiency in%	63.70%
<b>Direct costs</b>	
Personnel costs	2 723 759
consumable materials	730 386
industrial electricity	489 345
local tax	362 894
crude and sterile Transport	505 217

<sup>1</sup> All tables of this work have for source the internal documents of the company of phosphates of Gafsa

Other external services	226 842
Taxes	4 160
Work of workshops	957 681
Amortization	454 155
Total	6 454 439
indirect charges	
Quotas overhead	632 652
Quotas directions	3 420 263
finance costs Quotas	131 264
Supply in raw phosphate	16 389 263
Total	20 573 442
Production cost	27027 881
Unit cost of production	31.324

**Table 4: Movement of filtered phosphate (year (2004)). Moularès sector (Unit Dinar)**

Designations	Quantity	Cost per unit	Value
Initial stock	263 450	26.622	7 013 559
Production	862 848	31.324	27 027 881
Transport phosphates inter-siege (value).			0
Output for drying	285 597	30.224*	8 631 936
Output for sale	536 351	16 210 772	30.224*
final Stock	304 350	30.224	9 198 732

\*Unit cost (WACU)

**Table 5: Production cost of the dried phosphate. Moularès sector: 2004 (Unit Dinar)**

Designations	amounts
tonnage produced	285 597
Tonnage carried out	285 597
Efficiency in%	100%
Direct costs	
Personnel costs	0
consumable materials	815 539
industrial electricity	136 990
local tax	0
crude and sterile Transport	0
Other external services	0
Taxes	0
Work of workshops	0
Amortization	0
Total	952 529
indirect charges	
Quotas overhead	0
Quotas directions	0
Supply, crude phosphate	8 631 936
Total	8 631 936
Production cost	9 584 465
Unit cost of production	33.559

**Table 6: Movement of the dried phosphate (year: 2004). Moularès Sector (Unit Dinar)**

Designations	Quantity	Cost per unit	Value
Initial stock	21 800	29.272	638 140
Production	285 597	33.255	9 584 465
Transport phosphate inter-seat (value).			0
Output for sale	250 947	33.255*	8 345 339
final Stock	56 450	33.255*	1 877 266

\*Unit cost (WACU)

**Table 7: Valuation phosphate boarding to Sfax. Moularès sector Year: 2004**

Designations	filtered	Dried
Output cost factories	16 210 772	8 345 339
Transport Tunisian National Railway Company	2 465 069	1 153 352
Transport routes and movements	356 673	166 880
Costs of boarding	226 340	105 900
Cost phosphate arrived in Sfax	19 258 855	9 771 471
Unit cost of phosphate in Sfax	35.907	38.938

**Table 8: Movement of phosphate in the boardings of Sfax. Sector Moularès year: 2004**

Designations	Filtered			Dried		
	Quantity	Cost per unit	Value	Quantity	Cost per unit	Value
Initial stock	0	0	0	43 550	31.235	1 360 284
Production	0	0	0	43 550	31.235	1 360 284
Transport phosphate inter-seat (value).	536 351	35.907	19 258 855	250 947	38.938	9 771 471
Designations			0			0
Output for sale	536 351	35.907*	19 258 855	215 000	37.799*	8 126 831
Final Stock	0	0*	0	79 497	37.799*	3 004 924

\*Unit cost (WACU)

**Table 9: Cost of goods sold Moularès Sector 2004**

Tonnage sold	536 531	215 000
Designations	filtered	Dried
Cost of sales	19 258 855	8 126 831
Commercial activity	217 615	87 233
Cost of goods sold of phosphate	19 476 470	8 214 064
Unit Cost of goods sold of phosphate	36.313	38.205

**Table 10: Analytical Result. Moularès sector 2004 (Unit: in Dinar)**

Tonnage sold	536 531	215 000
designations	filtered	Dried
Turnover	18 772 285	8 600 000
Cost of goods sold of phosphate	19 476 470	8 214 064
analytical result	-704 185	385 936
Earnings per ton sold	-1.313	1.795

Result of the dried phosphate	Result of the dried phosphate
Result filtered phosphate	Result filtered phosphate
Total Results	Total Results

#### *Calculation of cost by the ABC method*

The calculation of the analytical results by the ABC method thereby following the same procedures as the full cost method (the direct costs are allocated directly to the cost) with the exception of the new allocation of indirect expenses.

#### *Direct costs*

Indirect expenses are expenses allocated directly without recourse to any intermediate calculations in the extraction or production whose components are (personnel costs, consumables, industrial electricity, outsourcing of production, other external services, income tax and taxes, work of workshops and amortization).

**Table 11: Direct costs concerning the extraction and production activity of Moularès sector**

seating activities	Career Moularès	Kef Eddour West	Moularès Factories	
			filtered	Dried
Extraction	4 810 182	5 700 003	-	-
Production	-	-	6 454 439	952 529
Total	4 810 182	5 700 003	454 439	9

#### *Indirect costs*

Indirect expenses are expenses that it is necessary to allocate resources on activities and allocate the costs of these activities on the cost objects. Applying the method of costs by activity in the allocation of indirect expenses is by listing all the areas used during 2004 in the Gafsa phosphate company (GPC).

**Table 12: sectors of GPC in 2004**

code	Labels	Code	attachment seat
76	Metlaoui Sector	11 16 12	career KefSchfaier career TablesMetlaoui Factories Metlaoui
77	Mdhilla Sector	56 57 52	career Jellabia career Mzinda Factories Mdilla
78	Moularès Sector <sup>2</sup>	33 17 32	career Moularès Career KefEddour west Factories Moularès
74	Redeyef Sector	20 23 22	Redeyef Mine career Redeyef Factories Redeyef
82	KefEddour Sector	14 15	Career Central KefEddour KefEddour Factory

Indirect expenses in the GPC are composed by charges of directions, general and common costs and net finance costs. They are distributed according to distribution keys, which are designated

<sup>2</sup> In the course of our work, we chose the Moularès sector. For the remaining sectors is the same methodology adapted

by the cost drivers. The allocation keys used to attach costs to objects. They measure the degree of achievement of an activity and also measure productivity. It induces the consumption of resources by activities grouped in an assembly center. The Multiply of unit cost of the inductor by the volume of this one gives an indirect cost to which is added a direct cost to obtain the total cost of the object.

**Table 13: Source of the inductors**

Nature of inductor choice	The inductor	Source
administrative activity	Effective	Administrative department
technical activity	Tonnage (extract or product)	central management of production
procurement activity	consumable material	Inventory Management Direction
maintenance and financial activity	Cumulative amortization	inventory Division
Commercial activity	tonnage sold	Commercial Directorate

**Table 14: Inductors of the sectors**

sectors \ inductors		Effective	Tonnage (extract or product)	consumable material	Cumulative amortization
S.Metlaoui	Extr	492	3 237 363	4 996 009	30 370 606
	Prod	558	2 041 275	2 039 237	40 121 620
	Total	1050	5 278 638	7 035 246	70 492 226
S.Redeyef	Extr	391	999 434	2 362 823	23 329 859
	Prod	281	743 360	455 772	7 275 897
	Total	672	1 742 794	2 818 595	30 605 756
S.Moularès	Extr	356	1 488 638	2 661 230	15 152 683
	Prod	317	798 976	1 340 522	12 427 221
	Total	673	2 287 614	4 001 752	27 579 904
S.Kefeddour	Extr	335	2 233 137	4 272 293	19 435 808
	Prod	122	1 846 784	854 559	27 325 962
	Total	457	4 079 921	5 126 852	46 761 770
S.Mdhilla	Extr	538	2 567 686	6 726 744	32 926 410
	Prod	374	1 946 636	3 016 473	31 834 182
	Total	912	4 514 322	9 743 217	64 760 592
totals		3764	17903289	28 725 662	0 248

*Distribution of indirect costs*

*Allocation of charges of the directions*

The approach to the distribution of burdens between the different directions of extraction and production sectors are summarized in the following table

**Table 15: Expenses of directions from all sectors of the CPG in 2004. (Unit: in dinars)**

Principal activities	Secondary activities	under activities	amounts	Inductor
Extraction et Production	Administrative	Security Directorate	441 719	Effective
		Administrative management	4 912 952	
		Financial direction	1 486 063	
		training Direction	6 277 061	
		Informatic direction	1 842 177	
		Head office	4 616 089	
		social Direction	2 370 361	
		Management Control Direction	749 894	
		totals	22 696 316	
	supplying	Purchasing Department	2 569 183	consumable material
		Inventory Management Branch	1 429 519	
		totals	3 998 702	
	Technical	research Branch	3 467 756	Tonnage (extract or product)
		development Direction	944 518	
		Branch P °	1 181 171	
		Branch dévppt	493 555	
		totals	6 087 000	
Maintenance	D.M.M	5 521 822	Cumulative amortization	
financial	Financial Directorate General	2 868 712		
commercial	commercial	Commercial Directorate General.	2 503 715	tonnage sold
Total expenditure of the directions			43676267	

- **The calculation approach**

According to the table of expenditures of the five sectors and the table of inductors, we will share the burden of directions on activities for each sector, applying the following formulas

$$\text{Cost per unit of the inductor} = \frac{\text{Total cost of activities}}{\text{Volume of the indicator}}$$

$$\text{Part of an activity of the expenses of direction} = \frac{\text{Unit cost of the inductor}}{\text{* Volume of the inductor of a main activity}}$$

- **Administrative Activity**

**Table 16: the part of every sector in the expenses of the directions according to the inductor "staff" of the activity extraction and production**

activities	Extraction	Production	Totals
S.Metlaoui	2 966 681	3 364 650	6 331 331
S.Redeyef	2 357 667	1 694 385	4 052 052
S.Moularés	2 146 623	1 911 459	4 058 082
S.Kef eddour	2 019 996	735 641	2 755 637
S.M'dhilla	3 244 054	2 255 160	5 499 214
Montant global	12 735 021	9 961 295	22 696 316
Note 1 :	Note 2 :		
CUI= 22696316 / 3764 = 6028	CUI = 22 696 316 / 3764= 6028		
Share of activity = 6028 * 356= 2 146 623	Share of activity = 6028* 317 = 1 911 459		



• **Technical Activity**

**Table 17: the part of every sector in the expenses of the directions according to the inductor "tonnage" extracts or produces "**

activities sectors	Extraction	Production	Totals
S.Metlaoui	1 100 682	694 020	1 794 702
S.Redeyef	339 801	252 737	592 538
S.Moularés	506 127	271 647	777 774
S.Kef eddour	759 252	627 894	1 387 146
S.M'dhilla	872 996	661 844	1 534 840
Montant global	3 578 858	2 508 142	6 087 000
Note 3 : CUI= 6087000 / 17903289= 0, 339994 Share of activity = 0, 339994* 1488638= 506 127		Note 4 : CUI = 6 087 000 / 17 903 289 = 0, 339994 Share of activity = 0, 339994* 798 976= 271647	

**Table 18: the part of every sector in the spending of directions sectors**

activities sectors	Extraction	Production	Totals
S.Metlaoui	949 270	598 550	1 547 820
S.Redeyef	1 179 286	877 131	2 056 417
S.Moularés	1 629 212	874 424	2 503 636
S.Kef eddour	1 402 537	1 159 886	2 562 423
S.Mdhilla	1 824 751	1 383 395	3 208 146
Montant global	6 985 056	4 893 386	11 878 442

• **Supply Activity**

**Table 19: the part of every sector in the spending of the directions According to the inductor "consumable materials"**

activities sectors	Extraction	Production	Totals
S.Metlaoui	695 460	283 868	979 328
S.Redeyef	328 912	63 445	392 357
S.Moularés	370 452	186 605	557 057
S.Kef eddour	594 717	118 957	713 674
S.Mdhilla	936 384	419 902	1 356 286
Montant global	2 925 925	1 072 777	3 998 702
Note 5 : CUI = 3 998 702 / 2872 662= 0, 139203127 Share of activity = 0, 139203127 * 2 661 230 = 370452		Note 6 : CUI = 998702 / 28725662 = 0,139203127 Share of activity = 0, 139203127 * 1340522 = 186605	

• **Maintenance activity**

**Table 20: The share of each sector in the spending directions According to the inductor "accumulated amortization"**

activities sectors	Extraction	Production	Totals
S.Metlaoui	698 172	922 332	1620 504
S.Redeyef	536 317	167 261	703 578
S.Moularès	348 336	285 682	634 018
S.Kef eddour	446 798	628 181	1 074 979
S.Mdhilla	756 926	731 817	1 488 743
Montant global	2 786 549	2 735 273	5 521 822
Note 7 : CUI = $5521822 / 240200248 = 0,02298841$ Share of activity = $0,02298841 * 15152683 = 348336$		Note 8 : CUI = $5521822 / 240200248 = 0,02298841$ Share of activity = $0,02298841 * 12427221 = 285682$	

• **Financial activity**

**Table 21: Distribution of financial burdens on five sectors. According to the inductor "accumulated amortization"**

activities sectors	Extraction	Production	Totals
S.Metlaoui	362 715	479 171	841 886
S.Redeyef	278 628	86 896	365 524
S.Moularès	180 968	148 418	329 386
S.Kef eddour	232 121	326 353	558 474
S.Mdhilla	393 239	380 194	773 433
Montant global	1 447 671	1 421 032	2 868 703
Note 9 : CUI = $2868712 / 240200248 = 0,011943$ Share of activity = $0,011943 * 15152683 = 180968$		Note 10 : CUI = $2868712 / 240200248 = 0,011943$ Share of activity = $0,011943 * 12427221 = 148418$	

• **Commercial activity**

**Table 22: The share of each sector in the spending directions According to the "tonnage sold" inductor**

Sectors activities	Metlaoui Sector	Redeyef Sector	Moularès Sector	Kef Eddour Sector	Mdhilla Sector	Total amount
commercial	614 279	289 237	254 453	629 696	717 050	2 503715

*Allocation of overheads of the extraction activity***Table 23: Distribution of overhead extraction activity**

Principal activities	secondary activities	under activities	amounts	Inductor
Extraction	Administrative	manager office	162 096	workforce
		Security seat	23 374	
		Guarding the CPG	74 978	
		Totals	260448	
	Transport	personal transportation	401 308	workforce
Total overheads of the extraction activity			661756	

**Table 24: Distribution of overhead Moularès sector Kef Eddour West seat**

Principal activities	secondary activities	under activities	amounts	Inductor
Extraction	Administrative	Leader of seat	141 047	workforce
		Safety siege	11 208	
		Guarding of the CPG	10 062	
		Totals	162 317	
	Technique	Powder magazine	82 540	Tonnage ext ou P°
	Transport	Personal transport	39 800	workforce
Total overheads of the extraction activity			284 657	

*Allocation of overheads of production activity***Table 25: Distribution of overhead of activity Production**

Principal activities	secondary activities	under activities	amounts	Inductor
Production	Administrative	Head office	199 466	workforce
		safety seat	108 061	
		Administrative department	5 411	
		Nurse and ambulance	5 702	
		Management control cell	10 699	
		totals	329 339	
	Technique	technical Secretariat	33 562	Tonnage ext ou P°
		Laboratory	208	
		Technical office	70 879	
		Store	198 664	
		totals	303 313	
total overheads of activity Production			632 652	

**Table of distribution of the overheads of Moularès sector (Moularès seat factory)**

Overheads are allocated 100% to the Moularès sector activity in extraction and production of the office concerned.

**Table 26: Drivers of Moularès sector**

seats activities inductors	career Moularès	Career kefEddour west	Total
	Extraction		
workforce	177	179	356
Tonnage (extract or product)	685 636	803 002	1 488 638
consumable materials	1 102 886	1 558 344	2 661 230
cumulated depreciation	7 117 339	8 035 344	15 152 683

**Table 27: Calculation of indirect expenses Moularès sector**

seating activities	career Moularès	Kef Eddour	Total of the sectors
administrative	$((2146623^3 / 356) * 177) + 162\ 317 = 1229599$	$((2146623 / 356) * 179) + 293\ 314 = 1372655$	2602254
Technical	$((506127 / 1\ 488\ 638) * 685\ 636) + 82\ 540 = 315652$	$(506127 / 1\ 488\ 638) * 803\ 002 = 273015$	588667
Transport	39 800	401 308	441 108
supplying	$(370\ 452 / 2\ 661\ 230) * 1\ 02\ 886 = 153\ 525$	$(370\ 452 / 2\ 661\ 230) * 1\ 558\ 344 = 216\ 927$	370 452
Maintenance	$(348\ 336 / 15\ 152\ 683) * 7\ 117\ 339 = 163\ 616$	$(348\ 336 / 15\ 152\ 683) * 8\ 035\ 344 = 184\ 720$	348 336
financial	$(180\ 968 / 15\ 152\ 683) * 7\ 117\ 339 = 85\ 002$	$(180\ 968 / 15\ 152\ 683) * 8\ 035\ 344 = 95\ 966$	180 968

(Extraction activity)

**Table 28: Calculation of indirect costs (production activity). Moularès sector / unit: in Dinar**

seating activities	Moularès factory		
	directions charges	overheads	totals
administrative	1 911 459	329339	2240798
Technical	271 647	303313	547960
Transport	—	—	0
supplying	186 605	—	186605
Maintenance	285 682	—	285682
financial	184 418	—	184418

**Calculation method of analytical results**

The determination of the analytical result by the method ABC of the Moularès sector is made by allocating directly the direct costs with a new sharing of indirect charges. The approach to the development of the result is determining the gaps between revenues and production costs. Treaty phosphate costs are calculated in different activities according to the operating process that consists of five activities listed below

- Extraction cost.
- Filtered production cost.
- Cost of production dried.
- Valuation phosphate arrived at the boarding Sfax.
- Determination of results

**Cost of extraction activity**

It is determined by taking consideration of all the charges made during the activities that contribute directly to the extraction cycle and can be controlled by the managers of operating units.

<sup>3</sup> 2146623: Corresponds to the part of the administrative activity of sector Moularès in this top loads(charges) her(it) indirect freshly of directions(managements) in the picture(board) we are going to proceed to affect(allocate) this indirect load(responsibility) between the seat Moularès and Kef Eddour

- General rules for calculation of indirect costs per seat

**Table 29: Cost of extraction activity (year: 2004) Moularès Sector**

Designations	Career Moularès	Kef Eddour West	Total sector
<b>Direct costs</b>			
Personnel costs	1 930 240	1 882643	3 812 883
consumable materials	1 066 558	1 909119	2 975 677
industrial electricity	0	4 117	4 117
Outsourced extraction	0	0	0
crude and sterile Transport	315 925	500 126	816 051
Other external services	46 492	68 580	115 072
Dues and taxes	234	209	443
Construction of workshops	709 933	576 694	1 286 627
depreciation	740 800	758 515	1 499 315
Total	4 810 182	5 700003	10510185
<b>indirect expenses</b>			
administrative activity	1229599	1 372655	2 602254
technical activity	315652	207315	588667
Transport activity	39 800	401 308	441 108
Supply activity	153 525	216 927	370 452
Maintenance activity	163 616	184 720	348 336
financial activity	85 002	95 966	180 968
Total	1987194	2478891	4466085
extraction cost	6797376	8178894	14976270
* Unit Extraction Cost	9.913	9.011	9.40

Total spending of the activity by sector = total Spending of the activity by siege +  
Overheads of the activity by siege

Cost of indirect costs of activity per siege = (unit cost of the inductor \* inductor  
of activity per siege) + Overheads of activity per siege

$$\text{Unit extraction cost} = \frac{\text{Extraction cost}}{\text{Inductor extraction activity}}$$

The phosphate extracted pass through a table of raw phosphate movements for valuation at weighted average cost of all outputs and final stocks

$$\text{Weighted average unit cost} = \frac{\text{Extraction+ initial inventory} + \text{Inputs} + \text{Transport. (Value)}}{\text{Initial inventory} + \text{inputs (in Quantity)}}$$

**Table 30: Moularès Sector Unit: in Dinar**

Designations	Quantity	Unit Cost	Value
Initial stock	51 650	11.179	577 403
Extraction	1 593 275	9.40	14976270
Production			2 226 081
Phosphate carried out	1 354 549	10. 808	14641122
Transport inter-siege phosphate (value.)			
final stock	290 376	10. 808	3138632

*Cost of activity of the production of filtered phosphate***Table 31: Cost of Production filtered activity. Moularès Sector Unit: in Dinar**

designations	amounts
tonnage produced	862 848
Tonnage carried out	1 354 549
Efficiency in%	63.70%
<b>Direct costs</b>	
Personnel costs	2 723 759
consumable materials	730 386
industrial electricity	489 345
Rental of trax	362 894
crude and sterile transport	505 217
Other external services	226 842
Dues and taxes	4 160
Construction of workshops	957 681
depreciation	454 155
Total	6 454 439
<b>indirect expenses</b>	
administrative activity	2 240 798
technical activity	574960
Transport activity	0
Supply activity	186 605
Maintenance activity	285 682
financial activity	184 418
Crude phosphate supply	14641122
Total	18113585
Production cost	24568024
* Unit cost of production	28. 473

\*Note

He is determined by taking into account the cost of enrichment which groups loads relative to the centers of the costs which contribute directly to the wash of the phosphate increased of the cost of the activity of the supply in raw phosphate obtained from the picture of the movements

$$\text{Cost per unit of filtered Production (filtered)} = \frac{\text{Filtered production cost}}{\text{The inductor of the activity production (filtered)}}$$

The filtered phosphate goes through a table of movements of the filtered phosphate to enhance the weighted average cost of all outputs (drying, sales) and ending stocks.

$$\text{Weighted average unit cost} = \frac{\text{Initial inventory} + \text{Production filtered (by value)}}{\text{Initial inventory} + \text{Production filtered (in quantity)}}$$

**Table 32: Movement of the filtered Production activity (year: 2004). Moularès Sector Unit: in Dinar**

designations	Quantity	Unit Cost	Value
Initial stock	263 450	26.622	7 013 559
Production	862 848	28. 473	24568024
Outputs for drying	285 597	28. 040*	8008187
Outputs for sale	536 351	28.040*	15039371
final stock	304 350	28.040*	8534025

*Cost of activity of the production of dried phosphate*

It is determined bearing in mind the cost of enrichment that includes charges related to cost centers that contribute directly to the drying of the filtered phosphate and the cost of filtered phosphate supply obtained from the filtered table movement.

**Table 33: Cost of activity Production of dried. Moularès sector in 2004 Unit: in Dinar**

designations	amounts
tonnage produced	285 597
Tonnage carried out	285 597
Efficiency in%	100 %
<b>Direct costs</b>	
Personnel costs	0
consumable materials	815 539
industrial electricity	136 990
Rental of trax	0
crude and sterile transport	0
Other external services	0
Dues and taxes	0
Construction of workshops	0
depreciation	0
<b>Total</b>	<b>952 529</b>
<b>indirect expenses</b>	
Supply of filtered phosphate	8008187
<b>Total</b>	<b>8008187</b>
<b>Production cost</b>	<b>8960716</b>
* Unit cost of production	31. 375

\*Note:

$$\text{Unit cost of Production dried} = \frac{\text{Dried production cost}}{\text{The inductor of activity Production (dried)}}$$

The dried phosphate product passes through a table of movements to value the weighted average cost of all outputs (sales) and final stocks

$$\text{Weighted average unit cost} = \frac{\text{Initial stock} + \text{Production dried (by value)}}{\text{Initial stock} + \text{Production dried (in quantity)}}$$

**Table 34: Movement of dried Production activity (year: 2004). Moularès Sector Unit: in Dinar**

designations	Quantity	Unit Cost	Value
Initial stock	21 800	29.272	638 140
Production	285 597	31.375	8960716
Outputs for sale	250 947	31. 226*	7836134
final stock	56 450	31. 226	1762722

\*Unit cost (WACU)

*valuation of phosphate arrived at boarding*

The phosphate returned to the boardings of Sfax is valued in the costs of the deliveries obtained from the paintings of movements of trade phosphates of the various increased sectors.

- Cost of transport routes and movements.
- Transport costs Tunisian National Railway Company
- Cost of shipments Sfax

**Table 35: Valuation phosphate shipments to Sfax. Moularès sector (year 2004)**

Designations	filtered	Dried
Output cost factories	15039371	7836134
Transport Tunisian National Railway Company	2 465 069	1 153 352
Transport routes and movements	356 673	166 880
Costs of boarding	226 340	105 900
Costs phosphate arrived in Sfax	18087453	9262266
* Unit cost of phosphate arrived in Sfax	33. 723	36. 909

\*Note:

$$\text{Unit cost of phosphate arrived in Sfax} = \frac{\text{Cost phosphate arrived in Sfax}}{\text{Tonnage sold}}$$

The phosphate arrived at the boardings of Sfax passes by a board of the movements to value the weighted average cost of all outputs (sales) and ending stocks.

$$\text{Weighted average unit cost} = \frac{\text{Initial inventory} + \text{Production arrived (in value)}}{\text{Initial inventory} + \text{Production arrived (in quantity)}}$$

**Table 36: Movement to phosphate shipments of Sfax. Moularès sector Year: 2004 Unit: in Dinar**

designations	filtered			Dried		
	Quantity	Unit Cost	Value	Quantity	Unit Cost	Value
Initial stock	0	0	0	43 550	31.235	1 360 284
Production	536 351	33.723	18087453	250 947	36.909	9 262266
Output for sale	536 351	33.723*	18087453	215 000	36. 070*	7755082
closing stock	0	0	0	79 497	36. 070	2867468

*Determination of analytical results*

The cost price of the selling phosphate is obtained by increasing the outlets for sales from the table of movements phosphates arrived at boarding commercial costs (distribution costs). The result is calculated as the difference between revenue and cost



**Table 37: Cost of goods sold Moularès Sector (year: 2004) Unit Dinar**

Tonnage selling	536 351	215 000
Designations	filtered	Dried
Cost of sales	18087453	7755082
Commercial activity	181 641	72 812
Cost of goods sold of phosphate	18269094	7827894
* unit Cost of goods sold of phosphate	34. 062	36. 409

**Table 38: Analytical Result Sector Moularès (year: 2004) (Unit Dinar)**

Designations	filtered	Dried
Turnover	18 772 285	8 600 000
Cost phosphate	18269094	7827894
analytical result	503 191	772106
Earnings per tonne sold	0. 938	3. 591

Result of the dried phosphate	772106
Result filtered phosphate	503191
Total Results	1275297

**Analysis of differences between the two methods (full cost method and ABC) in 2004**

The comparison between the method of full costs and the ABC method in calculation of the various costs such as the cost of extraction, the cost of production and cost of returns gives the following results:

\* The cost of extracting passing from the Full Costs method (16 935 056) to the ABC method (14976270) causes a decrease of 1958786. (Table 39 line 2)

\* The cost of production recorded a decrease of 3 083 606 as a result of the difference between the Full Costs (36 612 346) and the ABC method (33528740) (Table 39 line 3)

\* The cost of returns recorded a reduction of (1593546) as a result of the difference between the Full Costs (27 690 534) (table 40) and the ABC method (26 096 988) (table 41).

**Table 39: Analysis of the differences between the two methods (Moularès sector: 2004) (Unit: in Dinar)**

Designation	Methods	method ABC (1)	method of full costs (2)	variances methods (1)-(2)
Cost of extracting		14976270	16 935 056	-1958 786
Cost of production (filtered and dry)		33528740	36 612 346	-3 083 606
Cost of returns (filtered and dried)		26096988	27 690 534	-1 593 546
Analytical result (filtered and dried)		1275297	- 318 249	+ 1 593 546

**Table 40: Table of cost of returns Moularès sector according Full Cost method (year: 2004; Unit Dinar)**

Tonnage sold	536 351	215 000
Designation	Filtered	Dried
Cost of sales	19 258 855	8 126 831
Commercial activities	217 615	87 233
Cost of return of phosphate	19476470	8214064
Cost of return per unit of phosphate	36.313	38.205

**Table 41: Table of cost of returns Moularès sector according ABC method (year: 2004) (unit Dinar)**

Tonnage sold	536 351	215 000
Designation	filtered	dried
Cost of sales	18087453	7755082
Commercial activities	181 641	72 812
Cost of return	18269094	7827894
Cost of return per unit of phosphate	34. 062	36. 409

**Discussion**

Adopting the results mentioned above, two main issues can be raised: What is the origin of this decrease? What are its consequences?

Passing from the Full Costs to the ABC method found that direct costs do not pose a problem because they are directly affected in products and subsequently the origin of this decrease is the result of the allocation of indirect costs via cost drivers.

An analysis of this decline shows that there are indirect costs which are supported by Moularès sector under the full cost method, while under the ABC method, they are not. This calls into question the first allocation according to the unit of work as a result of too fine and equitable allocation via cost drivers since the new method of cost allocation is based on a very logical causal relationship. In our case of the CPG activities consume resources and products consume activities. Thus the two overheads: the cost of management and overhead costs are allocated to activities (administrative, supply, maintenance, financial, technical and transport) which will then be consumed by dried and filtered phosphate products. This principle is distinct from that of the full cost method under which products consume resources. Managers and accountants have mastered well the actual share of each activity in indirect costs and indirectly the share of each sector, speaking here of five sectors (Moularès, Redyef, Mdhilla, Keffeddour and Mèlaoui). Where a cost of returns is more sincere and benefit analyses of management level. Thus, the new method is to avoid the problem of fusion in the distribution of indirect costs between different analysis centers. The notion of reduction of charges in our case is not synonymous with the disappearance but the return of each charge to its real place. With the full cost method there is inefficient allocation of indirect costs between sectors and there after a sector will bear the burden of another. Indeed, it may happen that the sector is profitable while the full cost methodology has shown us that it is deficient and this is justified in the analysis of our analytical result. Thus, according to the method of Full Costs there is a negative analytical result for the filtered phosphate (704185) with a profit of(385936)for phosphate dried, whereas according to the ABC method both results for filtered and dried phosphate are beneficial (503191) for the first and (772106) for the second.

Observation of global results produce a deficit analytical result (318 249) according to the traditional method while one has a beneficiary result (1275297) giving the method of activity-based costing. The origin of this increase in result is the elimination of indirect costs which does not belong to Moularès sector and will increase the weight of the total expense of the latter. So in conclusion the results generated by the Full Cost method can cause serious decisions because it will treat filtered phosphate as a deficit product while this is not the case. Similarly the Manager will take time and support costs to eliminate the so-called loss that does not exist in Moularès sector according to the ABC method. Although that can exist in another sector, the full cost method is unable to detect the failure. Eventually the ABC method cannot eliminate charges but can achieve a better allocation on the basis of activity which allows taking strategic decisions which facilitate timely and appropriate decisions to managers.

### Conclusion

This study examines how the applicability of the ABC method is more relevant than traditional assessment methods. Our study is the subject of a study of the Gafsa phosphate company. Our result showed that the implementation of the ABC method has great importance for an industrial company that seeks to control its costs in an efficient way and determine the profitability by product.

### Limitation of the study

As is the case with all studies, it has its limits. First of all, the results of the case study of the Gafsa phosphate company cannot be invoked to represent all Tunisian companies. Secondly, the results are limited to the financial role of the ABC method

### Directions for future research

After, studying the contributions of the ABC method compared with traditional methods of cost calculations and the study of this method taken in the context of analysis of adoption rate (For Tunisia the adoption rate is about 23% (Moalla (2007)), the major question to pose is what are the contingent factors that explain this relatively low rate?

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