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# ACTIVITY-BASED COSTING IN THE MANUFACTURING SECTOR: A MANAGERIAL INSTRUMENT FOR DECISION-MAKING

Case study

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Activity-based costing  
Activity-based management  
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## Abstract

The aim of this paper is to emphasize the importance of using the activity-based costing (management) system in the manufacturing sector. The utility of the ABC (ABM) system concerns decisions taken at a strategic and operational level. In our country, few managers understand the need for such a system and many Romanian companies use only a traditional costing system or don't use one at all. The paper also includes a case study which is a small example of using the ABC method in a Romanian manufacturing company.

The study shows that the ABC/ABM system helps managers to properly manage indirect costs (by activities) and understand the profitability of products, distribution channels and customers. Therefore, it offers a powerful instrument for decision-making.

Although ABC is a new system of cost calculation that is absolutely necessary, in most cases the ABC method must be implemented in addition to the traditional costing systems, which are essential for the purposes of management accounting.

### **Theoretical approach regarding the activity-based costing and activity-based management system**

The aim of this paper is to emphasize the importance of using activity-based costing and activity-based management system in the manufacturing sector. In our country, few managers understand the need for such a system and many Romanian companies use only a traditional costing system or don't use one at all. Furthermore, some of them don't have a management accountant and won't even try to integrate this activity in the accounting department.

Accounting information, the historical source of management control and essential support of its functioning, is the subject of a continuous renewal process. In fact, it has come to an amplification of the management accounting's role through managers and accountants.

From its origins, which begin with the industrial revolution and the development of a competitive market economy, management accounting has focused on cost analysis. The terms of "industrial accounting" and "analytical accounting" show that the purpose was the cost calculation of products in the industrial environment.

At present, the aim of management accounting is identifying and shaping the connection between resources, methods of consumption and all the finalities for which the resources are gathered and consumed.

Thereby, management accounting becomes a way of representing the optimal functioning of the enterprise. It cannot be made independent from technology and activity organization, which structures the way of movement of the physical flows.

First of all, management accounting has to show the correlation between the resources that were consumed and the finalities. Thereby, it creates a double recording of the finalities and processes linked to the consumption of resources. Secondly, it is not an exclusively result of a technological determinism.

There are some resources that must be added in the accounting model. Among these are: information, the ability to learn, innovation, initiative of employees, the capacity of boosting up the financial instruments, the way the employees can be mobilized for an urgent order, the image of the company etc..

"An activity in a set of basic and complementary tasks oriented towards a finality." (Tab r & Briciu, 2012)

In the traditional costing systems the resources are divided in direct and indirect costs, which are allocated throughout the analysis centers to the final products. In the ABC system the resources are used to determine the costs of each activity, which allows management accounting to establish the full cost of the products.

"The products consume activities and the activities consume resources" (Grosu&Alman, 2008)

The management accountant can help at developing strategies, establishing resources and necessary capacities, as well as at the implementation of the selected strategies. A considerable part of the work of managers consists of choosing the strategy that will be applied. Management accounting cooperates with the company's management when developing a strategy, giving information about the sources of competitive advantages: for example the advantage in terms of cost, productivity or efficiency that the company has to its competitors.

"Managers used the more accurate ABC and profitability information to make better decisions about process improvements, order acceptance and rejections, pricing, and customer relationships. The decisions led to near-term and sustainable improvements in product and customer profitability" (Kaplan & Anderson, 2007)

By using the activity-based costing method the management accounting tries to estimate resource consumption for each product, which determines the company's

managers to focus on redistribution or elimination of the excess of resources.

The utility of the activity-based costing and activity-based management system concerns decisions taken at a strategic and operational level.

The activity-based costing method is motivated by the belief that, traditional accounting information is not useful to managers, which are interested in evaluating the efficiency of decisions concerning the resources allocated in their company.

“In the past, management accounting reports have tended to concentrate on analysing profits by products. Increasing attention is now being given to analysing profits by costumers using an activity-based costing approach. Customer profitability analysis provides important information that can be used to determine which classes of customers should be emphasized or de-emphasized and the price to charge for customers services.” (Drury, 2008)

Activity-based costing is a new system of cost calculation absolutely necessary, a new way of thinking regarding costs. In most cases, the activity-based costing method must be implemented in addition to the traditional costing systems, which are essential for the purposes of management accounting.

“The thought leaders in cost management have begun to integrate the ABC/M data to support decision making. This involves predictive costing, not simply segmenting and tracing historical costs. Linkages of trade-offs between customer profitability and increases or decreases in shareholder value have been receiving intense scrutiny.” (Cokins, 2001)

The objective of an activity-based costing and activity-based management system is to provide knowledge for managers and employees, not only basic data.

The study shows that the activity-based costing and activity-based management system helps managers to properly manage indirect costs (by activities) and understand

the profitability of products, distribution channels and customers. Therefore, it offers a powerful instrument for decision-making.

### **Case study regarding the activity-based costing system in the manufacturing sector**

PanRo is a Romanian company from the industrial sector. It's a bakery that manufactures and commercializes two types of products: bread and biscuits. The production is at a normal capacity.

The costing system used at this point is the one based on the orders the company has (job costing system) and it has a single working unit for the allocation of indirect costs. For the execution of the two jobs the following quantities are needed:

J1 : 18.000 kg of bread

J2 : 25.000 kg of biscuits

The company has the following costs:

- raw materials - a total of 118.166,49 RON, of which:

J1: 23.018,40 RON

J2: 95.148,09 RON

- direct labor – 84.546 RON :

J1: 31.897 RON

J2: 52.649 RON

- rent – 16.650 RON

- indirect salaries – 44.451 RON

- other materials - 3.753,90 RON

- electricity, gas and water – 29.224,77 RON

- maintenance – 2.020,56 RON

- machinery depreciation – 10.997,50 RON

- other external costs – 59.082,34 RON

- packing – 16.300 RON

The price the company sells one kg of its products is 7,5 RON for bread and 12 RON for biscuits.

The full cost of the two products is determined as showed below:

1.The direct cost of the products is determined in Table no. 1, globally by summing up the costs with raw materials and direct labor for each job, and unitary by dividing the total direct costs to the manufactured quantities.

2. Determining the working unit for the allocation of indirect costs:

The management chosen "direct labor hour" as the working unit. The company had 9.240 hours of direct labor, of which 2.688 hours for J1 and 6.552 hours for J2.

3. Determining the indirect cost for the working unit

The company had a total of 182.480,07 RON indirect costs in a single responsibility center. In this case the indirect costs per one hour are :

$$C_i = 182.480,07 \text{ RON} / 9.240 \text{ hours} = 19,75 \text{ RON/hour}$$

The indirect costs calculated for one hour of direct labor can be multiplied with the number of hours for each job. The global and unit values for the indirect cost as well as the full cost can be found in table no. 2.

The profit rate for each job is shown in Table no. 3 by calculating the difference between total revenues and full costs.

Here we can see that the job with the highest profit rate is J1 (bread), and that J2 (biscuits) has a minimum profit.

What would the full cost be if a ABC system is used?

1. The first step in ABC method is identifying the processes: supplying process, quality control process, manufacturing process, commercialization process, delivery process and managing process.

2. The second step is identifying the main activities regarding these processes:

- supplying process : preparation of internal orders (A1), stocking (A2), supplying (A3)

- quality control process : quality control (A4)

- manufacturing process : production launch (A5), manufacturing section 1 (A6), manufacturing section 2 (A7)

- commercialization and delivery process : packaging (A8), distribution (A9)

- managing process : administration (A10)

3. Calculating the direct costs:

The costs regarding packing will be included in the direct cost and must be directly allocated to the products in J2,

because only the delivery of biscuits requires this activity (Table no. 4).

4. Calculating the indirect costs

The resources consumed by each activity (indirect costs) can be seen in Table no. 5.

The cost drivers for each activity and the working units are specified in Table no. 6.

In order to make the allocation we need the indirect costs in Table no. 5 and the cost drivers in Table no. 6. The allocation will be made as follows:

A1) Allocation of the costs with the activity of preparation of internal orders:

$$K_{A1} = 5.500/400 = 13,75$$

$$J1 = 100 * 13,75 = 1.375 \text{ RON}$$

$$J2 = 300 * 13,75 = 4.125 \text{ RON}$$

A2) Allocation of the costs with activity of stocking:

$$K_{A2} = 7.100/1.900 = 3,74$$

$$J1 = 1.000 * 3,74 = 3.736,84 \text{ RON}$$

$$J2 = 900 * 3,74 = 3.363,16 \text{ RON}$$

A3) Allocation of the costs with activity of supplying:

$$K_{A3} = 7.500/500 = 15$$

$$J1 = 200 * 15 = 3.000 \text{ RON}$$

$$J2 = 300 * 15 = 4.500 \text{ RON}$$

A4) Allocation of the costs with activity of quality control:

$$K_{A4} = 11.300/1.080 = 10,46$$

$$J1 = 720 * 10,46 = 7.533,33 \text{ RON}$$

$$J2 = 360 * 10,46 = 3.766,67 \text{ RON}$$

A5) Allocation of the costs with activity of production launch:

$$K_{A5} = 8.000/43.000 = 0,19$$

$$J1 = 18.000 * 0,19 = 3.348,84 \text{ RON}$$

$$J2 = 25.000 * 0,19 = 4.651,16 \text{ RON}$$

A6) Allocation of the costs with activity of manufacturing section 1:

$$K_{A6} = 21.743,96/1.520 = 14,31$$

$$J1 = 800 * 14,31 = 11.444,19 \text{ RON}$$

$$J2 = 720 * 14,31 = 10.299,77 \text{ RON}$$

A7) Allocation of the costs with activity of manufacturing section 2:

$$K_{A7} = 24.779/1.420 = 17,45$$

$$J1 = 720 * 14,31 = 12.564 \text{ RON}$$

$$J2 = 700 * 14,31 = 12.215 \text{ RON}$$

A9) Allocation of the costs with activity of distribution:

$$K_{A9} = 10.200/250 = 40,8$$

$$J1 = 100 * 40,8 = 4.080 \text{ RON}$$

$$J2 = 150 * 40,8 = 6.120 \text{ RON}$$

A10) Allocation of the costs with activity of administration:

$$K_{A10} = 70.057,11/400 = 175,14$$

$$J1 = 100 * 175,14 = 17.514,28 \text{ RON}$$

$$J2 = 300 * 175,14 = 52.542,83 \text{ RON}$$

The full cost of the products determined using the ABC method is showed in Table no. 7.

The profit rate for each job is shown in Table no. 8.

According to the new calculation the profitability of the two products is almost the same.

### Conclusions

This case study is a small example of how the activity-based costing and activity-based management system can be used in the manufacturing sector.

Determining the full cost for a company's products requires at first to establish the process and the activities in which the resources are consumed. Each activity will have a cost driver which is used to allocate the indirect costs. The full cost calculation using the activity based-costing system reveals a different value that the one determined using a traditional costing system. This can lead to underestimating or overestimating the cost of the company's products.

The activity-based costing and activity-based management system is meant to provide the correct information for strategic and operational management. If the allocation of indirect costs isn't exact and the full cost of the products is distorted, the decision-making process may be seriously affected.

In conclusion, the activity-based costing and activity-based management system is a new costing system that must be used in the manufacturing sector in order to help managers in the decision-making process, but it is highly recommended to use a traditional cost calculation system that serves the other purposes of financial and management accounting.

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Table No. 1  
*The direct cost of the products*

	TOTAL	J1 (18.000 kg)		J2 (25.000 kg)	
		global	unit	global	unit
<b>Raw materials</b>	118.166,49	23.018,40	1,28	95.148,09	3,81
<b>Direct labor</b>	84.546	31.897	1,77	52.649	2,11
<b>Total direct costs</b>	202.712,49	54.915,40	3,05	147.797,09	5,92

Table No. 2  
*The full cost of the products*

	TOTAL	J1 (18.000 kg)		J2 (25.000 kg)	
		global	unit	global	unit
<b>Total direct costs</b>	202.712,49	54.915,40	3,05	147.797,09	5,91
<b>Allocated indirect costs</b>	182.480,07	53.085,11	2,95	129.394,96	5,18
<b>Full cost</b>	385.192,56	108.000,51	6,00	277.192,05	11,09

Table No. 3  
*The profit rate of the products*

	TOTAL	J1 (18.000 kg)		J2 (25.000 kg)	
		global	unit	global	unit
<b>Total revenues</b>	435.000	135.000	7,5	300.000	12
<b>Full cost</b>	385.192,56	108.000,51	6,00	277.192,05	11,09
<b>Profit</b>	49.807,44	26.999,49	1,5	22.807,95	0,91
<b>Profit rate</b>	11,45		20,00		7,60

Table No. 4  
*The direct cost of the products*

	TOTAL	J1 (18.000 kg)		J2 (25.000 kg)	
		global	unit	global	unit
<b>Raw materials</b>	118.166,49	23.018,40	1,28	95.148,09	3,81
<b>Direct labor</b>	84.546	31.897	1,77	52.649	2,11
<b>Packing (A8)</b>	16.300	0	0	16.300	0,65
<b>Total direct costs</b>	219.012,49	54.915,40	3,05	164.097,09	6,57

Table No. 5  
*The indirect costs for each activity*

Activ.	Rent	Indir. salary	Other mater.	Electric., gas and water	Maint.	Machin. deprec.	Other external costs	Total
<b>A1</b>	1.000	4.000		500				5.500
<b>A2</b>	2.000	4.000	100	1.000				7.100
<b>A3</b>	2.000	5.000		500				7.500
<b>A4</b>	1.000	7.000	300	3.000				11.300
<b>A5</b>	1.000	5.000		2.000				8.000
<b>A6</b>	3.500	2.250	2.043,4	10.000	1.000,56	2.950		21.743,96

<b>A7</b>	3.500	1.201	1.010,5	10.000	1.020	8.047,5		24.779
<b>A9</b>	2.000	6.000	200	2.000				10.200
<b>A10</b>	650	10.000	100	224,77			59.082,3	70.057,11
<b>Total</b>	16.650	44.451	3.753,9	29.224,77	2.020,56	10.997,5	59.082,3	166.180,07

Table No.6

*The cost drivers for each activity*

Activ.	Cost driver	J1	J2	Total
<b>A1</b>	No. of orders	100	300	400
<b>A2</b>	Quantity of stock (kg)	1.000	900	1.900
<b>A3</b>	Quantity of materials (kg)	200	300	500
<b>A4</b>	No. of testing hours	720	360	1.080
<b>A5</b>	Quantity of products (kg)	18.000	25.000	43.000
<b>A6</b>	No. of labor hours	800	720	1.520
<b>A7</b>	No. of labor hours	720	700	1.420
<b>A9</b>	No. of working hours	100	150	250
<b>A10</b>	No. of deliveries (kg)	100	300	400

Table No.7

*The full cost of the products*

	TOTAL	J1 (18.000 kg)		J2 (25.000 kg)	
		global	unit	global	unit
<b>Total direct costs</b>	219.012,49	54.915,4	3,05	164.097,09	6,57
<b>Indirect costs</b>	166.180,07	64.596,48	3,59	101.583,59	4,06
<b>Full cost</b>	385.192,56	119.511,88	6,64	265.680,68	10,63

Table No. 8

*The profit rate of the products*

	TOTAL	J1 (18.000 kg)		J2 (25.000 kg)	
		global	unit	global	unit
<b>Total revenues</b>	435.000	135.000	7,5	300.000	12
<b>Full cost</b>	385.192,56	119.511,88	6,64	265.680,68	10,63
<b>Profit</b>	49.807,44	15.488,12	0,86	34.319,32	1,37
<b>Profit rate</b>	11,45		11,47		11,44