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DESIGN OF AN ACTIVITY BASED MANAGEMENT MODEL FOR A STANDARD OIL MILL*/**

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Abstract

In this paper, it is designed a model of Activity Based Management (ABM) for those firms constituting the first link of the olive oil agroalimentary chain; more specifically, it describes the necessary stages to follow in order to introduce an ABM model in this kind of firms. The use of this model would involve a rationalization of the activities making up the olive oil commercialization and production processes, which would allow oil mills to carry out a strategic management of their costs aimed towards improvement of quality.

Key words: ABM model, costs, quality, oil mill.

1. INTRODUCTION.

ABM (activity based management) model is a management tool aimed to make a strategic control of business costing. It's basically a tool which, taking ABC (Activity Based Costing) model as a basis and putting into practice the continuous improvement in management control, aims to manage costing rightly in the different organizational levels of a firm (Forrest, 1996).

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This model's utility goes further from simple costing reduction, since it tries to achieve firm's competitive improvement by means of the adoption of strategic decisions correctly taken. In fact, ABM model tries to improve the position of products before the customer, in order to achieve a higher profitability, and to improve the productive and commercialising activities of the firm. The main indicator we have when introducing this management model is that of quality, in order to reach an economic efficiency degree allowing to achieve benefits and business continuity (Haase, 1995: 3).

ABM model's finality is not managing costing but managing those activities making up the firm's productive process (Sáez, Fernández and Gutiérrez, 1999: 203). Because of this, it highlights the distinction between added value activities and non added value activities, trying to reduce the latest and to carry out the formers correctly and with a minimal consumption of resources.

ABM model is as well considered as a tool to evaluate, assure and improve the quality of the products and services provided by the firm (Lyonnet, 1989). In this sense, ABM model takes advantage of quality improvement techniques, following the Total Quality Management (TQM) theory.

Once we have proposed ABM model generic focus, it's interesting to justify the usefulness of the value chain in the introduction of this model. In this sense, we would like to point out that the concept of added value is more limited than this of value chain. More precisely, added value begins too late and ends too soon, leaving unexploded the relationship with suppliers and customers (Mallo and Merlo, 2000: 386). So, it should be taken into account that the productive process of any firm is closely related with its environment. Because of this, we use Porter´s "value creation system", as it goes further both backwards (including suppliers) and forward (including customers). In fact, the value chain has as its ultimate objective the analysis of the necessary stages to satisfy the customer, this allowing to relate this consideration with the concept of added value, whose ultimate orientation is to achieve the satisfaction of the customer, but with the lowest possible cost. This objective is achieved by means of an analysis of the firm's activities in the customer's view, taking into account the added value the customer gets in order to, in one hand, improve customer's satisfaction, and in the other, to increase firm's productivity and profitability (AECA, 2001: 61).

The objective we pursue with this paper is to design an ABM model for those firms which constitute the first link of the olive oil agroalimentary chain. For this reason, it is described the generic process that must be followed in order to introduce a model of Activity Based Management firstly. Following, we will apply this model to oil mills. Finally, conclusions will be presented.

2. PROCESS TO INTRODUCE A MODEL OF ACTIVITY BASED MANAGEMENT.

In order to introduce a model of Activity Based Management, the following steps must be taken (Mallo and Merlo, 2000):

1. Analysing total costs by observing their evolution in time.
2. Analysing activities, detecting if they create added value or not.
3. Analysing cost drivers by activity.

1st stage. Total costing analysis.

This stage intends to analyse activity costing, as well as its adjustments and variations. Costing is classified according to: a) direct costing, rightly attributable to products and b) activity costing, rightly attributable to activities aimed to obtain the product.

2nd stage. Activity analysis.

Firstly, we must consider that any firm's resources are product-focused: to design, produce, commercialise and distribute it. In this way, all the costs when consuming factors and resources make reference to product costing. The application of resources to the creation of a product is a value addition process, generated by activities associated to itself.

Bearing in mind what has been previously said, we can proceed to a classification of activities. The most useful classification aimed to apply the ABM model is the one based in the capacity or incapacity an activity has when creating added value for the firm [1]. For the objective we pursue in this paper, this classification should be still more highlighted, taking into account that an activity is unimportant if it doesn't contribute to quality improvement, may it be from an internal focus (product focused) or from an external focus (customer perception focused).

In the general map of firm activities, we must highlight those activities not adding value of any kind to the product or service, may it be external or internal, to analyse and observe its need inside the firm and, in most of cases to adopt a policy aimed to reduce this kind of activities, which will later show itself as an effective measure in costing reducing.

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[1] There exist different activities classification; according to its performance in relation with the product (unitary level product activities, lots level, products line level and firm level), in function of their carrying out frequency (repetitive or non repetitive activities) or attending to the firm's technology (main activities, direct auxiliary activities and indirect auxiliary activities or structure activities).

3rd stage. Analysis of cost drivers.

By cost driver we must understand all those costs which may influence the performance of an activity; i.e. drivers represent the "effort" developed by each activity[2]. An increase in the unitary cost of a specific activity is directly proportional to a consumption increase in the number of drivers. The most the consumption is, the most the associated cost of that activity will be.

This stage goes together with the previous one, as it helps to detect those less efficient activities, or, at least, those which can be improved. It consists of the analysis of the evolution of drivers' unit cost, and of the amount of drivers needed to perform each activity. The essential objective will be to maintain or to reduce their unit cost. If a driver's unit cost increases, it may be due to two different reasons:

a) An increase in the activity costing, the amount of drivers remaining constant. In this case, it would be convenient to analyse such activity and look for the cause of its inefficiency within the system.
b) A decrease in the amount of drivers, the activity costing remaining constant. In this particular case, there would exist subactivity costing, this having to be identified in order to remove them and, in this way, increasing system efficiency.

Anyway, this stage can be improved by establishing standard unit cost for drivers taking historical and competition data as a basis. These costs should be regularly compared to actual cost in order to find important deviations, and, together with it, the key points the firm must analyse more exhaustively.

All in all, the introduction of an ABM model will allow to analyse the whole firm's productive process, giving answer to questions such as (Castelló and Lizcano, 1999: 4):

1. The most efficient way to perform activity related tasks.
2. The possibility of restructuring the business process activities, removing some of them.
3. The way of reducing at the full implementation costs of some activities, specially those which cannot be removed from the process as it's needed to obtain the final product.

[2] For instance, the activity of bottling would have as cost driver the amount of bottles.

3. APPLICATION OF THE ABM MODEL IN OLIVE OIL EXTRACTION FIRMS.

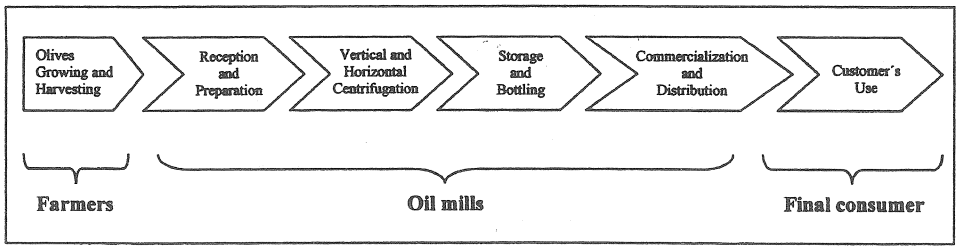
To fully understand an ABM model introduction process, we will apply it to a particular case: olive oil extraction firms (or oil mills).

Following the previously stated outline, the process starts with an intensive costing analysis. For olive oil extraction firms there exist an important problem when evaluating direct costs due to the difficulties produced when calculating olives purchase cost, as olives are a basic raw material in olive oil extraction process. In fact, the usual practice in olive oil cooperativism [3], consisting in paying every member following the gross margin criterion means that the raw material cost includes the firm's benefits.

Regarding indirect costs, we will revise the costs coming from the performance of each activity, taking into account the possibility of minimising or removing them. Relating activity analysis and, following the ABC model implemented in an oil mill (see Camacho, Núñez and Moyano, 2001) we are going to represent graphically what the value chain of a standard oil mill is (Figure 1).

FIGURE 1

The value chain of an oil mill



Inside this value chain we must identify activities and select those creating competitive advantage, so we need to know every activity's costs and value. The costs are known following the ABC model and activities are classified according to their value in this way: activities adding value for the customer, activities adding value for the firm and non adding value activities.

The first step to introduce an activity based management model is to design an oil mill activities map (Table 1), and, later on, to add specific suppliers and customers activities. Doing it this way, activities won't be regrouped, but will ease their management depending if they add value or not. The following activity map is made up by 44 activities. These activities are the ones making up the production and commercialisation process in a standard oil mill.

[3] Cooperativism has a very important role in olive oil industry as 75% of total olive oil produced in Spain has its origin in cooperatives (Julia and Server, 1999).

TABLE 1

Oil mill activities map

PROCESS	ACTIVITIES		
RECEPTION (11)	Unloading	Classification	Cleaning
	Washing up	Weighing	Sample taking
	Internal transportation	Reparation and conservation	Purchase orders
	Olives storage		Dirty water removal
PREPARATION (7)	Internal transportation	Milling	Beating
	Coadjuvants addition	Machinery reparation	
	Inspection and control	Machinery cleaning	
HORIZONTAL CENTRIFUGATION (5)	Centrifugation	*Alpeorujo* storage	
	Machinery cleaning	Analytic/visual control and inspection	
	Reparation and conservation		
VERTICAL CENTRIFUGATION (6)	Water addition	Centrifugation	Machinery cleaning
	Analytic/visual control and inspection		Dirty water removal
	Reparation and conservation		
STORAGE (4)	Classification according to quality		Olive-oil storage
	Warehouses cleaning		Control and inspection
BOTTLING (7)	Oil filtering	Filter cleaning	Bottling
	Labelling	Reparation and conservation	
	Dosage measure machine adjustment		Packing
COMMERCIALIZATION (4)	Sale orders	Bottled oil storage	
	Advertising	Transportation	

Differently, and following a "back focus" in the value chain, relating activities performed by suppliers we can identify the following:

Olives growing and harvesting (7):

- Watering.
- Fertilization.
- Pruning.
- Fungicide.
- Harvesting.
- Olives separation according to their qualities.
- Transportation to the oil mill.

Following the "front focus" in the value chain, we would have to distinguish between two different types of customers: final consumer, including member himself in the particular case of cooperatives (the member besides being a customer participate as well as owner and supplier for the oil mill) and important olive oil refining and bottling firms. Taking into account this difference, we can quote the following activities:

Use by the final consumer (3):

- Olive oil quality appreciation.
- Olive oil purchase.
- Payment at stipulated price.

Olive oil refining and bottling firms (8):

- Buying oil to the oil mill.
- Storage.
- Refining.
- Bottling.
- Labelling.
- Commercialisation.
- Advertising.
- Distribution.

Once we have distinguished all the different activities, we are going to focus in specific activities of oil mills, classifying them according to if they add value or not, relating quality. In Table 2 we will see activities performed in oil mills divided in responsibility centers and are classified this way:

- External customer-focused adding value activities (ECAVA) depending on the customer's focus when analysing quality. These activities' carrying out costing should be optimised to get a higher efficiency in resources consumption. We consider as external customer-focused adding value activities those of olives classification, olives cleaning and washing up, machinery, warehouses and filter cleaning previous to bottling. Their justification is based on the statement that olives classification according to quality, olives preparation and the process cleaning will result in a better quality oil. Activities such as filtering, bottling, labelling, packing, advertising and distribution contribute in the customer's appreciation of quality in a fundamental way as they are aimed to satisfy his needs. It is also important to classify qualities when storing oil as in this way it will be easier to

preserve the quality obtained in previous stages, what will allow the customer to see that the price he has paid is in accordance with the quality of the oil he has bought.

- Firm-focused adding value activities (FAVA). They are the activities the firm must carry out, and they give provided value to raw materials. These activities' costing must be minimised. Activities creating added value for an oil mill belong basically to its productive process: olives unloading, sample taking, weighing, purchase orders, milling, beating, horizontal and vertical centrifugation, dosage measure machine adjustment and sale orders. All these activities are necessary in order to get olive oil from olives and to commercialise it.
- Non-value adding activities (NVA). Once we have identified and measured up these activities it will be possible to control, manage and reduce associated costs with all these non-value adding activities which can be considered unimportant (AECA, 2001: 63). The amount of these activities is nineteen out of a total amount of forty-four; i.e., forty-three per cent of the total amount of activities we have already classified. This circumstance makes this paper interesting as it shows the important comfortable margin these firms have in order to reduce costs and to take advantage of new sources of competitive advantage.

Altogether, non-value adding activities in the final product would be the following:

- Analytic/visual control and inspection. This activity does not add any value as if the whole process adjusted to a standard protocol to carry out this activity wouldn't be necessary. For instance, the preparation center revision and control process wouldn't be necessary if it followed a concrete pattern.
- Internal transportation. It is a non-value adding activity for the raw material to get a good quality oil.
- Machinery reparation and conservation. This activity does not add any value to olive oil but it's necessary, depending on the technical conditions of the process and how they are used. This activity can't be removed from the process, as, obviously, machinery breaks down and depreciates. Actually, total quality philosophy – where we are placing ABM model's utility depending on how we focus it – aims to prevent breakdowns and mistakes in the technical structure by means of a preventive maintenance (James, 1998).
- Olives storage. Long term storage of the fruit must be completely eliminated in the productive process as it reduces final oil quality. This is, clearly, an unnecessary activity, besides being harmful (Uceda, Hermoso and Frías,

1989: 46). A possible solution, as it's been proposed previously, is the establishment of delivery data for suppliers. Another measure would be to increase milling capacity, what would imply important investments (non-viable in many cases).

- Dirty water removal. This activity does not add any value to the final product as it is a waste which is also highly toxic for the environment.
- Coadjuvants addition. Their addition does not add any value to the final product as its objective is to help to bind the olives pulp when olives are not yet ripe. So, they will be unnecessary when raw material gets in optimal conditions to the productive process. In any case, this activity should be minimised.
- *Alpeorujo* storage. It's a non-value adding activity, but goes together with nowadays extraction processes. The generation of this waste takes with it, besides, problems for the firm once it has been used. The objective would be to minimise this activity.
- Water addition. It does not add any value to the oil, and may even denature it. ABM model's objective is to try to minimise this activity.
- Raw and bottled oil storage. This activity should also be minimised as it does not add any value to the final product. This activity's costing could be reduced by improving the business management oil mills have followed till now[4]. This storage could be minimised by improving inventary management systems and optimising business links with the customer.

To sum up, the following table shows a classification of all the activities carried out in an oil mill depending if they add value or not. In fact, if the process developed correctly, with "zero mistakes" in it, following total quality management steps, only value adding activities would be carried out. Those labelled as non-value adding activities would be eliminated if possible, and, in the opposite, their carrying out would be minimised and, subsequently, their cost.

Some of these non-value adding activities can be eliminated by analysing links existing between in the value chain. In the particular case of oil mills, external links with suppliers are quite interesting. More precisely, there are four or five activities which can be carried out by farmers instead of oil mills, or at least they can be reinforced in order to get a common benefit. So, it would be possible to reach to agreements with farmers to guarantee the quality of the final product since the beginning of the process. We shouldn't forget that suppliers are the beginning of the chain and they must face quality demanded by the oil mill.

There are, in fact, some factors associated to olive growing which are easy to manage by farmers and also have an important influence in oil's quality. Most of

[4] For a detailed analysis on olive-oil commercialization in origin see Torres (1998) and Torres *et al.* (2000)

TABLE 2

Added value addition in an oil mill

CENTER	ACTIVITY	ECAVA	FAVA	NVA
RECEPTION	Unloading		X	
	Classification according to quality	X		
	Cleaning	X		
	Washing up	X		
	Weighing		X	
	Sample taking		X	
	Internal transportation			X
	Reparation and conservation			X
	Purchase orders		X	
	Olives storage			X
	Dirty water removal			X
PREPARATION	Internal transportation			X
	Milling		X	
	Beating		X	
	Coadjuvants addition			X
	Machinery reparation			X
	Inspection and control			X
	Machinery cleaning	X		
HORIZONTAL CENTRIFUGATION	Centrifugation		X	
	Alpeorujo storage			X
	Machinery cleaning	X		
	Analytic/visual inspection and control			X
	Reparation and conservation			X
VERTICAL CENTRIFUGATION	Water addition			X
	Centrifugation		X	
	Machinery cleaning	X		
	Anal./visual inspection and control			X
	Dirty water removal			X
	Reparation and conservation			X
STORAGE	Oil classification according to quality	X		
	Oil storage			X
	Warehouses cleaning	X		
	Oil control and inspection			X
BOTTLING	Stored oil filtering	X		
	Filter cleaning	X		
	Bottling	X		
	Labelled	X		
	Packing	X		
	Dosage measure machine adjustment		X	
	Reparation and conservation			X
COMMERCIALIZATION	Sale orders		X	
	Bottled oil storage			X
	Advertising	X		
	Transportation	X		

them (like, for instance, pruning, fertilizing, etc.) affect the obtained production level, despite the fact they have a limited influence in oil quantity and quality. Nevertheless, a well-grown fruit can also result in oils with different features (Hermoso, 1997:179) this having an effect in the degree of acceptance on the part of consumers. Interrelations are not obtained with these activities, but they would benefit both farmers and oil mill. Another benefitious activity for both parts would be farmer's control of plagues and diseases, what would have a bearing in the achievement of better oils in the oil mill.

Harvesting is another activity having a direct influence in quality. In this sense, to avoid olives long term storage and, consequently, in order to avoid the negative consequences it would have in quality, it would be interesting to date farmers' olives delivery with the aim of adjusting those dates with the rate of production in the oil mill. The fulfilment of these delivery dates should be economically compensated by the firm. Equally, devices non-affecting quality would be outweighed. The use of vibrators, for instance, does not fulfill this condition. Fruit classification according to quality would also be encouraged, as well as the use of adequated transportation systems in order to avoid fruit deterioration (Humanes, 1998).

Regarding external links with customers, activities like the use of information and communication technology could be promoted, in order to place orders via the Internet, what would result in a reduction in operational and storage costs for both parts. Nevertheless, it must be pointed out that oil commercialisation in final markets is yet a residual activity in most of oil mills (Torres, 1998; Torres *et al.,* 2000), having a s a key objective to make marketing campaigns with the aim of making high quality oil be known, what would, subsequently, increase its consumption.

Finally, to totally introduce the ABM model, it is necessary to make an exhaustive analysis of cost drivers associated to the oil mill activities. This study must be made in two directions: a time-based analysis in the evolution of drivers unit cost, and a study in the amount of drivers every activity implies. The objective, anyway, is to reduce global cost, minimising in a right way either total cost, or the amount of drivers to be used in each activity. Standard data and those data compared to other firms will be basic in order to complete this analysis. The causes for these variations will be justified regarding to costs evolution and the amount of drivers used to perform each activity.

4. CONCLUSIONS.

The introduction of an ABM model in an oil mill would allow to rationalize all the activities integrated in the olive-oil production and commercialization process.

This means that these firms would have the possibility of developing a strategic management of their costs oriented towards quality improvement.

To carry out this introduction it would be necessary to start from a model of Activity Based Costing (ABC). The aim would be to deeply analyse activities identified by the ABC model, managing them in the most efficient way and removing those non-value adding activities. This means that oil mills must be aware of the need to substitute traditional costing management models, as while using them it's impossible to determine which stages of the productive process result generate more costs and the causes for this. With ABC model we would know these costs and each activity's particular one. This is clearly positive for management, giving way to possibilities for continuous improvement at a global level (Johnson, 1993: 309 and following).

Consequently with ABM model it's possible to know the cost of carrying out non-value adding activities in the oil mill. More precisely, we have identified those activities which could be removed and some others whose cost must be minimised by the oil mill.

The elimination of some of the activities or costing reduction in some others requires an exhaustive analysis of the links with suppliers and customes on the part of the oil mill. With this analysis, the oil mill could make a contract with farmers in order to establish quality as the key objective. Equally, links with customers could be used to reduce operational and storage costs.

Despite this model would bring many advantages to this kind of firms it would also be interesting to point out some of its limitations. More precisely, this model doesn't allow any analysis on product direct costing. In the sector we are studying, raw material cost is not considered by ABM model, despite having an important weight since it is not included in activity costing.

Another ABM model's important limitation in this particular sector is the one derived from management problems appearing in many of the oil mills (Mozas, 1999). In fact, in order to introduce this management model it is necessary an efficient business organization, able to derivate costing responsibilities and allowing feedback between people in charge of carrying activity out and the department in charge of introducing the proposed model.

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