

A Work Project, presented as part of the requirements for the Award of a Master Degree in
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Product Costing and Activity-Based Costing/Management in Bacalhôa Vinhos de Portugal

CARLOTA TOMAZ DA COSTA PACHECO #2454

A Project carried out on the Master in Management Program, under the supervision of:

Associate Professor Maria João Major

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Abstract

The present Work Project introduces a case study addressing the adoption of an ABC/M system in a winemaking company. The system was implemented in only one area of the company, and its adoption allows the company to perform ABM analysis resorting to the ABC information. A mixed approach is used to cost the products: both traditional and ABC systems are used although in different areas of the company. ABC/M implementation was perceived as ‘successful’ despite not following recommendations prescribed in literature.

Keywords: Activity-Based Costing, Activity-Based Management, Management Accounting, Wine Industry, Case Study

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I. Purpose of the Work Project

According to Johnson and Kaplan (1987) management accounting systems in use by mid 1980s were obsolete as they were providing irrelevant and inaccurate cost accounting information, hence misrepresenting the amount of resources that each product was demanding. Heavy criticisms towards traditional management accounting explain the emergence of Activity-Based Costing (ABC) at the end of the 1980's. Two powerful networks, Harvard Business School and Computer-Aided Manufacturing, International (CAM-I), played a critical role in ABC development (Jones and Dugdale 2002). ABC is a product cost accounting approach, which uses activities and activities' cost drivers to allocate overhead costs to the final cost objects. Since its emergence, several authors have been studying ABC in order to enhance understanding towards its benefits and pitfalls (Englund and Gerdin 2008).

Bacalhôa Vinhos de Portugal, SA (henceforth, Bacalhôa) is one of the largest Portuguese wine making companies. The importance of the wine in the Portuguese gastronomy and economy, combined with the fact that there are not studies in management accounting field in this industry, motivated me to develop this Work Project (WP) together with Bacalhôa.

The purpose of this WP consists in understanding how Bacalhôa calculates the costs of its products and the role of ABC to this end. In order to achieve this objective, the researcher has adopted a case study as research method (Yin 2014; Ryan et al., 2002) and has posed the following research questions (RQ):

RQ1: How does Bacalhôa's product costing work?

RQ2: Why has Bacalhôa implemented ABC in only one area of the company?

The WP is structured within different sections, enabling a more comprehensive reading. First, the **Literature Review** section comprises the literature support regarding ABC and its implementation process. Then the **Methodology** presents the description and justification of how research was conducted. The following section is the **Case Study** where Bacalhôa's cost

accounting system and ABC is described. Lastly, the **Conclusions** present the main findings of the case study, as well as the main contributions and limitations of the WP.

II. Literature Review

i. Emergence of Activity-Based Costing/Management

The need to replace the traditional system to manage overhead costs appeared in 1985 when Miller and Vollmann reported in the “The Hidden Factory” that overhead costs as a percentage of value added were increasing in the American industries. The problem associated with this was the decrease in the competitiveness of American firms aligned with the managers’ poor control over such costs (Miller and Vollmann 1985). Besides this growth in costs, other two factors influenced the necessity of a new system for costing overheads: the changes in the cost components included in the overhead costs and the decrease in weight that direct labor represented in the totality of costs (Innes and Mitchell 1993).

The suggested solution was the development of a system which would allow managers to trace the causes that drive overhead costs (Miller and Vollmann 1985). In order to do so, it was crucial to understand that what drives overhead costs are the transactions involved in production and not the physical products (Miller and Vollmann 1985; Johnson and Kaplan 1987).

Following this reasoning, in 1987 ABC emerged under the name ‘Transaction Costing’ when Johnson and Kaplan (1987) studied the management accounting practices in the USA, concluding the obsolescence of management accounting systems. According to the authors, in a period where technologies were expanding, information processing techniques were being improved and competition increased in a global scale, management accounting systems were no longer able to provide relevant information for managers, as they allocated costs based on direct labor, simplifying the process and thus misrepresenting “the demands made by each product on the firm’s resources” (*ibid*, p. 2).

In fact, the beginning of ABC dates to the mid 1980’s, with the case studies of two networks:

the *Harvard* and the *CAM-I networks* (Jones and Dugdale 2002). The Harvard network is represented by Cooper, Kaplan and Johnson who contributed to the development of an innovative costing system by helping Schrader Bellows, John Deere and Weyerhaeuser, respectively, to solve their problems associated with traditional costing systems (*ibid*). At the same time, the CAM-I network starts a project in order to capitalize the benefits of Advanced Manufacturing Technologies in managing overhead costs (*ibid*). According to Jones and Dugdale (2002), although the purposes of usage differed, both networks developed similar costing systems thus contributing to the creation of ABC.

Later, in the early 1990s, research was focused in management philosophies, which promptly led ABC to evolve to Activity-Based Management (ABM) (*ibid*). The cost information of activities was now used to manage those that add (or do not add) value to the product, allowing managers to empower competitiveness. With the overhead overview, managers have information that will help in the assessment of performance: how much each resource costs, which activities spend more resources, and what value each product adds (Innes and Mitchell 1993).

ii. Basic Concepts

The Chartered Institute of Management Accountants (CIMA) defines ABC in its book “CIMA Official Terminology” (2005) as an “approach to the costing and monitoring of activities, which involves tracing resource consumption and costing final outputs” (p. 3). First, the process requires that resources are allocated to activities according to its consumption of resources, this way pooling the overhead costs, and in a second stage, cost drivers (as Cooper designates the former allocation bases) will allow to allocate activity costs to the final cost object (CIMA 2005; Innes and Mitchell 1993). Thus, in an ABC system the costing of products will be driving from the demand of the product for certain activities, having as final cost the sum of all the required activities’ costs (Cooper 1991). In comparison with traditional costing systems, Innes

and Mitchell (1993) state that ABC can be applied to non-production overhead costs.

To interpret the nature of overhead costs, activities have to be divided in four categories: (1) unit-level, (2) batch-level, (3) product-sustaining, and (4) facility-sustaining (Cooper 1995). The first category refers to activities that are executed each time a unit is produced. The second one, as the name suggests, refers to activities that are executed each time a batch of units is produced. The third one refers to activities that support the production process. Last, the fourth category can be defined as activities that support the production existence and the entire organization (Cooper 1995; CIMA 2005).

CIMA then defines ABM separating it into two categories differing in the final purpose of the information. The first is 'Operational ABM' in which the analysis of what drives activities is conducted aiming to "increase efficiency, lower costs and/or improve asset utilization" (p.4). The last is called 'Strategic ABM' and it is based in analyzing the costs of activities intending to improve profitability by managing the need for activities (CIMA 2005).

Innes and Mitchell (1993) refer the existence of four uses of ABC information to help managers. Traditional research distinguishes costs between variable and fixed if they vary with volume of production in the short term or not. However activity-based costing/management (ABC/M) authors, such as Miller and Vollmann (1985) state that fixed costs are actually variable according to volume of activities. Thus, the first use of information is the analysis of cost behavior patterns in which the volume of activities is used to explain the "fixed" overheads. Another use of ABC is to analyze customer profitability, as the customer is seen as the cost object, thus allowing the manager to appoint the costs that are driven from each customer and consequently each ones profits. Performance measurement is another advantage from ABC analysis. By allocating costs to activities and then to cost objects, problems are exposed and performance can be monitored and corrected (Innes and Mitchell 1993). Also, while conducting the activity interviews, opportunities to eliminate waste and to improvements are expected to

appear (Eiler and Ball 1993). Last, ABC/M is claimed to help in setting budgets and controls, as the analysis of activities' costs and volume will help to draw an estimation of future spending (Innes and Mitchell 1993).

iii. Development of an Activity-Based Costing System

Innes and Mitchell (1993) in their book "Overhead Costs" declare the existence of four stages for developing an activity-based system: (1) Identification of activities; (2) Costing activities; (3) Selecting cost drivers; and (4) Application of cost driver's rate to products.

For the first stage, the authors suggest an approach in which activities are profiled by first analyzing a physical map of the facilities identifying, at least, the mainstream and support activities. Then, with the contribution of the management accountant to distinguish activities from simple tasks, a deeper analysis is conducted with interviews to the workforce involved in each area (Innes and Mitchell 1993). This interview process is the center of the ABC implementation, thus being the most time consuming, but also the most informative. The questions should focus in listing the activities that are more relevant in terms of time and importance, estimating the time spent on each activity, understanding what drives the activities, gathering volumes of transactions, runs and setups, and establishing what or who consumes the activities (Eiler and Ball 1993). The expected final output will be an 'inventory of activities' (usually termed 'dictionary of activities') that will serve as basis for the design of the accounting system (Innes and Mitchell 1993).

The following step is to cost the activities, by collecting information regarding the resources (labor, equipment) that each activity consumes. This data gathering can be linked with the interviews performed in the previous step. In order to reach the real cost of activities, data regarding resources that are shared by several activities has to be clearly collected (Innes and Mitchell 1993).

After reaching the total cost of each activity, the third stage will be the selection of the cost drivers. Similar to the previous two, the data gathering method suggested by Innes and Mitchell (1993) is interviewing managers. The purpose of this managers' consultation is to analyze what each activity demands and what is the source of such demand.

Finally, the cost driver rates will be applied to allocate activity costs to the final cost object by multiplying the cost driver rates to the cost driver volume (Major 2007). The final cost of each product will be the sum of the activity costs attributed to such product.

iv. Implementation of Activity-Based Costing/Management

The ABC/M literature does not have a clear definition of what it is considered a successful implementation (Shields 1995; Major 2007). Nevertheless, CAM-I defines what Eiler and Ball (1993) call 'some fairly universal measures of success': ease and practicality of data collection, inherent costs of installation, ease of implementation, financial benefits, acceptance by users, organizational feedback and completeness and accuracy. With a different approach, Foster and Swenson (1997) define four measures of ABC/M implementation success: the degree of usage of ABC/M information in organizational decisions; the changes in decision making arising from ABC/M information; the financial savings originated from ABC/M implementation; and the overall satisfaction of management with the system implementation.

For Cooper (1990) the successful implementation process has two stages, one before the implementation and the other during the implementation. Before a company starts implementing an ABC/M system, it is necessary to define six major issues: if the system should be implemented independently or combined with the existing one; if it is necessary to approve the plan with the design of the system or if the implementation starts right away; who will be responsible for the system (management vs financial system); how precise should the system be; if the disclosed costs should be historical or future; and the complexity level of the initial design. The second phase was designed in order to certify a global (implementation team and

management) understanding of the ABC theory and practice and its respective benefits, and to secure the success of the collection of data. For that, seven steps were developed: (1) Seminar on ABC; (2) Design Seminar; (3) Design and data gathering; (4) Progress meeting; (5) Executive seminar; (6) Results meeting; and (7) Interpretation meetings (Eiler and Ball 1993).

Research demonstrates that some firms are experiencing problems when implementing ABC/M mainly due to the understanding of the system as a technical aspect, disregarding the behavioral and organizational perspectives (Shields 1995; Shields and Young 1989). Within this reasoning, Shields and Young (1989) developed the “Seven Cs Model” (culture, champion, change process, commitment, compensation, continuous education and controls) which emphasizes the importance of a corporate culture that incentivizes employees to understand their impact in the organization. Both Shields and Young (1989) and Eiler and Ball (1993) value the role of the ABC champion in the implementation phase, as Shields (1995) values the importance in top management commitment and support. Also, Argyris and Kaplan (1994) support the importance of behavioral aspects in performing a successful implementation, by presenting an approach built around aligning individual with organizational goals in order to eliminate individuals’ resistance. The authors suggest the implementation of two processes: one based on ‘Education and Sponsorship’ aimed to cultivate and inform the technical aspects of the system, thus gathering the support of management and the understanding of individuals; the other called ‘Create Internal Commitment’ which intends to motivate and engage participants and to avoid their defensive barriers to the implementation of the system.

For the ABC implementation there are two approaches: the pilot and the staged. The pilot approach is the recommended one due to its safety level. It consists in applying the system to one area of the company (Eiler and Ball 1993). The process is the one presented earlier by Cooper (1990). The staged approach is merely the gradual application of the pilot one into several areas of the organization.

v. Criticisms of Activity-Based Costing/Management

Alongside with successful cases of ABC implementation, several authors argue the existence of concerns regarding power and politics that should be taken into consideration in implementation (Drennan and Kelly 2002; Granlund 2001; Malmi 1997). The reasoning behind such cases is the potential of the ABC system as a tool for some individuals to empower within the organization, while others will intend it as a threat (Englund and Gerdin 2008). Innes and Mitchell (1995) in the survey they conducted to the UK's largest companies also found that a significant amount of interviewees associated ABC to discharging of staff, resented the task of input data in time sheets and felt threatened with the increase in personal accountability.

One example of the threat of power that can be raised from ABC implementation is the one of Major and Hopper (2005). In this case, the ABC system was designed and implemented with the commercial department's needs in mind, neglecting the ones of production managers and engineers (previously considered the most important areas of the company). The latter, who due to organizational changes had seen their workload increase, found the system too time consuming, with a high level of complexity and no utility in return. Also, they felt the system was threatening their position in the company and their autonomy. Therefore, there was a detachment of such departments with the system, submitting data late and continuing to use non-financial data for their decision-making. As a result, ABC was not displaying cost data accurately, neither on time. Despite these issues and the dependence of the system on such departments, the accounting and commercial departments were overall satisfied with the system, as it was still better than the previous one.

Malmi (1997) presents a different case where the ABC implementation can be considered a success or a failure depending on the level of management, i.e., when top and local managers have different goals, the fulfillment gathered from the ABC system will also differ. On the local management perspective, the ABC implementation is viewed as a failure due to economic,

political and cultural reasons. First the new accounting system did not provide additional information, when compared with the previous one. In the political perspective, the fact the implementation approach was a pilot only in that factory, visibility of accounts would increase resulting in a higher bargaining power for transfer pricing from other units, changing the power within the organization. Also, the increased visibility would also result in increased accountability. Last, the culture of the organization was dominated by engineers, which gave little importance to accounting issues.

vi. Activity-Based Costing in the wine industry

There is little information regarding the use of an ABC system on a wine making company. The wine production industry has been facing a higher level of competitiveness due to an increase in the effort customers put in their decision making – companies face a more informed and judicious customer (González-Gómez and Morini 2006). Additionally, the processes of wine production have been evolving and consequently reducing indirect and labor costs importance and focusing in differentiation rather than volume (*ibid*). Given these characteristics and taking into consideration that the wine making process is very flexible, being possible to vary according to the oenologist or the wine that it is produced, traditional costing systems have proven to be obsolete as it does not provide the necessary information. ABC appears as an alternative costing system since it allows to manage costs and cost information within such flexibility and variety of processes (*ibid*).

III. Methodology

As mentioned before, this WP adopts a case study research strategy (Yin, 2014; Ryan et al., 2002). As proposed by Yin (2014), the researcher started by reviewing literature in order to be able to identify research gaps. This allowed the researcher to formulate two research questions that guided the empirical study of the present WP:

RQ1: How does Bacalhôa's product costing work?

RQ2: Why has Bacalhôa implemented ABC in only one area of the company?

Case study was adopted as this research method has been advocated as the most appropriate to answer ‘how’ and ‘why’ research questions (Yin 2014). Two additional conditions have been indicated by Yin that supports the adoption of case study research: (i) no control over behavioral events; and (ii) focus on contemporary events (see **Appendix 1**). This research meets all these three conditions. Furthermore, case studies represent an important research method in management accounting research (Ryan et al., 2002). Moreover, the type of accounting case study chosen is the *explanatory* where an accounting system is explained using the theoretical knowledge gathered from the literature review (*ibid*).

The main sources of data collection for the case study elaboration were semi-structured interviews and archival records. The interviews were performed during the five months period of the WP elaboration, where five managers were interviewed reaching a total of eight interviews amounting to five hours in total. Interviews were tape-recorded, excluding the first one where the topic of this WP was discussed, and all were conducted in the company’s facilities in Azeitão. A ‘data accounting log’ (see **Appendix 2**) was elaborated to document the subject of each interview (Miles and Huberman 1984).

The interviews conducted to the Finance director were *in-depth interviews* type as they allowed to gather facts and opinions regarding specific events through the five months period (Yin 2014). Additionally, the Finance director is considered more an informant than an interviewee as he guided the researcher with different sources of evidence to the case study. Regarding the other interviewees, the case study interview method was semi-structured interviews since it followed a guide previously prepared by the researcher (see **Appendix 3**). Finally, during the interviews some archival records (e.g. field worksheet, group organigram, enology and bottling processes) were delivered to illustrate topics that were raised.

For each interview, a transcription was elaborated, following with a *data reduction* process to simplify the data analysis. In order to draw conclusions, clusters of information were created, grouping the different themes covered in each meeting (Miles and Huberman 1984).

During the case study development, some advices and insights with individuals working in the agriculture area were gathered, due to the specificity of some subjects. The knowledge collected was used for guidance and to better understand the work procedures and practices associated to the agricultural world.

IV. Case Study

i. Bacalhôa Vinhos de Portugal, SA

Bacalhôa Vinhos de Portugal, SA (henceforth Bacalhôa), located in Setúbal, is one of the largest Portuguese wine making companies (*Revista de Vinhos*, 2012), which achieved a 42 million euros turnover in 2015. Its emergence dates back to 1922, under the name João Pires & Filhos, Lda. In the late 1970's a new owner focused in acquiring several vineyards and developing new advanced winemaking techniques, placing Bacalhôa (at that time J.P. Vinhos) in the top of the Portuguese wineries producing high quality wine. In 1998 José Berardo, the current owner, acquired J.P. Vinhos and, by 2000 amongst the purchase of Quinta and Palácio da Bacalhôa, the name of the company changed to Bacalhôa Vinhos de Portugal, SA.

Nowadays it is present in seven wine regions of the country representing 1,200 hectares of vineyards and four wineries, from where several different wines among forty different castes are born. Throughout its years of existence, Bacalhôa has built a very strong reputation, being recognized as a prestigious brand from both national and international consumers winning several international awards such as the Decanter World Wine Award.

From its core business, Bacalhôa has a wide product portfolio with wines for every taste and occasion. The wines can vary according to the region where they are produced (Alentejo, Douro, Dão, Bairrada, Setúbal, Beiras and Lisboa), the type of wine (white, red, muscatel, rosé

and aguardente – a kind of brandy), and the grape variety (Moscatel de Setúbal, Syrah, Touriga Nacional, among others). Combining these factors, different brands were created, being Quinta da Bacalhôa, Moscatel de Setúbal, and Aliança the most popular ones. All Bacalhôa brands are then segmented into four product categories that can be defined hierarchically in terms of price/quality: Super Premium, *Quintas*, Premium and Value For Money.

The company's internal structure (see **Appendix 4**) is organized in departments, where three are in charge of wine making stages – Viticulture, Enology and Operations – and the following are support departments of Commercial, Finance and Administration. Lastly, there is a department responsible for the wine tourism area which Bacalhôa offers.

ii. Wine making process

Bacalhôa is responsible for the entire process of wine making, from the growing and production of the grapes, to the sale of the final product directly to the customer or to the point of sale. It is a complex process that has to be carefully planned, as it will directly influence the final product.

The process starts with the Viticulture area, the one comprising all the operations responsible for the grape production, from the preparation of the soil until the harvest and delivery to the winery (see **Appendix 5**). If the demand for grapes is higher than the production, Bacalhôa will buy the missing grapes in the market. Nonetheless the proportion of grapes in-house produced is much higher, representing about 95% of the grapes used.

The following stage is the Enology, which is the one in charge of the transformation of the grapes into the different types of wine (see **Appendix 6**). To illustrate, in the production of Red Wine, the oenologist starts by collecting a sample of the grapes from the vineyards in order to test the level of ripeness – if it is as wished, it will then give the order to the Viticulture manager to start the harvest of those grapes. Then in the winery, grapes are washed and smashed. Usually the smashing process separates the juice from the pulp, skin and stems. However, to produce

Red Wine, the skin has to be kept so that the wine gains the expected red color. Thus, the pulp and skin move into the fermenting process that has to be carefully monitored. Following this stage, the pulp is separated from the skin and moves on to the crushing phase. From this stage onwards the dry wine will be clarified and stabilized through the addition of substances like bentonite to avoid muddying in the bottle. Finally it reaches the filtration phase and it is ready to be bottled. After the product being finished, the Operations department handles the bottling and the application of the cork stopper, label and packaging, until it is ready to be sold (see **Appendix 7**). This last stage can be done in different time frames as there are wines that need to age, thus having the label and packaging in a posterior phase; and others that are finished and ready to be sold at once.

iii. Group Reorganization

In 2007, when Bacalhôa acquired Aliança, a prestigious producer of high quality sparkling wines, it felt the need to restructure the Viticulture area of the group. Within the new environment, Bacalhôa owned companies across all the country, facing the dominance of more than one firm per region, operating the same activities. The problematic started to appear, as each of those companies retained their own vineyards and resources (both labor and machinery).

Thus in 2008, the Administration decided it was necessary to unify the management functions of the different areas of the group, meaning that it was nominated one director for the Viticulture, one for the Operations, and so on, whose functions included the whole group. For the Viticulture area, this decision combined with the existence of several companies operating in the same region, resulted in what the Finance director called a “*controlling pandemonium*”: being able to manage the Viticulture resources as a group, resources from one company were being used in other companies of the region, turning the accounting process more complex.

Facing this situation, Bacalhôa developed a strategy to mitigate the environment in which the Viticulture was operating. It created a company called Agro ABC in which the goal was to

“absorb all the labor and machinery resources, and then to provide the service to each region” (Finance director). Agro ABC started to be responsible for the purchase of supplies, and also for providing all the Viticulture services to the different companies – there is a contract in which Agro ABC is in charge for managing the work in the vineyards. Thus, Agro ABC is not expected to generate profits, but to provide a service at the lowest possible cost.

Since Agro ABC was composed with resources from all the companies of the group with Viticulture operations, each of those companies holds a position of Agro ABC in proportion of such resources (see **Appendix 8**). In the end, the company is owned in its totality by the group.

If by one side the acquisition of Aliança increased complexity in the controlling and costing tasks, on the other side the creation of Agro ABC brought to the group some benefits in terms of efficiency in the use of the resources and in negotiations with suppliers. First, while analyzing the circumstances, the company found out that the operations that were conducted in the vineyards in the South of the country were held in different periods of the year, than the ones in the North. This created the opportunity for the same equipment to run across all country, decreasing the need for having multiple machinery and increasing efficiency of the actual ones. Lastly, with Agro ABC being responsible for the purchases at a national level, it gained dimension and scale to negotiate with the suppliers compared to the earlier months, when each company purchased its supplies to local suppliers in small amounts. With the new company supplies are bought at a national level, meaning that a higher amount is purchased at once, which results in better purchasing prices for Agro ABC.

iv. Motivations for a new costing system

Prior to 2008, although being held by the same group, each company followed its own cost accounting practices. According to the Finance director, due to the small dimension of the companies there was no need of adopting a sophisticated cost accounting system, such as ABC. Yet, this does not prevent him to think that the adoption of an ABC system would be important

to improve the efficiency of activities in terms of resource's consumption; however adopting ABC in all companies of the group was not perceived as relevant when comparing the effort needed to implement the system against the benefits of its adoption.

Once Agro ABC was created, in 2008, it emerged the need and the opportunity to adopt an ABC system. Acting as a service provider, Agro ABC needed a costing system that allowed to trace the resource consumption to each one of the vineyards across the country, enabling to charge each vineyard with the respective cost. Moreover, there was an opportunity to start controlling the efficiency of resources being used in each activity undertaken by Agro ABC, in order to “*reach the best quality with the minimum costs*” (Finance director). Thus, Agro ABC implemented a very simple ABC system, only using ‘labor hours’ and ‘machine hours’ as cost drivers. Still, it allowed to benefit from an ABM analysis.

v. Wine costing method

Every year Bacalhôa computes the cost of production of a bottle of wine for each of its brands (see **Appendix 9**). This cost comprises the costs of three areas of production: Viticulture (grapes), Enology (winemaking), and Operations (bottling). Bacalhôa is responsible for the Enology and Operations stages of the process, and Agro ABC for the Viticulture one. Agro ABC uses an ABC system while the other two departments use a traditional cost accounting system, where there are cost centers to compile all the costs.

The first cost to input is the grape cost per kilogram, which will vary if the grapes are bought in the market or if are produced in Bacalhôa. In the first situation the cost to consider is the market price paid, that is negotiated regarding the ripening degree of the grapes. In the second, they are internally bought to Agro ABC at a ‘Fair Value’ – price set by the company, considering the effort put in production and the grapes’ characteristics that can result in a valuation or devaluation of the grapes’ cost of production (see **Appendix 10**).

After the grapes, the second step is to add the vinification (winemaking) costs in order to cost the bulk wine. These costs are associated with the initial operations that will transform the grapes into a liquid bulk wine. Those costs are established by the company to represent 35% of the total costs of the Enology department, being able to suffer a small variation if the grape's characteristics require a more complex vinification process. Therefore, that proportion of the costs will be divided by the liters of wine produced, reaching a unitary vinification cost per liter to add to the grapes' value.

The third step will be at the responsibility of the Operations department that is in charge of the bottling, but also to the Enology department since there are finishing operations such as aging or allotment that need to be performed. So, there will be two overheads adding to the bulk wine cost. The first is the Operations overhead to allocate the bottling costs. Here, the company divides the budget estimated to the Operations department – which includes labor, depreciations, among other operational expenses - by the amount of bottles it is expected to produce in that year, reaching a unitary cost of Operations per bottle. Both these budgeted values, department costs and expected production, are set up in annual meetings. Since there are two bottling lines in Bacalhôa - one that is simpler thus requiring less costs, that is used to the less expensive brands; and other more complex which takes more time and requires more costs that is used by higher category brands - to the unitary overhead a subjective reasoning is applied in order to differentiate the brands that use each one of the lines. Thus, a higher overhead is attributed to the brands requiring the complex line and a lower overhead to the brands using the other, knowing that in the end the total cost of Operations¹ cannot exceed the budgeted one.

To compute the Enology overhead a similar reasoning is applied. From the estimated costs for the Enology department, more or less 65% are spent in performing activities after the vinification process (the other 35% are vinification expenses, as previously explained). With

¹ $[(Ov_1 \times Bottle_1) + (Ov_2 \times Bottle_2) \approx Operations\ Budget]$, where Bottle is the budgeted number of bottles per line.

that proportion of estimated costs divided by the estimated liters to be produced, the company reaches a unitary cost of Enology per liter. Here, there is also the need to differentiate brands by creating an overhead for each product category (Super Premium, *Quintas*, Premium and Value For Money): a Super Premium wine requires more sophisticated operations, like aging in a wooden barrel, than a Value For Money wine. Thus, similar to the Operations overhead, a subjective view is applied to the unitary cost of Enology in order to define one overhead for each of the four categories, giving a higher overhead to a higher product category, and a lower overhead to the categories that require less effort.

Last, one has to add the costs of the bottling supplies - bottle, cork stopper, capsule, label, counter label and package – that are previously set in annual negotiations with suppliers. In the end, the sum of all these components will represent the cost of production of a bottle of wine.

vi. Activity-Based Costing/Management

Amongst its creation, Agro ABC needed a system to trace indirect costs to each vineyard and that allowed for a managerial analysis of the activities, thus adopting an ABC/M system.

In Agro ABC, costs could be allocated to the vineyards only using ‘labor hours’ and ‘machine hours’ spent working in each vineyard, being unnecessary to separate the costs by activities. Yet, since Bacalhôa wanted to perform ABM analysis with the data gathered in order to improve several activities of the Viticulture area, it opted for a simple version of the ABC system.

As a matter of fact, there are two reasons that justify the choice of a simple system. First, the agriculture business in general and its work methodology is a very intuitive one, where each operation’s characteristics and resource’s demand are naturally managed by engineers: as a cuisine chef does not need to follow a recipe to serve a delicious meal, the agriculture intuitively knows how to adapt to the new conditions and developments of the vineyards. Second, the operations necessary to explore a vineyard are mostly measured in ‘labor hours’ and ‘machine hours’, being sufficient to use only these cost drivers.

Activity-Based Costing Mechanics

In the Viticulture area it is necessary to know the total cost of a vineyard, in order to compute the cost of the grapes. The total cost of a vineyard is composed by the sum of several cost components – labor and machinery, technical management, phytosanitary treatments, maintenance and repair, electricity and the depreciations of the investments made in the vineyards (see **Appendix 11**). The ABC system is only responsible for the costing of the labor and machinery component, having the vineyards as cost objects. In the following subsections it is presented how the cost components are allocated to the vineyards.

1. Labor and machinery component (the ABC system)

The ABC system developed has an everyday task of filling in a ‘Field Worksheet’ by the employees working in the vineyards. This worksheet has a list of the activities (see **Appendix 5**) that are performed every year in a vineyard. Then, the goal is for each employee to fill in the hours spent on each activity every day and for a specific vineyard. Hours have to be divided between ‘labor hours’ and ‘machine hours’, where the first represents the time spent doing tasks by hand or with instruments, and the second the time spent in that activity using heavy machinery (tractors, trucks, backhoe or uniloaders). Using these records Agro ABC management calculates, on a monthly basis, the total amount of ‘labor hours’ and ‘machine hours’ spent per activity on each vineyard, in order to allocate those hours to the respective vineyards.

In the beginning of each year, it is elaborated a budget for Agro ABC where costs are estimated based on historical values. The costs that will be allocated through the labor and machine cost rates are the ones presented in **Table 1**.

Table 1 - Costs to consider in budgeted rates

Labor Costs	Machine Costs
- Handwork salaries expenses	- Machine operators salaries expenses
- Fuel	- Fuel
- Vehicle maintenance (collective transport)	- Equipment/machine maintenance & repair
- Communication expenses	- Equipment/machine depreciations
- Instruments and Vehicle depreciations	- Communication expenses

To both these costs it is added a margin of 5%, since Agro ABC is computing a price to charge to each vineyard. Afterwards, managers will estimate the labor and machine hours necessary to perform each activity, considering the historical records of the labor and machine hours spent per activity and the available hours – each employee works 8 hours per day, yet travelling and break times are discounted as vineyards are separated from each other.

Last, it is dividing the estimated costs by the estimated hours that are computed the labor and machine cost rate per hour. With both these rates, Agro ABC will allocate the costs to each vineyard: using the monthly hours per activity that were collected, multiplied by the budgeted cost rate, Agro ABC reaches the total cost of each activity.

After this step, to calculate the total cost of one vineyard, it only has to sum all the activity costs. By doing this costs are being allocated to each vineyard using labor and machine hours as resource and activity cost drivers (see **Appendix 12** for an example).

2. Technical management, phytosanitary treatments, maintenance and repair, electricity and depreciations of vineyards' investments components

The Technical Management component gathers the costs incurred by the supervision directors. It is divided in five cost centers – National director, North management, Center management, South management and National assistance – that gather the costs incurred with these management departments. Every year incurred expenses with salaries, fuel, travel and subsistence, representation, communication and maintenance of the vehicles are estimated for each of those cost centers. To these costs it is added a margin of 5%, as in the previous component. The budgeted costs plus the margin will then be allocated to the vineyards with the hectares of area as allocation basis: the national cost centers will be allocated to the 1,200 hectares of vineyards, the Center management will be to the vineyards in Bombarral and Azeitão, and so on.

The following cost that is necessary to add is the one relative to the products of phytosanitary treatments that are applied to the vineyards - herbicides, pesticides and insecticides. Since the products are bought together for all vineyards, the allocation driver used by Agro ABC is the area (in hectares). Using this allocation driver, the company assumes each hectare of land will have the same amount of treatment, which sometimes is not true as the demand for phytosanitary treatments varies according to the characteristics of each vineyard.

The last three components represent costs that can be directly traced to the vineyards. The electricity costs are directly allocated, since the energy provider charges each vineyard independently. The maintenance and repair costs of the vineyards represent for instance, the maintenance of the water hole or the reparation of some vineyards posts that may have fallen during machinery work. Considering that these costs are not regular, as they occur by necessity to repair some damage, they are allocated directly to each vineyard. Finally, it is necessary to add the depreciations of the expenses the company incurred setting up the vineyard: the costs of the firsts three to five years of existence of a vineyard are considered as an investment since all operations - plantation, building the waterhole (water reservoir), among others – are conducted to build the biological infrastructure of the future grape production. Given this, following the investment period, it is necessary to consider a depreciation of those investments.

Activity-Based Costing/ Management Implementation Process

When confronted with the creation of Agro ABC, the Finance director had to quickly implement the new costing system, since by the end of that month products had to be billed and cost. The process was designed and coordinated by him and the Administration, and at his eyes it was an easy and pacific process: the situation previous to the creation of Agro ABC was so complex to manage, that the new one appeared as an easy change. Agro ABC creation started to be prepared in June 2008, and with that the new costing system started to be planned as well: by September the implementation process begun, being fully operating by the end of that month.

As a matter of fact, the implementation process of the ABC/M system at Bacalhôa was not a typical one, as it was faster, simpler and with less steps than the recommended, mainly due to the simplicity of the system designed. Since the beginning, the process was viewed as easy to implement and the help of external consultants was excluded, and it did not count with seminars to help spreading the benefits and characteristics of the new system across the company. In fact, the message regarding the new costing system was transmitted in a meeting with the engineers, simply to explain the new *modus operandi*. Moreover, the creation of a dictionary of activities was also viewed as unnecessary due to the familiarity with the business and the tasks.

One factor that contributed to the one month implementation was the possibility to eliminate the initial phases of a ‘typical’ ABC implementation process. The agriculture business generally has difficulty in predicting resources’ demand and the need for several operations due to the dependency on the weather and soil conditions. However the amount of activities that can be performed to a vineyard are easily identified and listed. Given this characteristic, together with the intuition of who works in this business, the creation of a list of activities to be costed and the necessary resources was a simple task, eliminating the need of interviews to field labor (the most time consuming stage of the process). Furthermore, since the resource and activity cost drivers were the same, and only based in labor and machine hours, the typical implementation stages that focus in organizing the cost drivers’ information were also eliminated.

The implementation of the ABC system came alongside with the creation of Agro ABC, which resulted in a better organization of the Viticulture area and in the elimination of some complex tasks. Given this, people were more opened to the new system as it would make their work easier. This was the case of the records that are necessary to be collected. In the past, resources were shared across the different vineyards, but costed to the company that ‘owned’ them (see *Group Reorganization* chapter). With this, field labor had to keep record in where they were working each day, so that each vineyard’s engineer could gather all his workers

records, to then deliver the information to the Finance department that was responsible of charging other vineyards with the borrowing costs. Both engineers and Finance department employees considered this record gathering and costing approach a very complex and time consuming task. With the creation of Agro ABC, resources were centralized and those records were no longer necessary. Therefore, when confronted with the new ABC system that demanded keeping a daily record of the hours spent per activity and in each vineyard, there was no resistance from the field labor as in the past a similar task was performed. Additionally, the organization of the data gathered was easier, since in Agro ABC functions were centralized thus existing only one person, the Viticulture assistant, in charge of receiving and organizing the 'Field Worksheet' data. As a result the propensity to detect mistakes and solve them directly with the field workers increased. Also, engineers did not need to perform this task anymore and the Finance personnel received a more organized and timely information. Moreover, for the Finance director there were controlling benefits when using the new ABC/M system, as he could draw managerial decisions through the use of ABM data.

When asked regarding the difficulties that emerged during the process, the Finance director stated that *"There were no room for problems to be considered as there was an imposition from the Administration"*. Nonetheless, time shortage was appointed as the main constraint in the implementation process, whereas the new system needed to be operating until the end of the month in which it started to be implemented.

Regarding the workers of the vineyards, at the eyes of the Finance director, there was no resistance relative to the new role of filling in the hours spent per activity in each vineyard. The data collection process was designed to be as simple as possible, as the illiteracy rate among these workers is considerable – each worker has a pocket notebook to fill in with the data, which afterwards will be inserted in the Excel by the Viticulture assistant. Similarly, the Viticulture assistant, confirmed that she never heard anyone complaining and that data always arrives on

time and generally without problems. She and the Viticulture director considered that the change in costing system went smoothly and without resistance. These statements were expected considering that the filling task was already done yet with other type of information.

Since the new system came side by side with the centralization of the labor and machine resources into Agro ABC, there were some cultural changes that, in the opinion of the Finance director, also helped smoothing the new tasks. Before 2008, although the personnel worked in several vineyards, they were contractually associated with only one company, which sometimes created a competitive spirit when working with other companies' colleagues. Within the new environment, Bacalhôa proceeded with the creation of uniforms similar to everyone across the country, which reinforced the team spirit, since now they all were Agro ABC colleagues.

Activity-Based Management

The information gathered from the activities can be used for multiple managerial purposes. In Bacalhôa, the first goal is to consider activities costs when computing the total cost of the vineyards. However, there is an operational analysis of the data that plays a very important role. In fact, as mentioned before, the possibility to have an ABM analysis was the reason behind the adoption of an ABC system.

The first ABM analysis that Bacalhôa does, is to improve efficiency of resources and to capitalize investments into certain activities. To illustrate, a suitable example is the analysis made to the Pruning (see **Appendix 5**) activity. Through the analysis of hours spent in Pruning, Bacalhôa noticed that too many 'labor hours' were being used, representing a high cost associated to this activity. Knowing this, the group invested in the introduction of pruning shears that would help decrease the amount of time necessary to prune, and also added a Pre-Pruning activity, which occurred before Pruning, to facilitate the work as it diminished the amount of branches and leafs to be pruned in the next time. This solution managed to reduce almost 50% of the Pruning hours. Similar to this example, there were other improvements made

by Bacalhôa in order to increase efficiency of resources and activities and to reduce costs, from elimination of activities to investing in new working techniques.

Additionally, in Bacalhôa the historical information collected regarding the utilization of resources by each activity is used as a basis to develop the annual budget for the Viticulture area. By analyzing the historical consumption of resources that each activity has, the group is able to estimate how much it will spend in the following year. Moreover, the data gathered from the Field Worksheet regarding the labor and machine hours spent per activity, will be used to calculate the budgeted cost rate for both labor and machine hours.

Possibilities of expansion?

As previously mentioned, the ABC/M system was implemented only in the Viticulture area of the group, derived from the opportunity raised with the creation of Agro ABC and the existent necessities to trace costs to each vineyard. This decision of implementation in only one area is unusual, as theory suggests an implementation across the group.

From the Administration side, the possibility of implementing this ABC/M system throughout all the areas of the group is not in future plans, since they perceive the actual method of costing the wine is working as intended. However, from a financial and controlling perspective the opinion is not the same. The Finance director believes the expansion of the ABC/M system to other areas of the group would bring several benefits, not only to make the costing of the wine less complex, but also to improve the group's efficiency and productivity.

V. Conclusions

The present WP introduces the implementation of an ABC/M system, which was adopted to cost one important element of the final product and to allow the company to perform ABM analysis with the ABC information. The implementation was a pilot one, since it was only implemented in one area of the company (Eiler and Ball 1993). Thus, a mixed approach is used to cost products in Bacalhôa: both traditional and activity-based costings systems are used.

In comparison with the literature, this case study reflects several differences regarding the approach chosen. Eiler and Ball (1993) state that the pilot approach can be adopted to allow the company to evaluate the implementation, before extending it across the entire company. However, here there was never the intention to expand the system. Moreover, in contrast with the design guidelines suggested by Cooper (1990) and Eiler and Ball (1993) to reach a successful implementation process, Bacalhôa adopts a simple method eliminating several of those recommendations. The traditional path to develop an ABC system presented by Innes and Mitchell (1993) is also simplified, shortening the implementation time and number of tasks.

The implementation of ABC/M at Bacalhôa seemed to be a ‘successful’ one, given that concerns raised by literature on ABC/M, such as shift in power and politics and employee resistance, appear to be inexistent in this case. Obviously, the study would have benefited if the researcher could have had access to the vineyards employees’ point of view.

Finally, the findings of the current WP bring additional information to ABC/M literature, as the case study introduces an industry that has not been studied in the fields of management accounting. Future research in both wine making industry and agriculture should be conducted to address the specificities that are intrinsic to its work methodology and to understand if the findings obtained in the present WP apply to similar companies in the industry.

VI. References

Argyris, Chris, and Robert S Kaplan. 1994. “Implementing New Knowledge : The Case of Activity-Based Costing.” *Accounting Horizons* 8 (3): 83–105.

Chartered Institute of Management Accountants (CIMA). 2005. *CIMA Official Terminology*. Oxford: CIMA.

Cooper, Robin. 1990. “Implementing an Activity-Based Cost System.” In *The Design of Cost Management Systems: Text, Cases and Readings*, edited by Robin Cooper and Robert S. Kaplan, 386–95. Englewood Cliffs, NJ: Prentice-Hall International.

Cooper, Robin. 1991. "The Rise of Activity-Based Costing - Part One: What Is an Activity-Based Cost System?" In *The Design of Cost Management Systems: Text, Cases and Readings*, edited by Robin Cooper and Robert S. Kaplan. Englewood Cliffs, NJ: Prentice-Hall International.

Cooper, Robin. 1995. "Activity-Based Costing: Theory and Practice." In *Handbook of Cost Management*, edited by Barry J. Brinker. Warren, Gorham & Lamont.

Drennan, Lyndal, and Michael Kelly. 2002. "Assessing an Activity-Based Costing Project." *Critical Perspectives on Accounting* 13 (3): 311–31.

Eiler, Robert G., and Catherine Ball. 1993. "Implementing Activity-Based Costing." In *Handbook of Cost Management*, edited by Barry J. Brinker. Warren, Gorham & Lamont.

Englund, Hans, and Jonas Gerdin. 2008. "Transferring Knowledge across Sub-Genres of the ABC Implementation Literature." *Management Accounting Research* 19 (2): 149–62.

Foster, George, and Dan W Swenson. 1997. "Measuring the Success of Activity-Based Cost Management and Its Determinants." *Journal of Management Accounting Research* vol. 9: 109–41.

González-Gómez, José Ignacio, and Sandra Morini. 2006. "An Activity-Based Costing of Wine." *Journal of Wine Research* 17 (3): 195–203.

Granlund, M. 2001. "Towards Explaining Stability in and around Management Accounting Systems." *Management Accounting Research* 12 (2): 141–66.

Innes, John, and Falconer Mitchell. 1993. *Overhead Cost*. London: CIMA.

Innes, John, and Falconer Mitchell. 1995. "A Survey of Activity-Based Costing in the U.K.'s Largest Companies." *Management Accounting Research* 6: 137–53.

Johnson, H. Thomas, and Robert S. Kaplan. 1987. *Relevance Lost: The Rise and Fall of Management Accounting*. Harvard Business School Press.

Jones, T. Colwyn, and David Dugdale. 2002. *The ABC Bandwagon and the Juggernaut of*

Modernity. Accounting, Organizations and Society. Vol. 27.

Major, Maria. 2007. "Activity-Based Costing and Management: A Critical Review." *Issues in Management Accounting*, 155–74.

Major, Maria, and Trevor Hopper. 2005. "Managers Divided: Implementing ABC in a Portuguese Telecommunications Company." *Management Accounting Research* 16 (2): 205–29.

Malmi, Teemu. 1997. "Towards Explaining Activity-Based Costing Failure: Accounting and Control in a Decentralized Organization." *Management Accounting Research* 8 (4): 459–80.

Miles, M. B., and A. M. Huberman. 1984. *Qualitative Data Analysis: A Sourcebook of New Methods*. California: SAGE Publications Inc.

Miller, Jeffrey G., and Thomas E. Vollmann. 1985. "The Hidden Factory." *Harvard Business Review* 63 (5): 142–50.

Ryan, Bob, Robert W Scapens, and Michael Theobald. 2002. *Research Method & Methodology in Finance & Accounting*. Second Edi. Thomson Learning.

Shields, Michael D. 1995. "An Empirical Analysis of Firms' Implementation Experiences with Activity-Based Costing." *Journal of Management Accounting Research* 7 (1990): 148–66.

Shields, Michael D., and S.Mark Young. 1989. "A Behavioral Model for Implementing Cost Management Systems." In *The Design of Cost Management Systems: Text, Cases and Readings*, edited by Robin Cooper and Robert S. Kaplan, 450–60. Englewood Cliffs, NJ: Prentice-Hall International.

Yin, Robert K. 2014. *Case Study Research: Design and Methods (Applied Social Research Methods)*. Thousand Oaks, CA: SAGE Publications Inc.

Case Study Bibliography

Alemão, Samuel. “Quinta da Bacalhôa – História e sedução na terra do moscatel.” *Revista de Vinhos*, April 18, 2012.

<http://www.revistadevinhos.pt/artigos/show.aspx?seccao=enoturismo&artigo=672&title=quinta-da-bacalhoa-historia-e-seducacao-na-terra-do-moscatel&idioma=pt>.

Amaro, Sandro Filipe. “Aplicação de um modelo de custeio baseado nas actividades (ABC) ao sector vitivinícola.” *Revisores & Empresas*, January/March, 2006.

Azeitao.net. “Bacalhôa vinhos”. <http://www.azeitao.net/vinhos/JP/index.htm>.

Bacalhoa.com. “História - Bacalhôa Vinhos de Portugal”. <http://www.bacalhoa.com/pt/conteudos/conteudos/scripts/core.htm?p=conteudos&f=conteudos&lang=pt&idcont=1313>.