

**ACCOUNTING COSTS WITHOUT A COST ACCOUNTING SYSTEM:
THE CASE OF A SMALL ITALIAN WINERY OF EXCELLENCE [i]**

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ABSTRACT

In recent years the cost accounting of wine production has been the subject of increasing debate in some countries. However, a large number of small and medium-sized companies, often family-run, encounter difficulties and costs to implement cost accounting and management control systems.

In this context this study seeks to determine the wine production cost of a small Italian winery of excellence devoid of a cost accounting system, which, at the same time, shows the need to know and control its costs. Trying to determine the cost of wine production for this company, this study seeks to create a new cost accounting instrument that could be applied to other small and medium-sized wineries as well.

To this end, the production process of the company studied here has been examined and a bespoke model to determine its costs has been created. The accrual accounting data coming from financial statements have been reclassified and inserted in the new cost accounting model.

The purpose of creating this new model is to try to understand whether, in absence of a cost accounting system, it is practicable to use accrual accounting data in order to obtain a satisfactory determination of the full wine production cost and, consequently, whether it is possible to meet, albeit in a limited way, the information needs of companies operating in this sector.

The paper's main element of novelty is the attempt to determine the cost components of wine production without the availability of cost accounting data. This is, at the same time, the main limitation of this study, as its findings cannot be supported by a comparison with those theoretically obtainable applying the model to other companies.

This study is likely to impact on wineries and insurance companies alike, as companies in both sectors are interested in being able to determine the wine production cost at different stages of ageing and storage.

1. INTRODUCTION

In recent years cost accounting of wine production has been the subject of increasing debate in some countries.

As a general trend, the wine sector is not very receptive to management innovations. The growing interest in correctly determining wine production costs is probably justified by a gradual shift from the logic of a family-run company towards a more modern managerial logic (Antonelli, D'Alessio, 2007).

The need to face the growing competition, especially the one represented by emerging countries, and the uncertainty of economic performance, strongly influenced by climatic and environmental conditions, require wineries to accurately determine the costs of their products, to control them and use the information obtained to support their decision-making processes.

However, a large number of small and medium-sized companies, often family-run, encounter difficulties and costs to implement cost accounting and management control systems.

In this context, this study seeks to determine the wine production cost of an Italian winery devoid of a cost accounting system that, at the same time, shows the need to know and control its costs. This scenario is very common, not only in Italy but also in other wine-producing countries. Faced with an objective difficulty in the introduction of a cost accounting system, whose costs are often not easy to bear for such companies, wineries need a first tool for cost analysis and control that may then evolve into a more complex instrument.

Therefore, the purpose of this study is to determine whether, in absence of a cost accounting system, it is possible to reclassify the accrual accounting data in order to obtain a satisfactory determination of the full wine production cost in order to meet, albeit in a limited way, the information needs of companies operating in this sector.

To this end, following the review of relevant literature on wine production costs, the production process of the company subject of this study has been analyzed and a bespoke model to determine its costs has been created. At a later stage, the accrual accounting data have been reclassified and inserted in the new cost accounting model.

The main limitation of this study is related to the lack of cost accounting in the analyzed winery. For this reason a comparison cannot be drawn between the results of this study and the results theoretically achievable with by applying the tool it proposes to other companies.

In light of recent events of sabotage in some Italian wineries (e.g. Soldera in Montalcino and Mannino in Pantelleria), this study is likely to impact on wineries and insurance companies alike, as companies operating in both sectors are interested in a correct determination of the wine production cost, at its different stages of ageing and storage.

The main element of novelty of the present paper is the attempt to determine the various cost components of wine (including the cost of ageing) without the availability of cost accounting data. Indeed, the model proposed here is based on accrual data only. Some studies on cost accounting in small and medium-sized companies discuss the cost-benefit ratio of cost accounting systems on the concrete financial sustainability of associated costs.

The paper proposes a case study, structured as follows. Firstly, a critical review of national and international literature on the determination of wine production cost is presented. Secondly, a brief description of the company under investigation is provided. Thirdly, the model proposed to calculate the full cost of wine production is described. Fourthly, the findings obtained with the application of this model are presented. Finally, some concluding remarks on the information effectiveness of a cost analysis done without a cost accounting system are offered, along with a commentary on the limitations of this procedure and on the model's possible further improvements.

The ultimate purpose is to understand whether the proposed model can effectively meet the information needs related to the knowledge and control of wine production costs or if these information needs can only be met through the use of cost accounting.

2. LITERATURE REVIEW

The importance of Management Control has been widely acknowledged for a long time, but it is mainly from the end of the 19th – beginning of the 20th century that a critical reconsideration of the traditional control systems has started in order to provide more adequate and flexible answers to the sudden environmental changes, such as globalization, enhanced international competition, information technology development and financial crises (Brusa, 2012). Cost Management plays a prominent role within Management Control (Drury, 2008; Atrill and Mc Laney, 2009; Brusa, 2009).

The changes listed above have different consequences according to the specific sector they affect. This has led to the adaptation of cost measurement and accounting methodologies to the specific needs of the various sectors (Dearden, 1978; Evans and Bellamy, 1995).

The wine industry plays a relevant role in world economy and Italy is one of the main producers at a global level, surpassing other European countries and definitely outperforming America, Australia and Africa (see Table n. 1).

INSERT TABLE N. 1 HERE

Therefore, it is surprising that research on cost management in wineries is mainly carried out in countries that have recently emerged as wine producers. Furthermore, this research is carried out to a great extent in business environments (as opposed to academic) and is addressed to professionally run companies (Lopez-Valeiras Sampedro and Gonzalez Sanchez, 2008).

Despite the importance of the Italian viticulture, there are virtually no scientific studies of a theoretical, empirical or practical nature on determining the cost of wine in the Italian literature. Unlike in other countries (e.g. Portugal, Spain, Australia), no specific wine accounting standard exists in Italy. Therefore, although accounting in the wine industry has gained momentum in recent years (Couto Viana and Lima Rodrigues, 2006), there still remains a lot of room for improvement in developing cost structure methodologies fit for small, family-run wineries, such as the Italian ones.

Talking about winery accounting, two important elements have to be considered:

- the wine category/quality under consideration: accounting for premium wines differs from accounting for low quality level wines (Wittwer and Anderson, 2001; Blake *et al.*, 1998);
- the size of the company: accounting for large companies differs from accounting for small and medium companies. (Perera and Baker, 2007; Welsh and White 1981; Reddaway *et al.*, 2011).

Furthermore, in order to clearly identify the determinants of cost of the wine industry, it is important to analyze its production chain. This latter consists of three stages (Ciaponi, 2005):

1. Farming: growing grapes (viticultural activity);
2. Manufacturing (winemaking). This stage can be divided into:
 - a) production of new wine;
 - b) wine ageing;
 - c) bottling and logistics;
3. Marketing/Sale.

Costs occur during phases 1 and 2 and revenues are earned in phase 3. Incomes are postponed in the years according to the ageing time of wine (e.g. five years for Brunello di Montalcino) and they are subject to several risks: biological risk (which influences the time of ripening of the grapes), land risk (which influences quantity and quality of the grapes), climatic risk (which could cause the loss of the product or a lower production).

Therefore, the literature has identified several accounting issues for the wine industry, by making of it a special case of analysis (Maxwell, 1946; Lee and Jacobs, 1993; Juchau, 1996; Blake et al., 1998; Couto Viana and Lima Rodrigues, 2006):

- a) time related problems: *inventories* constitute a large part of the assets whose evaluation is critical. It is argued that *inflation* is an accounting problem for wine companies producing premium wine;
- b) tax related problems: part of the literature raises some issues related to the depreciation of wood barrels for tax purposes, to the right moment to recognize the negative residual value of vine plantations, and to the interests allocated to wine bottles in inventories until they are sold, for the purpose of capitalization; others argue that there is an inconsistency in the impact of taxes in both high and low quality wine industries;
- c) evaluation problems: in the case of companies using home-grown grapes it is possible to find several approaches to recording costs in inventories, as the cost recorded could be equal to the grape production cost or otherwise to the “fair value” cost, derived from transactions related to similar grapes;
- d) cost allocation problems: cost allocation for wineries varies considerably from the system used by producers in other sectors, as the combination of the above mentioned factors makes it difficult to determine.

Focusing on the latter point, to calculate the cost associated with each unit sold (i.e. a single bottle of wine), the cost of each element of the product should be considered: bottle, cork, seal, labels and wine. Most of these costs are easily assigned to the unit of production, but wine remains the main problem.

The proper allocation of overhead expenses is not easy and assumes that the company adopts a cost accounting system able to structure the production process in cost centres. Furthermore, many of the people or other costs involved in the process overshoot cost centre boundaries (i.e. “indirect costs” also called “period costs”) (Dal Poggetto, 1985).

However, cost accounting is neither compulsory nor traditionally used in small and medium-sized family-run companies, such as the Italian ones (Casini *et al.*, 2012).

The main reason is that small wine producers are constrained by size, budget and employee numbers (Lee and Jacobs, 1993). Information provided by the accounting system should be fairly accurate and readily available to be useful for decision-makers but, at the same time, the system should be cheap enough to justify its own existence (Cribari, 1953).

It follows that, despite its importance, the cost of the product is not really known to the companies, because they may not have the accounting system needed to determine the cost of their wine.

Very few attempts have been made to overcome this lack of information. Quite recently, Gonzalez-Gomez and Morini have tried to determine the cost of winemaking through an adapted Activity-Based Costing (ABC) system (2006); Lopez-Valeiras Sampedro and Gonzalez Sanchez (2008) proposed a free online tool to enable grape-growers to assess the resources absorbed by each of the operations carried out in the cultivation of vineyard.

This paper intends to be a contribution to the development of wine cost accounting, attempting to provide an easy approach to calculating the cost of wine also for those companies that do not have at their disposal analytical data from cost accounting.

3. DESCRIPTION OF THE ANALYZED COMPANY

This article is going to apply the cost accounting model proposed to a company founded in the early Seventies in Tuscany. It is a family-owned company, in which the following people work: the founder, some of the members of his family, nine full-time workers and some seasonal workers [ii].

The company produces Brunello di Montalcino, a red wine entirely made from Sangiovese Grosso grapes. In 1980 this wine obtained the Controlled and Guaranteed Designation of Origin seal (DOCG). It is a wine that requires a long ageing period. The company produces two types of the same wine:

- 1) the "Brunello di Montalcino", which needs to age for at least five years before being marketed;
- 2) the "Reserve", which needs to age for at least six years before being marketed.

In some years the company also produced other types of wine (for example, "*Rosso di Montalcino*" or red table wine). However, these productions were very limited in terms of quantity. As observed above, the main production consists of two types of Brunello di Montalcino which only differ in terms of ageing, so the company can be considered as a mono-product company.

The manufacturing process of the company is based on a business philosophy aimed at creating a high quality product. The vineyard is part of a complex ecosystem designed to create optimal conditions for the ripening of the grapes. Close to the agricultural land there are a forest, a stream, a pond, an orchard and a garden. The latter includes extremely rare plant species that make it a true natural heritage.

This environment is home to many species of animals (birds, mammals, insects, etc.) and creates ideal conditions for the production of a wine of absolute excellence, without the use of chemicals and other harmful substances.

The entire production, from the vineyard to the bottle, takes place according to strict rules aimed at obtaining the best possible quality of wine. The staff employed in the company is carefully trained and ready to intervene at any time, both in the vineyard and in the cellar. The production activity requires continuous material intervention on the vines, in order to improve the product's quality.

This company's philosophy leads to the production of a quantity of wine by far lower than what is potentially attainable, but of excellent quality. On average the company produces 15,000 bottles of wine yearly.

Due to the strict rules of the production process and the necessary upkeep of the land, carried out with little use of machines, the company supports unusually high production costs compared to other wineries. One could consider, for example, the costs for management and maintenance of the forest, the garden and the orchard, or the costs for the many manual tasks that are carried out in the vineyard and in the cellar, which are substantially higher than the costs incurred by other wineries making heavy use of mechanization.

4. THE MODEL TO CALCULATE THE FULL COST OF PRODUCTION

This part describes the methodology followed to assess the full cost of production of a bottle of Brunello di Montalcino wine of the examined company; general accounting data aptly elaborated have been used to this aim. In absence of an analytical accounting system, only data coming from financial statements for the financial years ranging from 2005 to 2011 could be used.

The proposed logical model could be adopted as a general scheme for calculating production costs for other wineries, in absence of an analytical accounting system. It is acknowledged, however, that the achieved results may be considerably different, depending largely on the business to which the model is applied.

The company can be considered as a mono-product company, although it has occasionally produced wines other than the Brunello di Montalcino (for example the “Rosso di Montalcino” and the “Rosso da tavola”). Indeed, the production of other types of wine is sporadic and it concerns extremely small quantities of wine.

In a mono-product company, determining the full cost of production raises fewer problems than in multi-product companies. It is not unreasonable to calculate the average cost of annual production dividing the average total cost of the seven year period (€1,015,125) by the average number of the bottles produced per year (approx. 15,000). The result is an average cost per bottle of approximately €68. Taking as a reference a standard 75 cl bottle, the cost per litre is €90.23 (€9,023 per hectolitre). This result, however, suffers from severe distortions due to the discrepancy between the production period and the recognition of costs in the general accounts and, more generally, due to the life cycle of the product. This issue is particularly relevant to the proper determination of the production cost of a bottle of wine.

The basic problem lies in having to attribute to the selected item (product/process or organizational structure) the natural costs recognised and accrued according to their nature by conventional accounting systems in the same time span (e.g. production costs with reference to the same period of time). In the examined company the bottles produced during a specific year (e.g. 15,000 bottles in 2010) are made with productive factors consumed over a significantly longer period (i.e. 2005-2010), because of the particular life cycle of the bottles.

The production cycle of the examined product is as shown in Table n. 2.

INSERT TABLE 2 HERE

The 2005 vintage is ready for being marketed by the end of 2010 (at the end of 2011 for the “Reserve” type). Therefore, the first revenues related to the 2005 vintage will be recorded in 2011 (in 2012 for “Reserve” quality). Thus, in order to know the cost of production of the 2005 vintage, one cannot consider only the costs dating back to 2005; it is also necessary to look at the costs of the related ageing period (2005-2010).

The choice could be made, then, to calculate the average cost of production by summing the costs of the years under investigation and dividing them by the average yearly production. It is, however, obvious that even this solution is not acceptable, since the costs of the several years considered cannot be attributed entirely to the average yearly production. In fact, during any period of reference (e.g. 2006-2010) the production costs of different vintages overlap (e.g. in 2006 the wine produced before 2005 will be still in the course of ageing, and the wine of the 2002 vintage will be bottled). In other words, the costs recorded in the 2005-2010 period cannot be allocated exclusively to a single vintage.

In summary, there are two kinds of problems:

- 1) calculating the costs recorded along the production course;
- 2) finding a policy to isolate, among these, only the proportion related to a particular production.

The cost of the products sold in 2011 is the sum of the costs of the individual activities carried out in different years. The cost of each activity is related to a particular semi-finished product (i.e.: grapes, wine in casks, aged wine, bottled wine). In view of these considerations, the most logical solution seems to be to design a system of cost allocation that is a mix between the

traditional model of cost centres and the most modern method of Activity-Based Costing (Kaplan and Cooper, 1988, 1991, 1992, 1998; Brusa, 1995; Bubbio, 2002; Anthony *et al.*, 2012). In doing so, cost-activity centres that represent the peculiarities of the production process of the analyzed company can be identified.

According to the literature cited above, the *costing* process is divided into several stages:

- 1) selection of the main cost–activity centres involved in the production process;
- 2) attribution of direct costs to the relevant activities;
- 3) allocation of indirect costs to the relevant activities using appropriate allocation criteria;
- 4) transfer of costs allocated to activities onto products (activity cost per unit);
- 5) calculation of the full cost as the sum of the costs of the aforementioned activities.

The following sections describe these stages in detail.

4.1 Selection of the main cost-activity centres involved in the production process

Firstly, it is necessary to identify the main cost-activity centres involved in the production. Based on the literature (Ciaponi, 2005), the wine production in the surveyed company is linked to the performance of the following macro activities:

- viticultural activity;
- winemaking;
- ageing;
- bottling and logistic activities;
- marketing/sale.

The sum of the costs associated with these activities can be regarded as the full cost of production, as shown in Table n. 3.

INSERT TABLE N. 3 HERE

In order to define the macro activities to examine, Porter's value chain model (1985) has been used. Following the indications of the value chain, activities can be divided into *primary* (including production and sale of the product) and *support* (i.e. providing input, technology, human resources, and any other activities cross-sectional to the others, such as administration). The common trait of these activities is to be auxiliary not to one but to all other activities.

In this case study five *primary* activities and three *support* activities have been identified, with some differences from the traditional value chain. In this case inbound logistics and services are not considered separately. In addition, technological development is called Research and Development (R&D). The fact that inbound logistics is not mapped separately does not mean that the activity does not exist. Indeed, for the examined company (and wineries in general), it is more reasonable to insert inbound logistics after the viticultural activity and before winemaking. The activity is still important, because there are large quantities of grapes to be handled quickly in order to enhance the final quality. However, for costing purposes it is preferable to ascribe the logistics (and related costs) of managing the newly harvested grapes to the winemaking rather than considering it as an activity per se.

The value chain of the surveyed company is shown in Table n. 4.

INSERT TABLE N. 4 HERE

The following sub-sections will briefly describe the individual macroactivities divided into "*primary*" and "*support*". This analysis will help in determining the criteria of cost allocation to the activities and in better understanding the peculiarity of the company under examination.

4.1.1 Description of the primary activities of the company

As already mentioned, the *primary* activities identified in the company are: viticultural activity, winemaking, ageing, bottling (and related logistics) and marketing & sale.

a) Viticultural activity

In the viticultural macroactivity there are two main phases linked to the natural evolution of the vineyard:

- installation and development of the vineyard;
- vineyard management.

For the purposes of this analysis only the management phase is considered, as the company's vineyard is fully developed. The vineyard productivity (grape quantity per hectare) is linked to the life cycle of the plant. On average, the maturity phase characterised by constant productivity spans from 6 to 30 years from the installation of the vines, and then productivity starts decreasing (Spano, 2010). However, life cycles and related productivity are specific to each vineyard, and quality is in an inverse relationship with productivity, as evidenced by the experience of the examined company. In this case, the best wine is produced by the oldest vines.

Management activities aimed at grape production are different in terms of quality and accuracy depending on the vineyard. Exactly because of these activities, the company under examination is unique on the international scene. Preventive operations, soil management and analysis are carried out with extreme accuracy. For example, thinning operations are carefully carried out to reduce the quantity of grape produced by vines in order to improve the quality of the remaining grapes. All operations are carried out manually.

The pruning is likewise delicate and precise: specific rules must be observed in order to obtain a wine of exceptional quality. This operation begins in February, when the plant is dormant and it is done in order to prepare the plant as well as possible (assuming oncoming adverse weather). All this is possible if the vine is preset to extremely low yields (even down to only one bud per plant in the company under examination).

The arrangement of trellis structures for the vineyard is carried out immediately after the pruning in order not to disturb the gems that will be blooming during the spring. The maintenance of trellis structures and especially the tying of trunks is made so that the cords are not too tight and the sap is allowed to flow without impediments). Suckering operations are equally difficult, because they may affect the gems.

In case of adverse weather, further operations take place:

- drastically reducing the bunches, keeping only the best in terms of both health and maturation level;
- removing leaves and buds that block light and heat for the few remaining clusters;
- eliminating any bunch which is dry or affected by mould or has incurred other incidents;
- waiting for the optimal time of grape maturation for the harvest;
- making a further manual selection of the clusters in the winery before vinification.

For the company under examination, the management of the garden bordering with the vineyards must be added to the described activities. This garden represents a heritage of great value, because of the rarity and the beauty of the hosted species, and it constitutes an irreplaceable biodiversity area; it is, in fact, a shelter and a proper reproductive environment for birds, small mammals and insects. Its care requires the use of several resources. There are also artificial nests positioned to induce animals to reside there. Ultimately the goal is to create an ideal ecosystem for the vineyard.

The harvest has special features and precise rules, too. According to the owner: "The grape harvest should only be done at the right time, when the grapes are fully ripe. Only absolutely healthy and perfectly ripe grapes must be collected and vinified and, finally, the duration of the harvest should be very brief, because otherwise the grapes deteriorate". With the grape harvest, the viticultural activity comes to an end.

b) Winemaking

In this study "winemaking" refers specifically to the first transformation of grapes into wine, namely must production and vinification, excluding ageing. Indeed, given the importance of the ageing operations, both in economic and quality terms, it has been decided to consider this activity as object of independent costs. Winemaking starts with the reception and selection of the grapes and their chemical and organoleptic analysis. For the company under examination, the whole process requires only two days.

The fruit is carefully selected and, within an hour, destemmed in the cellar and placed in vats, where fermentation will take place thanks to indigenous yeasts, without temperature checks and with manual pumping of the must to the surface. All these operations are carried out trying to minimize human interventions. The must will remain there for over thirty days. After these operations, there is the stripping, i.e. the removal of stems from the grapes. The company under examination purchased cutting-edge machine to do this in order to minimize the impact of mechanization on grape quality.

These stages are usually followed by crushing and maceration, during which procedures juice and skins remain in contact at a certain temperature, and applied pressure allows the substances contained in the skins to leach into the must. In the company under examination, however, in order to avoid ruining the grapes' quality, they are not crushed. During the same evening that the vats are filled, the owner proceeds personally to pump the must to the surface outdoors, and, at a later stage, this operation is done three times a day for each vat.

Every morning, samples of must are taken for analysis from each vat and, late in the evening, the results of the analysis are checked. Another important consideration is the age of the vines from which the grapes come. The vinification shows different trends between the vineyards of 35/36 years and the vineyards planted in 1998/1999/2000. In the first case, the duration of the vinification is usually shorter (20/22 days), in the latter it is longer (28 days). For the purposes of this study, the vinification ends the winemaking activity.

c) Ageing

Considering the importance of these operations in the case under examination, the ageing activity is treated separately from winemaking. It is a peculiar activity linked to quality standards that allow the wine to acquire specific organoleptic characteristics. The minimum period is determined by the production regulations. The "Brunello di Montalcino" DOCG must be subjected to an ageing period of at least two years in oak containers of any size, in addition to a period of at least four months in bottles. It cannot be placed on the market before the 1st of January of the following year at the end of five calculated years, considering the year of the grape harvest. The "Brunello di Montalcino" DOCG can be classified as "Reserve", if it is placed on the market after the 1st of January of the

following year at the end of six years, calculated by considering the vintage year, two years of ageing in oak barrels and six months in bottles.

In the company under examination, in order to achieve the best possible quality, maturation times are greatly dilated and the wine is constantly monitored and analyzed with the support of a university (owing to a research and experimentation agreement). Wine maturation takes place in specially designed cellars with the right temperature, humidity, air circulation, light, noise and odour, in large wooden barrels that do not transfer flavours and aromas to the wine. In this way, the wine naturally acquires its taste and smell from the grapes, which would otherwise be destroyed and replaced by flavours and aromas of the oaks.

The owner has designed and built a detailed studied wine cellar, focused on ageing activity in order to enable the maturation in the best possible circumstances.

d) Bottling and logistics

Although part of the ageing takes place in the bottles and the bottling process precedes bottle ageing (which is part of the ageing activity), in order to identify cost units, it has been preferred to consider bottling, packaging and commission management separately. In this way this phase is monitored independently from the purely operational phases of winemaking and it is considered as a management activity, not as a productive one.

This solution is inconsistent in terms of sequentiality of the process, but it preserves the advantage of separately considering tasks belonging to different activities, whose costs are allocated separately. In the company bottling is done without any fining, filtration, polishing, additives, preservatives, colours, flavours and/or fragrances. In addition there is a studied selection of bottles, caps and packages for the best preservation of wine.

e) Marketing/Sales

This category includes management activities of national commercial agents, foreign importers, sale targets, contractual terms and conditions of any financial incentives linked to the sale budget and all the activities related to promotion in a broad sense (organizing events, trips abroad, participation in fairs, etc.). With reference to the advertising strategy, the company, in line with the niche occupied by its wine, promotes the brand with targeted interventions: it avoids the most common media channels and integrates the promotion with a continuous activity of hospitality/reception to raise awareness regarding the quality of the product purchased for those who have specific interests in it.

4.1.2 Description of the support activities of the company

The main *support* activities identified in the company are: Research and Development, procurement activity, infrastructural activity and Human Resource management.

a) Research and Development (R&D)

This activity is a task of strategic importance. For the purpose of the costing process, this category includes all the activities carried out by the owner in constant collaboration with the university, through specific agreements aimed at continuously improving the quality of the product. Consistent with the corporate production philosophy and intrinsic exclusivity of the product, research on the consumers' taste and demands on the produced wine have not been undertaken.

b) Procurement activities

This category includes some of the activities supporting production. It is important to point out that for the purposes of costing in this model, the cost of each purchased input is allocated to the activities using that productive factor (for example, the cost of the stemmer machine has to be allocated to the vinification activity and not to the procurements); consequently, only the inputs

used in purchasing activities (human resources, infrastructures, tools used to perform activities) should be linked to procurement activities and not the objects of purchasing activities (machines, services, fertilizers, bottles, corks, etc.). With reference to the purchased productive factors, these are distinguished between factors used in the operating cycle of the vineyard/wine cellar (e.g. fertilizers, fungicides, bottles, corks, labels, capsules, packaging) and structural factors (e.g. barrels, vats, buildings).

c) Infrastructural activities

This category includes those operations that fulfil the accounting, legal and tax functions.

d) Human Resource management (HR)

It includes all the activities related to research, selection, training and management of the personnel in a broad sense, regarding full-time workers, freelance workers employed cyclically, national commercial agents and importers. HR management also includes those activities regarding the incentive system related to sale activities.

Although from the value chain point of view it is more correct to keep *support* activities separated, for the purpose of the costing process the procurement, infrastructural and human resources management activities are all grouped into a single category called “administrative activities”, in which all the costs of these three activities are allocated. This happens for purposes of simplification and because of a lack of a detailed account chart.

4.2 Allocation of direct costs to relevant activities

The second phase of the costing process consists in the allocation of direct costs to the respective activities. This allocation has been made considering the nature of the cost (e.g. the cost of fertilizers is clearly a direct cost of vinification).

4.3 Allocation of indirect costs to relevant activities through appropriate allocation criteria

After defining the activities to be considered in the costing process and after having allocated the direct costs, the indirect costs allocation criteria must be identified. Proper cost allocation would be easier if the company was equipped with an analytical accounting system, which would allocate the consumption of productive factors to the cost-activity centres that have led to the creation of the product at the time of the operation. Without this tool, only a simulation on the basis of general accounting system information can be proposed.

The indirect costs are listed below:

- a) wages;
- b) depreciation;
- c) maintenance and consumptions.

The criteria for indirect cost allocation are identified below.

a) Wages

For personnel costs, the cost driver is represented by the days dedicated to each activity. The costs are calculated separately for each full-time employee and teams of autonomous workers. They are then allocated to the various activities according to the percentage of working days dedicated to each activity. A time report instrument, working on a monthly basis and able to detect the time spent by the personnel in various activities more accurately, could be introduced in the company at a later stage.

b) Amortisation

With reference to assets, a distinction must be drawn between those directly and indirectly attributable to specific activities. To identify the use of the assets the description given in the general accounting system was used, as well as the details observable in the register of depreciable assets. The greater part of the depreciation is represented by the wine cellar (approx. 71%). The cellar is the typical asset that produces indirect costs to be redistributed between winemaking, ageing and bottling/logistic activities; the remaining activities have been excluded, because they are not considered to be involved in the consumption of the productive factor in question.

The most reliable allocation driver is represented by the square meters occupied in the cellar for use by the three activities mentioned. The square meters are assumed to be exploited for the three activities for 10%, 70% and 20% of the total respectively, even though this estimate would benefit from more accurate measurements. Other indirect costs (equipment, vehicles, etc.) have a relatively modest importance (1-2%), except for the building that hosts the main office (the owner's house), which is around 4.5% of the total depreciation. In view of the relative weight, it has been decided not to use a basis for specific allocation, but to allocate the costs in question linearly to the seven activities (1/7). Alternatively, the working days could be calculated assuming that the more labour-intensive activities absorb proportionally higher costs.

c) Maintenance and consumptions

Maintenance has an extremely small effect on the total business costs. It is related principally to the operative and logistic activities (in particular the wear and tear of the bottling machine), but defining a parameter for cost allocation is a difficult goal. The same holds true for consumptions, with the difference that the use of the productive factor, in this case, could theoretically be related to all the activities and not just to operative and logistic ones. In view of the insignificance of the amounts, it has been decided to select a linear distribution criterion with respect to the various activities.

4.4 Transfer of costs allocated to activities onto products

After having quantified the costs (direct and indirect) of each activity, it is possible to transfer it onto each of their related products (grapes, bulk wine, aged wine, bottled wine). Dividing the activity cost by the units of product (within the same time horizon) it is possible to determine the cost of performing that activity per single unit of product. For example, dividing the total cost of the vines by the total weight of grapes produced delivers the cost per quintal of grapes. The sum of the unit costs of the various activities is the full cost of production. The following scheme summarises the individual activities.

a) Viticultural activity cost (see Table n. 5)

INSERT TABLE N. 5 HERE

Vineyard hectares and quintal of harvested grapes are extracted from the ARTEA (Tuscan Regional Agency for Supplies in Agriculture) database, converting the units respectively in hectares (ha) and quintals (ql). In absence of official data for the years 2005 and 2006, the average for the 2007-2011 period has been used. In the interest of simplicity, the harvest has been considered as producing only "Brunello" type, even if a portion of the total belongs to the "Red" type. In any case, considering the products separately would not change the logic used. In this case, it would be sufficient to spread the total costs of the two products under examination using the respective volumes as driver. The vineyard productivity provides strategic data for the analysis of the production cost. Indeed, the average cost per harvested quintal is strongly influenced by the acres of terrain and the quantity of harvested grapes: by changing the input values, the average harvest cost is significantly modified.

Focusing on data from 2011, it is evident that the cost of grapes doubles with respect to the previous year, due to a drastic reduction in the productivity of vines. Given the inverse relationship between productivity and wine quality (low productivity is usually connected with high quality wines), it is clear how the company, managing the vineyards in low productivity, supports considerably higher unit costs. The average cost per quintal of harvested grapes is €750 (€7.5 per kg). If required, the wine cost per hectolitre is determined by converting quintals of grapes to equivalent hectolitres, using the concept of yield per hectare. ARTEA source data have been used also in this case. With approximately 190 hectolitres produced in total (29 hectolitres per hectare), the average cost is of €1,000 per hlof of wine (€10 per litre).

Once again, it is evident that the value is strongly influenced by the yield per hectare (see Table n. 6).

INSERT TABLE N. 6 HERE

b) *Winemaking cost* (see Table n. 7)

INSERT TABLE N. 7 HERE

The same logic has been used for winemaking. The total cost has been divided by the amount of obtained product. The cost of winemaking for 2005 is then determined according to the following calculation: $\text{€}46,156 / 191.2 \text{ hl} = \text{€}241.4 \text{ per hl}$ (€2.4 per litre). The sum of the cost of the viticultural and winemaking activities amounts to approximately €14 per litre.

c) *Ageing cost* (see Table n. 8)

INSERT TABLE N. 8 HERE

For ageing activities, the basic problem lies in linking the costs coming from conventional accounting systems to the product. The sum of the annual ageing costs (indirect and direct) must then be linked to the object of the activity, namely the wine maturation in the cellar in the surveyed year, to obtain the cost per hectolitre of wine maturation. The amount of wine (in hectolitres) subjected to maturation has been determined consulting stock cards.

It is reasonable to assume that the product is all the wine in stock, excluding the bottles ready for sale. In other words, it is necessary to find a criterion to distinguish the semi-finished products from bottles sold, as they ended their production cycle. Since the bottles are ready for sale at the end of a five year period after the harvest, it can be assumed that it is necessary to determine the total inventory of the saleable wine in order to identify the wine undergoing maturation (also in bottle).

For example, for the year 2005 the warehouse would consist of a total stock of 876 hl, divided as follows:

- marketable wine from the 1999 vintage and previous years (80 hl);
- wine under maturation ($876 - 80 = 796$ hl).

At this point, the period costs can be allocated to the semi-finished product to get the annual unit cost of maturation. This approach determines a cost of €702 per hl for the past five years, equal to circa €7 per litre (on average €1.4 per year). This is the only economic cost, to which the financial cost (opportunity cost of an alternative investment) must be added. An alternative solution for the allocation of these costs can be suggested, as most of the costs are related to assets used for maturation (tanks, casks). The result in this case is given by the annual cost of each asset divided by its capacity in hectolitres and again divided by 365 days (unit cost per time unit). Thanks to this algorithm the maturation cost for a hectolitre per day is determined with reference to a particular asset. As a result, the maturation cost of a certain amount of hectolitres for a specified period shall be given by the unit cost per time unit x (Hl) x (time). This solution is definitely more accurate, because it does not allocate the costs of underutilization to the ageing wine, if the aged hectolitres

are less than the barrel capacity. In addition, this method has the advantage of considering not only the volumes of product, but the time as well.

The first solution has the advantage of allocating to the product all the costs related to the maturation: not only barrels, but also personnel, maintenance, bills, i.e. all the productive factors consumed in order to get the wine to the market. It also considers the bottles in stock that absorb part of the costs of ageing in the cost allocation process. Time is also considered as a factor: annual costs of ageing for each of the five years are allocated to the wine.

The cost considered so far can be defined as the annual economic cost of ageing. However, the cost of ageing also presents a financial side, namely the opportunity cost generated by immobilized capital, in this case the semi-finished products in stock. In particular, the immobilized capital for a bottle in maturation for five years is the cost of the first year activities on the product (viticultural, winemaking and ageing) with the addition of the ageing cost of the next four years.

The rate of return used in this instance to determine the financial cost is that of long-term (five years) Italian Treasury Bonds, assuming an annual gross coupon of 4% and an original issue discount of 2%. The rate of return net of tax for five years is therefore of 17.25% (based on a tax rate of 12.5% on the discount and on the coupon over a five year period, without including in the calculation yields of the original issue discount and commissions). As an alternative, the historical performance of short term (annual) Italian Treasury Bonds could be used, returning a lower average rate. In any case, the calculation logic remains the same.

At this point, applying the rate of return of the capital immobilized on alternative investments, the financial cost of ageing can be calculated. Added to the economic cost, it represents the total cost of ageing. For the company under examination, the financial cost for five years is €310 per hectolitre, corresponding to €3 per litre. The total average cost of ageing (economic and financial) is $(140 * 5) + 310 = €1008$ per hl, equivalent to approximately €10 per litre.

d) Bottling and logistics cost (see Table n. 9)

INSERT TABLE N. 9 HERE

All the costs related to bottles washing and sterilization, the transfer of bulk wine in bottles, capsule and label application, bottles packaging, general packaging, order management costs and logistics are attributed to this activity. On average, the cost per litre of this activity is approximately €7. The sum of the unit costs of the activities represents the full production cost. On average, over the period considered, this cost amounts to €3,149 per hl, corresponding to €31.5 per litre. In order to calculate the full corporate costs, the cost of the remaining non-operating activities should be considered, as described in the previous sections.

e) Marketing/Sale cost (see Table n. 10)

INSERT TABLE N. 10 HERE

All the costs generated by sales force, events organization, trade fairs, travel and the overall hospitality activities are allocated to this activity. The allocation driver is represented by the bottles sold. In order to work on the same unit of measure as for other costs (HI), 0.75 litre bottles have been considered in terms of hectolitres of sold wine. In the interest of simplicity, average data have been used (112 hectolitres). Alternatively, the quantity of bottled wines could be used for this calculation.

This cost should be added to the amount of lost profits, i.e. the costs related to the commercial brokerage, which are paid through a discount on the purchasing price instead of through a commission on the final sale price. In this instance, however, it has been decided not to consider this aspect. The cost per litre of commercial activities is, thus, on average, approximately €15.

f) *Support activities costs*

The *support* activities consist of the R&D and administrative activities in the broadest sense (see Table n. 11).

INSERT TABLE N. 11 HERE

The costs incurred for the activities reviewed are not referable to manufactured and sold product, but to the company as a whole. It is reasonable to assume that all the company has to absorb a percentage of these costs, which cannot be allocated to the annual production alone. Because of these considerations, the total wine lying in stock has been selected as the basis of cost allocation excluding the sold wine. Also for what concerns *support* activities, some cost items should be accounted for in more detail. In any case, the calculation logic would not be affected. The cost per litre of these activities is circa €4.

4.5 Full cost calculation

At this point, by adding the cost of the individual activities, the full cost can be obtained (See Table n. 12).

INSERT TABLE N. 12 HERE

The average full cost for five year aged wine is approximately €40. The scheme shows some variability over the years, due to the different vineyard productivity during the period under investigation. This estimate, however, represents only an initial assessment requiring further refinements. Accounting for the cost of brokerage would require using specific data rather than average data and the hypothesis of wasted production has not been considered in this study.

The feature of the described model that should be highlighted is its logic, which facilitates the correct determination of the production cost. The average cost per hectolitre, circa €5,000, is consistent with the evaluation of inventories included in the balance sheet. However, the cost as defined in this study can still be considered partial.

There is, in fact, a further cost configuration called "technical and economic cost". To quantify the technical-economic cost, which goes beyond the objectives of this study, at least the remuneration of the owner and his wife and the opportunity cost of the cultivated land should be added to the full cost.

5. CONCLUSIONS

The aim of this article was to provide a contribution to cost accounting in absence of a cost accounting system from the theoretical, but also from the empirical point of view. Under the theoretical aspect, it was necessary to adopt a methodologically composite approach, adapting some costing models from the literature to the case study. Under the empirical aspect, it was necessary to apply theoretical knowledge in a company whose economic information was not fully available. Therefore, this study presents various aspects of novelty, since analytical accounting data relating to the costs of wine production are often not available in Italy. The limited availability of analytical accounting data creates difficulties in using the information on production costs for decisions of governance of small and medium-sized wineries.

The model proposed appears to have a theoretical and practical relevance and it may constitute a first step, susceptible to improvement, toward the determination of production costs in this sector, whose importance is great in the Italian economy. The determination of the various configurations of the cost of producing a bottle of wine has required periodical meetings with the management of the company. These meetings were useful both for academic and managerial purposes: they served to accurately determine the full production cost of a bottle of wine, as per

the main aim of this study, and to provide the management with a more thorough knowledge of the weight of the cost of each activity on the finished product

The company represents an exception in the Italian viticultural sector, in terms of the quality of its product but also of its organisational structure and the availability of accounting data. This translates at the same time in a strength and a weakness of this study: thanks to the company's characteristics, the creation of a general theoretical model for the determination of the full production cost in a very complex scenario was possible; at the same time, the model resulting from this study would need adaptation to be applied to companies with other characteristics (e.g. different quality of the product, lack of availability of general accounting data).

Small and medium-sized wineries have recently approached general accounting systems for management reporting and preparation of financial statements, even though often these companies still do not feel the need for an analytical accounting system able to describe and evaluate the full wine production cost in its basic unit of sale: the packaged bottle of wine.

Originally, the aim of calculating the wine production cost of a company committed to excellence without the availability of analytical accounting data seemed questionable and difficult to reach. The first attempts to identify direct and indirect costs and to assign them to specific activity areas of the wine production process have proved difficult in the absence of basic accounting data. Another critical factor was the possible arbitrariness of the allocation of costs to the various areas of activity.

Calculating the various cost configurations in the company under examination was possible only after having overcome these initial difficulties and having verified the existence of analytical knowledge, albeit fragmentary, in the company. The basic information about accounting data was fundamental for this study.

The study of available data, collected with the help of operators of the company, allowed the allocation of costing data to the activities conducted in the manufacturing process. The obtained results appear reliable and noteworthy, both for corporate governance of the company and the literature on the subject.

In this study, the benefits contributed by the ecosystem to the production of this wine of excellence have not been evaluated. If this ecosystem had had to be set up ad hoc for corporate purposes, the opportunity cost of creating these specific conditions should have been assessed as well.

The methodological approach followed for the configuration of the technical-economic cost and, more importantly, for the articulation and overall determination of the cost of producing a bottle of "Brunello di Montalcino" wine illustrates an attempt to use the best known definitions of business costs (direct cost, full cost, activity cost, etc.). This has given rise to a methodology applicable to the company in question and suitable for the determination of analytical economic information on the costs faced by small and medium-sized companies in the winemaking sector.

The aim of this study was to obtain economic information able to support decisions about product pricing. The method used appears to be appropriate, as the values it determines are consistent with the initial hypotheses, with general reflections of the company owner and with the national and international economic environment. Therefore, it seems possible to conclude that this methodological approach can be useful to wine producers who do not have, or even do not want to have a complex system of cost accounting in their small businesses.

Further research will be carried out on the foundation laid by this study, as further applications of this methodology seem appropriate to confirm the theoretical and practical validity of the proposed model, as well as to bring its possible structural and practical limits to the surface. A possible limitation of this methodology could be linked to the conciseness of the information

obtained and its usefulness in a set time. In this methodological approach, indeed, it is difficult to detect whether there are critical factors in the production process to be considered in the future, their number and nature. The full cost of a bottle of wine must be the foundation of pricing and of the determination of the profit margins expected and achievable by the company.

The proposed method is justified only in absence of an analytical accounting system. However, the possible developments of this informative approach reach far beyond its initial purpose. Other users (such as, for example, insurance companies) could be very interested in an exact determination of wine production costs and, for this purpose, further research is required.

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ENDNOTES

[i] Even though this paper comes from a joint research work of the Authors, it can be attributed to: Lucia Biondi for section 2 and sub-sections 4.1.1 and 4.1.2, Lidia D'Alessio for section 5, Carmela Gulluscio for sections 1 and 3, Andrea Rossi for section 4.

[ii] Due to confidentiality reasons, all elements that could lead to the identification of the company under examination have been omitted from this study. The claims made in this article on the company and its products are based on the company's website, interviews and documentation provided by its management, the national and international press coverage received and the awards won by the company itself.

Table n. 1: Global production of wine in hl (millions)

Source: our adaptation from OIV data

	2005	2006	2007	2008	2009	2010	2011	2012
France	52,1	52,1	45,7	42,7	46,3	44,5	49,8	40,5
Italy	50,6	52,0	46,0	47,0	47,3	48,5	42,3	40,8
Spain	37,8	38,1	34,8	35,9	36,1	35,4	33,4	31,5
Germany	9,2	8,9	10,3	10,0	9,2	6,9	9,1	8,9
Portugal	7,3	7,5	6,1	5,7	5,9	7,1	5,6	5,9
Romania	2,6	5,0	5,3	5,2	6,7	3,3	4,1	4,1
USA	22,9	19,4	19,9	19,3	22,0	20,9	19,2	20,6
Australia	14,3	14,3	9,6	12,4	11,8	11,3	11,1	11,6
Argentina	15,2	15,4	15,0	14,7	12,1	16,3	15,5	11,8
Chile	7,9	8,4	8,3	8,7	10,1	8,8	10,5	10,9
South Africa	8,4	9,4	9,8	10,2	10,0	9,3	9,7	10,0
Other	51,9	52,4	55,4	58,1	54,6	51,5	54,1	51,8
TOTAL	208,1	283,1	266,0	269,8	272,0	263,8	264,2	248,2

COSTS					INCOMES
	Viticultural activity	Winemaking	Ageing	Bottling and	Marketing/Sale
Brunello	2005	late 2005	2006-2010	2010	2011
Riserva	2005	late 2005	2006-2011	2011	2012

Table n. 2: Production cycle of a bottle of wine for the examined company

Source: our elaboration

	Viticultural activity cost	Winemaking cost	Ageing cost	Bottling cost	=	FULL COST OF PRODUCTION
Brunello	2005	2005	2006-2010	2010		
Riserva	2005	2005	2006-2011	2011		
Allocation Base	Produced Grapes	Wine in casks	Aged wine	Bottled wine		Produced wine
Unit of measurement	hl	hl	hl	hl		hl

Table n. 3: Logical scheme of the full cost of production
Source: our elaboration

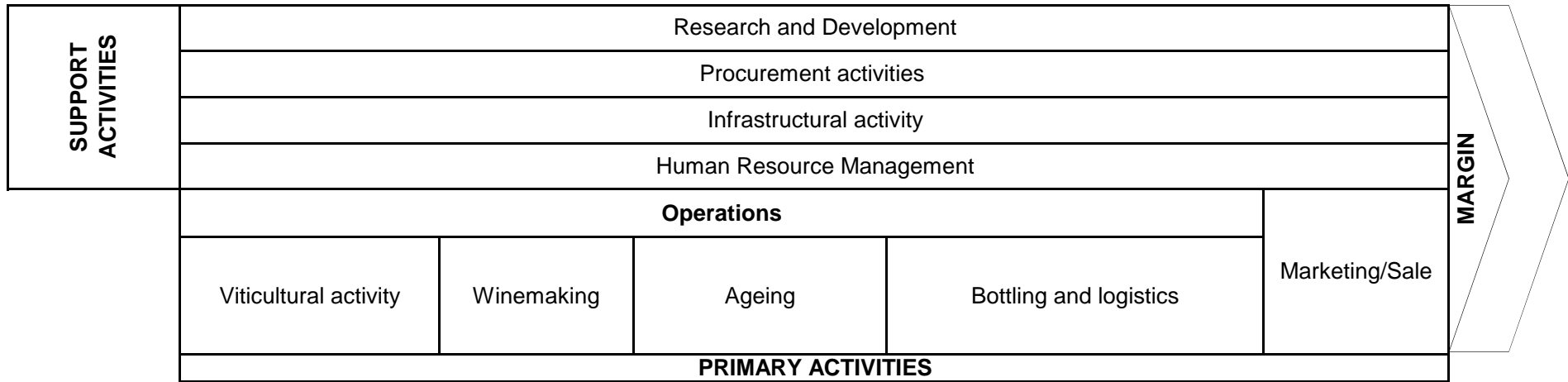


Table n. 4: Value Chain of the examined Company

Source: our adaptation from Porter, M.E. (1985)

Harvest Year		2005	2006	2007	2008	2009	2010	2011
	Average							
Vineyard (ha)	6.6	6.6	6.6	4.9	6.0	7.3	7.3	7.4
Quantity of grapes (ql)	263.5	263.5	263.5	330.0	347.0	313.0	190.5	137.0
Productivity (ql/ha)	41.8	40	40	68	57	43	26	19
Viticultural Activity (€)	178,839	133,720	160,643	236,856	194,435	163,972	161,737	200,509
Wages (€)	103,148	84,648	104,237	128,270	87,217	92,867	98,866	125,929
Depreciation Charge (€)	2,441	3,874	3,827	2,045	2,128	2,026	1,570	1,617
Maintenance (€)	5,657	2,465	4,124	6,422	5,946	5,139	5,272	10,229
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	18,934	8,047	8,047	20,984	24,856	24,400	23,308	22,894
Fertilizer and fungicide (€)	9,155	3,199	6,678	27,792	10,193	10,963	519	4,743
Fuels (€)	7,501	7,947	4,868	6,286	8,415	6,544	8,089	10,358
Viti-vinicultural Services (€)	27,864	20,100	25,430	41,037	50,962	18,169	19,174	20,175
Equipment (€)	139	625	325	25	-	-	-	-
Cost of harvested grapes (€/ql)	747	507	610	718	560	524	849	1,464

Table n. 5: Viticultural activity cost (in €)

Source: our elaboration

Total Crop Yield (hl)	191	191.2	191.2	240.6	260.6	231.6	130.3	92.9
Crop yield per hectare (hl/ha)	30	29	29	49	43	32	18	13
Viticultural Activity Cost (€/hl)	1,053.9	699.3	840.1	984.4	746.1	707.9	1,240.9	2,158.3

Table n. 6: Viticultural activity cost per hl (in €)

Source: our elaboration

Winemaking (€)	55,859	46,156	55,675	62,809	57,105	50,137	54,641	64,489
Wages (€)	5,157	4,232	5,212	6,414	4,361	4,643	4,943	6,296
Depreciation Charge (€)	26,148	27,198	27,150	25,493	26,048	25,947	25,491	25,708
Maintenance (€)	5,657	2,465	4,124	6,422	5,946	5,139	5,272	10,229
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	8,439	6,971	6,971	7,265	9,959	8,816	7,416	11,674
Wine cellar management (€)	6,457	2,475	9,110	13,220	6,072	1,728	6,580	6,017
Cost of viticultural and winemaking activity (€)	234,698	179,876	216,319	299,665	251,540	214,110	216,378	264,998
Total crop yield (hl)	191.2	191.2	191.2	240.6	260.6	231.6	130.3	92.9
Cost of winemaking activity (€/hl)	334.7	241.4	291.2	261.1	219.1	216.5	419.2	694.2
Cost of viticultural activity and winemaking (€/hl)	1,388.5	940.7	1,131.3	1,245.5	965.2	924.4	1,660.1	2,852.5

Table n. 7: Viticultural activity and winemaking cost per hl (in €)

Source: our elaboration

Ageing (€)	128,978	119,165	126,947	135,997	126,723	125,893	127,740	140,381
Wages (€)	30,944	25,394	31,271	38,481	26,165	27,860	29,660	37,779
Depreciation Charge (€)	85,416	85,507	85,460	84,115	85,850	85,748	85,292	85,937
Maintenance (€)	5,657	2,465	4,124	6,422	5,946	5,139	5,272	10,229
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	2,961	2,984	2,984	2,984	4,044	3,282	2,576	1,872
Wine subjected to maturation (hl)	933	796	871	874	898	1,149	984	960
Economic cost annual maturation (hl)	140	150	146	156	141	110	130	146
Cost of viticultural activity, winemaking and ageing (€)	1,528	1,090	1,277	1,401	1,106	1,034	1,790	2,999

Table n. 8: Viticultural activity, winemaking and ageing cost per hl (in €)

Source: our elaboration

Bottling and logistic (€)	84,207	75,634	76,359	80,424	95,850	68,798	70,469	121,917
Wages (€)	5,157	4,232	5,212	6,414	4,361	4,643	4,943	6,296
Depreciation Charge (€)	14,294	15,536	15,488	13,769	14,088	13,987	13,530	13,663
Maintenance (€)	5,657	2,465	4,124	6,422	5,946	5,139	5,272	10,229
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	-	-	-	-	-	-	-	-
Packaging (€)	37,069	25,781	30,650	29,975	47,831	25,001	26,636	73608
Consumable materials (€)	18,029	24,805	17,777	19,849	18,906	16,164	15,148	13556.6
Bottled wine (hl)	112	112	112	112	112	112	112	112
Bottling and logistic activities cost (€/hl)	752	675	682	718	856	614	629	1,089

Table n. 9: Bottling and logistic cost per hl (in €)

Source: our elaboration

Marketing/Sale (€)	165,201	113,215	172,881	192,781	222,957	101,277	184,840	168,456
Wages (€)	43,322	35,552	43,780	53,873	36,631	39,004	41,524	52,890
Depreciation Charge (€)	2,441	3,874	3,827	2,045	2,128	2,026	1,570	1,617
Maintenance (€)	-	-	-	-	-	-	-	-
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	-	-	-	-	-	-	-	-
Marketing consulting (€)	45,677	-	10,000	36,066	123,536	28,776	76,104	45,254
Fees (€)	23,488	48,412	57,046	55,298	2,568	551	542	-
Hotels and restaurants (€)	19,593	7,065	13,619	23,275	16,296	14,242	28,919	33,737
Subscriptions and books (€)	12,594	2,628	30,653	1,761	20,222	1,007	15,064	16,823
Fairs and exhibitions (€)	4,440	2,400	4,400	4,500	3,227	4,492	5,500	6,563
Travels (€)	1,867	3,696	606	468	2,742	548	1,439	3,567
Transportation (€)	7,391	6,436	5,423	11,076	10,363	6,425	8,975	3,039
Toll charges (€)	388	337	420	424	526	341	264	402
Sold wine (hl)	112	112	112	112	112	112	112	112
Cost of marketing activities (€/hl)	1,475	1,011	1,544	1,721	1,991	904	1,650	1,504

Table n. 10: Marketing/sales cost per HL (in €)

Source: our elaboration

R&D (€)	94,635	92,397	87,563	119,343	91,977	87,807	90,712	92,649
Wages (€)	8,252	6,772	8,339	10,262	6,977	7,429	7,909	10,074
Depreciation Charge (€)	2,441	3,874	3,827	2,045	2,128	2,026	1,570	1,617
Maintenance (€)	-	-	-	-	-	-	-	-
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	-	-	-	-	-	-	-	-
Tests and researches (€)	50,495	41,098	46,834	52,530	51,530	59,035	53,097	49,342
Technical consulting (€)	8,073	2,071	7,712	25,393	1,878	1,950	6,589	10,918
Owner's expenses (€)	21,374	35,767	17,743	25,119	24,746	13,502	16,607	16,134
Administrative activities (€)	307,405	347,452	281,476	343,142	380,090	335,921	224,043	239,711
Wages (€)	10,315	8,465	10,424	12,827	8,722	9,287	9,887	12,593
Depreciation Charge (€)	2,441	3,874	3,827	2,045	2,128	2,026	1,570	1,617
Maintenance (€)	-	-	-	-	-	-	-	-
Consumptions (€)	4,001	2,815	3,108	3,995	4,718	3,864	4,940	4,564
Direct depreciation (€)	2,149	3,169	3,169	3,083	3,056	115	1,064	1,616
Receipts and undocumented expenses (€)	31,292	76,987	40,694	16,486	21,167	33,642	30,066	-
Other costs (€)	10,289	2,981	5,579	6,254	2,973	37,362	5,313	11,559
Stationery (€)	2,543	1,144	2,463	1,443	2,792	2,342	3,205	4,413
Wine organization fee (€)	2,157	1,201	2,129	1,929	2,117	1,653	3,692	2,380
Membership fee (€)	1,033	257	1,830	2,363	1,487	245	395	655
Car costs (€)	588	543	758	617	696	410	587	502
Purchases of goods < € 516,45	742	-	634	-	1,007	681	647	2,225
Chamber of Commerce (€)	189	-	153	-	41	400	237	491
Enjoyment of third party assets (€)	544	2,070	26	1,715	-	-	-	-
Fiscal and Administrative Consulting (€)	34,459	29,803	32,885	36,174	42,696	27,845	32,384	39,424
Insurances (€)	33,990	29,758	28,999	32,993	37,403	31,652	33,568	43,554
Legal Advices (€)	12,055	3,487	14,131	5,208	12,614	31,901	1,988	15,058
Banking (€)	4,259	4,799	4,871	7,191	4,078	3,466	3,064	2,345
Landline usage (€)	3,953	3,270	3,620	3,764	5,366	3,678	4,308	3,667
Postal charges (€)	1,470	1,632	878	1,047	2,212	2,218	1,156	1,149
Mobile phone usage (€)	1,147	-	-	-	-	-	4,759	3,271
Revenue stamps (€)	36	-	38	156	-	27	34	-
Software licence fee (€)	5,820	3,464	7,754	5,501	5,848	6,021	6,666	5,484
Company award (€)	351	-	-	-	-	-	-	2,457
Variation of inventory book (€)	-	-	- 22,678	14,835	- 5,060	12,903	-	-
Financial Expenses (€)	126,656	152,861	120,562	166,525	207,575	110,361	62,652	66,057
Extraordinary Expenses (€)	211	-	5	-	584	3	-	884
Net taxes (€)	14,715	14,872	15,618	16,991	15,870	14,049	11,862	13,746
Total amount of accessory charges (€)	402,040	439,849	369,039	462,485	472,067	423,728	314,755	332,360
Total amount inventory (hl)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Support activity costs (€/hl)	402	440	369	462	472	424	315	332

Table n. 11: Support activity costs per hl (in €)
Source: our elaboration

	AVERAGE	%
Viticultural Activity (€)	10.54	21%
Winemaking (€)	3.35	7%
Ageing (€)	10.08	20%
Bottling and Logistic (€)	7.52	15%
Marketing/Sale (€)	14.75	29%
R&D, Administrative Activity (€)	4.02	8%
FULL COST per litre (€)	50	
FULL COST per bottle (€)	38	
FULL COST per hl (€)	5,026	

Table n. 12: Full cost of the analyzed company's wine (in €)

Source: our elaboration