

## **Full cost analysis for the creation of managerial benchmarks in the wine sector: a case study in Tuscany**

**Enrico Marone**

*University of Florence, GESAAF, UniCeSV, Italy*  
([enrico.marone@unifi.it](mailto:enrico.marone@unifi.it))

**Marco Bertocci**

*University of Florence, GESAAF, UniCeSV, Italy*  
([marco.bertocci@unifi.it](mailto:marco.bertocci@unifi.it))

**Nicola Marinelli**

*University of Florence, GESAAF, Italy*  
([nicola.marinelli@unifi.it](mailto:nicola.marinelli@unifi.it))

**Fabio Boncinelli**

*University of Florence, GESAAF, Italy*  
([fabio.boncinelli@unifi.it](mailto:fabio.boncinelli@unifi.it))

---

### *Abstract*

◦*Purpose:*

*This paper aims at identifying and quantifying the connection between a winery business typology and its production cost per bottle in order to create benchmarks for managerial and organizational choices.*

◦*Design/methodology/approach*

*Accounting data from wineries in representative areas of the Tuscan wine sector were collected with direct, face-to-face interviews. The data were processed using a Cost Accounting model elaborated by UniCeSV (Centre for the Strategic Development of the Wine Sector, University of Florence) to classify costs according to production phases and production factors. The study was completed using a Hierarchical Cluster Analysis (HCA) approach to investigate the relation between cost structures and business typologies.*

◦*Findings*

*The implementation of the Cost Accounting model and the HCA showed a strong relationship between how wineries are organized and how costs are structured. Moreover, the weight of geographical localization (in terms of belonging to a specific Denomination of Origin area) has proved to be a key determinant in the shape of the cost structures of wineries.*

**Key words:** wine production, full cost analysis, clustering, managerial choices, Tuscany

---

## 1. INTRODUCTION

The globalization of wine markets and the evolution of consumption patterns have determined a stronger necessity to satisfy the tastes of larger and more heterogeneous groups of wine consumers (Menghini 2007). These changes have caused a reduction of profit margins and, as a consequence, the necessity to increase the attention on cost measurement and management (Ciaponi 2005).

Knowing the production cost of a good is a fundamental element in the management of a winery and the basis for a correct managerial strategy. (Mastroberardino 2002, Salghetti 2007). Nevertheless, most wine farms still do not have adequate systems for the monitoring of production costs, and such a situation shows how important it is to compensate for this deficiency supplying appropriate tools to wineries.

The Production Cost Monitoring Center of UniCeSV (Center for the Strategic Development of the Wine Sector, University of Florence), has developed a specific model to be employed in a software for the recording of costs in the wine sector and has implemented pilot studies (Casini et al. 2012, Alampi Sottini et al. 2013, Casini et al., 2014) that have emphasized how this tool could also prove to be very useful for the economic sustainability of the whole sector.

This paper uses the standard UniCeSV cost accounting model for the recording and the analysis of production costs in the wine sector in order to verify how the composition of the production cost of a single bottle of wine can be an expression of business typology. In the hypothesis of a strong relation, such information can be used as an important benchmark for managerial and organizational choices.

## 2. THE CASE STUDY

Tuscany is one of the most important wine regions in Italy in terms of cultivated land with 60,286 ha (10% of national total), with 69.2% dedicated to D.O. wine production. 27,396 farms cultivate vine, and 22% of them have D.O. grape growing activities. The main three grape-growing provinces are Siena (31.7%), Florence (28.2%) and Grosseto (14.5%) (ISMEA 2011, Regione Toscana 2013). More than 2.5 tons of wine were produced in the region in 2010, with D.O. wine representing 62% of the total (ISTAT 2013). There are two main farm typologies in the region, one that produces mainly D.O. wines, with an average vineyard area of 7 hectares per farm and producing 5,000 bottles per hectare, and one that produces mainly table wines, with an average vineyard area of less than one hectare and producing almost 7,000 bottles per hectare.

The regional wine sector is characterized by two big D.O.C.G.s, Chianti and Chianti Classico, that represent, respectively, 49.7% and 16.4% of all the D.O. wine produced in Tuscany. IGTs represent 32% of the regional wine production.

Viticulture is very important in the regional agricultural economy, as 15% of gross salable production originates from this sector. The value of exports was over 509 million euros in 2009 with a 13.6% increase in the first semester of 2010 (Regione Toscana 2013).

The structure of the Tuscan wine sector, as it is described above, is the main reason why this study was focused on D.O. producing wineries, concentrating the attention towards “historical” D.O.s – Chianti Classico and Brunello di Montalcino – and “new” D.O.s – Montereale di Massa Marittima and Morellino di Scansano – located on internal and coastal hills, trying to cover the wider quality range of regional wine productions. Within the four chosen D.O.s, and in proportion to the number of wineries located in each of them, the subjects of the survey were identified with a random extraction on a stratified sampling based on vineyard area. The survey was conducted on 40 wineries from Chianti Classico, 19 from Brunello di Montalcino, 9 from Morellino di Scansano and 8 from Montereale di Massa Marittima, for a total of 76 interviews.

A specifically designed questionnaire was administered to every winery via direct, face-to-face interview, allowing for the identification of the production cost of the main product of each winery in quantitative terms. The total cost was classified according to production phases (grape production, vinification, aging, bottling and marketing) and for each of them the costs for every production factor were determined. The analysis resulted in the definition of “standard” costs for each D.O., but the level of detail of the data allowed us to implement further elaborations to verify how much production costs are influenced by different business typologies and by the location within different D.O. territories.

### **3. LITERATURE AND METHODS**

The knowledge of the production costs of a good is a key element in business management and the basis for a correct strategy to deal with management issue and/or to check the efficiency of the various production phases (Mastroberardino, 2002; Salghetti and Ferri, 2007). However, many wineries tend not to deepen the analysis of costs at the level of the individual product (Casini et al, 2012). This fact is especially true for small and medium-sized family farms, where the resources and/or the skills are not adequate to invest in improving accounting information systems, in particular in relation to cost accounting. Usually, the entrepreneur is not very keen to introduce innovative systems that go beyond general accounts (Antonelli and D'Alessio, 2007). Therefore, the absence of a management control system is a further shortcoming of Italian wineries if compared to global competitors, especially at a time where profit margins tend to progressively shrink.

The application of cost accounting in a winery requires specific expertise and resources for its successful implementation and management. Indeed, there are objective difficulties to properly assess the costs of individual bottles of wine as the business reality is often complex and multiproduct. The allocation of the share of the joint costs to a single bottle of wine is very complex and is a key process in the context of cost management (Ciaponi, 2005). In the literature, the allocation of joint costs to single products requires, at first, their aggregation according to one of these criteria: the individuation of homogeneous groups or “cost centers” (administration, marketing, cellar,...) or the Activity Based Cost method that identifies the management activities that generated the costs (vineyard, vinification, aging, ...). Then, the aggregated costs need to be assigned to each product using appropriate partition parameters or “drivers” (Salghetti and Ferri, 2007; Anna Maria Nati, 1989).

In this study we chose to evaluate the cost of producing a bottle of wine with the full cost method (Ghelfi, 2000; Torquati, 2003; Antonelli and D'Alessio, 2007). The production cost considers the remuneration of all the factors that contribute to the making of a wine bottle, including both the explicit and implicit costs. The former also account for such items as the inputs that the owner's family provide in a family-run business (family labour, land opportunity cost, ...).

The evaluation of the total cost of the bottle was carried out using a specific software developed by the research group working for the UniCeSV (Casini et al., 2014, Alampi Sottini et al., 2013). The data were collected by administering face-to-face questionnaires to the farms included in the sample, and then uploaded in the software.

The most representative product was identified for each winery. The procedure allowed for the calculation of the production cost per bottle and the calculation of separate items for each production factor and for each production phase. The factors cover the cost of family labour and non-family labour, administrative costs, raw materials, utilities, maintenance of durable goods, depreciation and the opportunity cost of land (land benefit). Then, each of these costs was attributed entirely or split among the various phases of production: grape production, vinification, aging, bottling and marketing.

## 4. RESULTS

A Ward Hierarchical Cluster Analysis (HCA) was conducted to pursue the aim of understanding the possible connection between the composition of production costs and business typologies. Since our focus is on the farms which cover all phases in the production chain, we excluded from the sample the wineries that buy grapes, bulk and aged wine.

Two HCAs were performed using two sets of variables representing the main classifications of production costs resulting from the cost accounting model used for the collection and the analysis of data:

- Set 1: production phase costs (all items pertaining to grape production, vinification, aging, bottling and marketing)
- Set 2: production factor costs (all items pertaining to the labour, capital and land categories).

The choice of the hierarchical level was based on the observation of dendrograms and the dissimilarity measure, resulting in a two level cut for Set 1 and a four level cut for Set 2.

Table 1 shows the main characteristics of the groups resulting from the Set 1 HCA.

Tab. 1: Results of Set 1 HCA (production phase costs).

<i>Characteristics</i>	<i>Group 1</i> <i>"Standard Quality"</i>	<i>Group 2</i> <i>"Top Quality"</i>
n. of wineries	47	24
cost per bottle (€)	4.45	9.11
Labour	mainly family	mainly non-family
vineyard area (ha)	30.13	31.86
D.O. vineyard area (ha)	21.54	20.03
bottled wine (%)	78.79	86.16
D.O.	Chianti Classico, Monteregio, Morellino	Brunello, Chianti Classico

The HCA results show significant differences between the two groups of wineries in relation to both average production cost and its composition. In terms of production phase, the costs of the first three (grape production, vinification and aging) for the second group are over double than those of the first. In terms of production factors, the second group shows higher values in all the categories and especially for “common costs”, “depreciation” and “non-family labour”. The results for labour costs are probably due to the fact that the two groups of wineries differ in the level of skills of the human capital they require. On the other hand, the two groups are very similar in terms of average vineyard areas and D.O. grape cultivation. However, the data show that the second group has a lower yield per hectare and a higher share of D.O. wine production in their portfolio, indicating a stronger attitude towards high quality. It is also important to point out how territory seems to be relevant in the groups composition, as the first group is mainly composed by farms belonging to lower quality D.O. territories and all the farms from the Montalcino area are concentrated in the second one; Chianti Classico farms are split between the two groups, as a result of a wider range in the quality of production and business typologies. The emphasis on quality aspects in the characteristics of the groups explains our use of “Standard Quality” and “Top Quality” for their definition.

Table 2 shows the main characteristics of the groups resulting from the Set 2 HCA.

Tab. 2: Results of Set 2 HCA (production factor costs).

<i>Characteristics</i>	<i>Group 1</i> <i>"No Brand"</i>	<i>Group 2</i> <i>"Average Brand"</i>	<i>Group 3</i> <i>"Top Brand"</i>	<i>Group 4</i> <i>"Elite"</i>
n. of wineries	20	22	20	9
cost per bottle (€)	4.39	4.20	7.33	11.21
Labour	mainly family	mainly non-family	mainly non-family	family & non-family
vineyard area (ha)	20.64	39.62	37.12	17.13
D.O. vineyard area (ha)	13.05	30.22	23.51	10.76
bottled wine (%)	24.33	92.50	81.65	91.89
D.O.	Chianti Classico, Monteregio	Chianti Classico, Morellino	Brunello, Chianti Classico, Monteregio	Brunello

The results of this second HCA apparently confirm what emerged from the first one, adding a higher level of detail. Specifically, the second HCA basically splits the groups resulting from the first one into more defined groups (with only a few exceptions: group 1 from the first HCA splits in groups 1 and 2 from the second HCA, group 2 from the first HCA splits in groups 3 and 4 from the second HCA). The word “brand” was used in the definition of the four resulting groups for two main reasons: the strong characterization of the first group as a bulk wine selling category, with no emphasis on branding, and the business/territory diversification that suggests different brand strengths that depend on the identity of both the winery and its D.O.

The four groups differ significantly in terms of average price per bottle and its composition, showing a progressive increase of the quality of the product and specific characteristics related to business organization and management and territory. This representation allows for a better description of specific benchmarks in relation to different production environments and settings: for example, the different composition of production costs shows how the wineries belonging to the first two groups, even though they share a similar average cost per bottle, differ in terms of business structure (size, labour market).

The average cost per bottle of group 4 is over 50% higher than that of group 3. In addition, group 4 represents a typology of smaller, more family-run and quality oriented wineries with a strong territorial brand, while group 3 includes larger, more complex organizations producing high quality wine and belonging to different territories, indicating a strength based on diverse mixtures of business and territorial brands.

As a final remark, the description of the results indicates that the territorial aspect, though not the main focus of the study at the beginning, has indeed a pervasive influence on the cost structures of wineries. Thus, the territorial reputation linked to specific D.O.s goes far beyond being a contextual issue, as a specific localization determines the quality of the final product crucially impacting the composition of factor and phase costs.

Table 3 shows the composition of average costs per bottle for the four groups resulting from the second HCA.

Tab. 3: Composition of average costs for Set 2 HCA (€/bottle).

<i>Macro cost items</i>	<i>Group 1</i> <i>"No Brand"</i>	<i>Group 2</i> <i>"Average Brand"</i>	<i>Group 3</i> <i>"Top Brand"</i>	<i>Group 4</i> <i>"Elite"</i>	<i>Total</i>
<i>Factors</i>					
Family labour	0.89	0.13	0.14	1.51	0.52
Non-family labour	0.35	1.15	1.98	1.23	1.17
Common costs	0.31	0.58	1.12	1.17	0.73
Depreciation	0.97	0.81	1.32	2.78	1.25
Variable costs	1.65	1.32	2.13	3.05	1.86
<i>Av. Total Cost</i>	<i>4.39</i>	<i>4.20</i>	<i>7.33</i>	<i>11.21</i>	<i>6.03</i>
<i>Phases</i>					
Grape production	1.34	1.46	2.68	4.82	2.19
Vinification	0.38	0.49	0.81	1.12	0.63
Aging	0.56	0.51	0.92	1.57	0.77
Bottling - Marketing	2.11	1.74	2.93	3.71	2.43
<i>Av. Total Cost</i>	<i>4.39</i>	<i>4.20</i>	<i>7.33</i>	<i>11.21</i>	<i>6.03</i>

## 5. MANAGERIAL IMPLICATIONS AND CONCLUSION

This study has tested the validity of the UniCeSV full cost accounting model as useful tool in support of decision making processes for wineries, highlighting its importance when applied on a territorial level.

The results of the study clearly show that the information on the distribution of total costs among phases and production factors can certainly provide indications to improve business management. The most important result is represented by the elicitation of an unequivocal relationship between different cost structures and different, well defined business typologies. In more detail, the HCA highlights an articulated link between the cost of a single bottle of wine and the level of wine quality, the managerial and organizational structure of the winery and the prestige of the territorial brand. This link justifies the possible use of the results for the definition of benchmarks to guide management choices and decisions. In particular, the deviation from defined benchmarks/standard costs could represent an impulse for winery managements to carry out specific market analyses to verify the economic feasibility of their activities; moreover, if such deviations are traceable to specific cost items, they may be interpreted as a signal to be investigated in order to identify and correct the problem.

In addition, at the local level, the information and the economic-financial data supplied by the study can be a very useful tool for the preparation of business plans and feasibility analyses for potential new activities and investors.

The results obtained with this model would be of further significance if matched with results on studies on prices and margins; this would provide valuable information to better understand if and how the value of certain product attributes justify the pertinent costs.

The benefits deriving from the application of this model can also be expanded by extending the observations and data recording to more differentiated territories that include other D.O.s and by setting a dynamic, systematic monitoring of the data. As a matter of fact, only a timely and continued recording of production costs can provide useful and reliable information. In order to do so, it is imperative to increase the interest of farmers towards management control tools for the creation of local monitoring centers.

## REFERENCES

- Alampi Sottini, V., Bertocci, M., Marinelli, N., Marone, E. and Menghini, S. (2013), “Brunello di Montalcino Wine Farms Remaining Competitive Through Full-Cost Accounting”, in Mora, P. (Ed.), *Wine Business Case Studies Thirteen Cases From the Real World of Wine Business Management*, The Wine Appreciation Guild, South San Francisco, USA, pp. 103-118.
- Antonelli, V., D'Alessio, R. (2007), *Casi di controllo di gestione*, Wolters Kluwer, Milano, Italia.
- Casini, L., Corsi, A.M., Daniele, C., Marinelli, N., Marone, E. and Scozzafava, G. (2012), “Contabilità analitica e sostenibilità economica del settore vitivinicolo: il caso del Chianti Classico”, *Economia & Diritto Agroalimentare*, Vol. 1/2012, pp. 83-103.
- Casini, L., Marone, E. and Scozzafava, G. (2014), “Management accounting in the winegrowing sector: proposal and development of an ad hoc control system” *Quality Access to Success*, Vol. 15 No. 138/February 2014.
- Ciaponi, F. (2005), *Il controllo di gestione delle imprese vitivinicole*, FrancoAngeli, Milano, Italia.
- Ghelfi, R. (2000), “Evoluzione delle metodologie di analisi dei costi aziendali in relazione alle innovazioni tecniche ed organizzative” in *Atti del XXXVII Convegno di studi Sidea, Innovazione e ricerca nell'agricoltura italiana*. Bologna, 14-16 settembre 2000, Avenue Media, Bologna, Italia.
- ISMEA (2011), *Report Economico Finanziario*, Vol. 3.
- ISTAT (2010), “VI Censimento Generale dell'Agricoltura Italiana”.
- Mastroberardino, P. (2002), *L'approccio sistemico al governo dell'impresa. L'impresa della vite e del vino*, Cedam, Padova, Italia.
- Menghini, S. (ed.) (2007), *Il mercato del vino. Le leve per il futuro*, Franco Angeli, Milano, Italia.
- Nati, A. (1989), *Costi di produzione e decisioni aziendali*, CEDAM, Padova, Italia.
- Regione Toscana (2013), *Toscana in cifre - Sistema Statistico Regionale – Agricoltura*.
- Salghetti, A. and Ferri, G. (2007), “Metodologia di calcolo del costo di produzione del latte e analisi applicativa su allevamenti convenzionali e biologici”, *Annali Fac. Medic. Vet.*, Vol. XXV, pp.247-268.
- Torquati, B. (2003), *Economia e gestione dell'impresa agraria*, Edizioni agricole, Bologna, Italia.