

The role of quality in wine production

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Starting from the Sixties the main changes which characterized the sector of wine are mainly related to the product quality differentiation (Banterle and Stranieri, 2013). The new CAP rules contributed to improve and diversify the quality of the wine among different kind of wines with different origin. Moreover, producers retailers played an important role due to their strategic position along the supply chain and their structural characteristics. The quality differentiation of wines included both processes, logistic along the supply chain and the market recognition of quality attributes of wines through labelling. In the next sections an overview of the main determinants affecting the quality of wine are presented.

1. The EU policy for the wine sector

1.1. The Common Market Organization (CMO)

The EU wine sector is deeply regulated. This can be easily understood as almost half of the world's vineyards are located in the European Union area. Moreover, the EU is also the main importer and exporter in worldwide wine markets. Due to the importance of wine sector at the European level, public regulation provides a wide range of rules to protect and differentiate the production of wine.

To protect wine sector, the EU wine sector has been strictly regulated by the CMO, which was established in 1962. This legal framework is one of the most complex arrangements within the Common Agricultural Policy (CAP). The CMO for the wine sector was created in order to enable a gradual convergence of prices and the elimination of customs barriers, with the goal of establishing a single market for products with one common tariff for the rest of the world. Another important intervention for the regulation of CMO was the Reform of 1999. The aims of the 1999 reform of the CMO was to align supply and demand at the community level through the restructuring of large areas of vineyards, to eliminate the use of intervention as exits for surplus production, to arrange regional diversity, to recognise the role of producers and give them the possibility to guarantee a production that is in line with a market that demands higher quality products. To achieve these objectives, the CMO was based on rules concerning: production potential, market mechanisms, oenological practices and processes, designations, presentation and protection of products and trade with third countries. In addition to these provisions, the regulation included the establishment of a classification of authorized wine grape varieties, of a wine inventory and vineyard register. However, this reform was insufficient in reducing wine surpluses and huge sums still had to be spent. For this reason a new reform of the wine market was needed. In 2008 the Council of Ministers of European Union reorganized the EU wine

market. This reform is part of the 2003 CAP reform introduced by Regulation (EC) No 1782/2003. The reform adopted by the EU in 2008 had different aims. Among these, the normative framework recognized the importance of the following: the abolition of the ineffective public intervention in EU wine market; the convergence between EU wine production and demand; the augmentation of EU wine producers competitiveness; the reinforcement of European wines reputation; the improvement of market share both in the EU market and worldwide; the importance to protect the traditions of European wine cultivation and encourage the social and environmental role of wine growing in rural areas.

In 2013 the European Parliament and the Council adopted a reform built with the aim of harmonising and simplifying the outlines of the CAP. This reform is part of the wider reform of the CAP for the period from 2014 to 2020. The main topics discussed under the 2013 CMO reform relate to the national support programmes and the scheme of authorisations for vine plantings.

The first approach is linked to the one adopted in the framework of the 2008 Wine CMO reform. Thus, it regulates measures already existing in the 2008 Wine CMO reform. Such actions are: the restructuring and conversion of vineyards; the green harvesting; the mutual funds; the harvest insurance; investments; by-product distillation; promotion in third countries. The purpose of this normative framework is to foster new products and processes development, especially related to the introduction of advanced systems of sustainable wine production. In addition, it promotes the spread of information communicating with consumers about the responsible consumption of wine and about the system of the designations of origin and geographical indications.

With regard to the authorisations, the planting rights approach will be abolished by December 2015. In the future personal authorizations will be granted without charge and won't be transferable to the market. For this reason between 2016 and 2030 a new system for the management of vine plantings will be set up as the "Scheme of authorisations for vine plantings" in which "Member States shall make available each year authorisations for new plantings corresponding to 1% of the total area actually planted with vines in their territory, as measured on 31 July of the previous year". This plan is based on the outcome of the High Level Group on Vine Planting Rights organised in 2012.

1.2. The EU wine quality policy

Besides these rules to protect and regulate the European wine sector, different regulatory interventions succeeded in order to strengthen also the quality of wine. Such rules referred mostly to three main issues: the market recognition of wine quality through the introduction of new labels; the introduction of rules for planting restrictions; the regulation of intrinsic quality wine attributes and their production methods.

Regulation (EC) No 817/70 introduced a specific regulation for the provisions relating to quality wines produced in specified regions. A quality wine produced in specified regions (PSR) shall be sold under

the name of the region granted it by the producer Member State. Examples of recognized quality schemes were the following expressions: 'Naturwein', 'Originalabfüllung', 'Spatlese', 'Auslese', 'Beerenauslese', and 'Trockenbeerenauslese' for German wine; 'Champagne' for French wine. Moreover, these names could be followed by recognized expressions of quality, like 'Qualitätswein' in Germany, 'Appellation Contrôlée' (AOC) and 'Vin délimité de qualité supérieure' in France and 'Denominazione di origine controllata' e 'Denominazione di origine controllata e garantita' in Italy. The AOC was among the first quality label to be recognized at European level. It was in fact introduced in France for the wine industry since 1935. Such quality scheme regulated the geographical name of a country, province or department and it designed a product whose origins and characteristics were due exclusively or mainly to the geographical place of origin. Among the distinctive features of these products were also included the characteristics of human capital and natural resources and this became for consumers a guarantee of the quality of the wine. In addition to quality recognition policy, Regulations introduced also boundaries on the replanting of vines for European Member States.

The Regulation No. 1161/76 introduced new rules on the definition of intrinsic quality parameters for wine. In specific, such normative framework aimed at introducing and changing rules on different aspects. Firstly, each Member State had to fix a minimum natural alcoholic strength for each of the quality wines produced within its territory. Secondly, wine-making and processing methods adopted for quality wines had to be defined. Third, the regulation also suggested that a permission for the sweetening of a quality wine had to be ask to a Member State. The same authorization was referred also for the enrichment, acidification and deacidification methods. With regard to planting restrictions, in these years a complete ban on all new plantings for table wines was introduced in Europe. Such intervention aimed at limiting the production of wine and incentivising the production of quality differentiated products.

The Regulation (CEE) 823/1987 introduced the first system of European wine quality recognition. Such normative framework aimed at homogenising the wine quality policy of each Member State and it regulated conditions of production and characteristics for quality wines PSR. With the such Regulation new quality schemes were introduced: Quality wines produced in specified regions (QWPSR); Liqueur wine quality produced in specified region; Sparkling wines produced in specified regions; Semi-sparkling wine quality produced in specified regions. On the basis of such integration wines makers adopt a disciplinary of production, where the following information is provided: the determination of the production area; types of grape; cultivation methods; wine-making methods; title minimum blood-alcohol; yield per hectare; analysis and assessment of organoleptic characteristics.

Italy implemented such rules with the national law 164/1992. Different quality labels were introduced within the Italian territory to diversify the quality characteristics of wines. Organic, DOCG (Denominazione di Origine Controllata e Garantita), DOC (Denominazione di Origine Controllata)

and IGT (Indicazione Geografica Tipica) became the main quality labels introduced for wine quality differentiation. In specific, organic wine refers to wines produced without the use of chemical synthesis (fertilizers, herbicides, fungicides, insecticides, pesticides in general). This recognition is not among those referred to in cited law 164 of 1992 and, therefore, a specific legislation did not exist about this type of wine. Such certification was introduced by Regulation 2092/91, which fix rules in a general way for all organic products. The DOC recognition of quality is attributed to wines produced in limited geographical areas (usually small/medium sized) and products follow strict rules, which include: the use of pre grapes, regulated vinification techniques, predetermined wine characteristics. These wines are allowed for consumption, only after accurate chemical and sensory analysis. For wines DOC is also permitted: the designation 'Classico' which comes from the ancient wine home areas; 'reserve', if the wine is exposed to a period of aging - usually two years. For these wines there is a restrictive product specification, that includes the following requirements: the DOC designation on the label; the boundaries of the production area territory; the maximum yield of grapes per hectare; a minimum alcohol volume; the specification of chemical, physical and organoleptic characteristics of the wine; the production conditions (climate, soil, altitude, soil exposure); the authorized vine types; the density of the installations, pruning systems, etc.; chemical and organoleptic examination mode; any minimum period of aging in wood and bottle aging; any indication of the areas authorized bottling. The DOCG is a particularly prestigious certification reserved for certain wines DOC of high quality or with a high international recognition. Like the DOC wines, it is produced following strict rules which include: the use of pre grapes, regulated vinification techniques, predetermined characteristics. These wines are allowed for consumption, only after checks, chemical and sensory analysis, even more severe than for DOC wines. They must be marketed in containers of less than five liters and must carry a label that gives the State the guarantee of origin, quality and which allows the number of bottles produced. Finally, IGT is quality awarded to table wines, which have generally a quite large production area. IGT wines correspond to the French "Vin de Pays" and the German "Landwein"; for these kinds of wines the production is regulated with simple and flexible rules. For such quality certification the following information is required: the indication on the label of the origin and the names of grape varieties; the boundaries of the production area territory; the list of grape varieties used in the production; the color and wine type; the maximum yield of grapes per hectare; the alcoholic volume; the grape-wine yield; the authorized corrective practices.

With Regulation (EC) No 479/2008 the oenological practices and the policy for wine quality were changed in order to harmonize the EU quality policy for food products with that of wine products. More precisely, such Regulation linked the PSR labelling normative with PDO (Protected Designation of Origin) and PGI (Protected Geographical Indication) rules. The present normative framework distinguishes between wines of quality produced in a specific area and wines without a geographical

indication. Within the first category we find PDO and PGI wines. PDO wines refer to a product which is entirely produced and transformed in a given geographical area. PGI refers to wine products where at least one production step within the supply chain is based in a specific geographical area. In specific, for PDO, the requirement is that "the production must take place in the geographical area" and "shall cover all the operations involved, from the harvesting of the grapes to the completion of the wine-making processes, with the exception of any post-production processes". For PGI, "the maximum 15% share of grapes which may originate outside the demarcated area shall originate from the Member State or third country in which the demarcated area is situated". The consequence of this new regulation is that many IGT wines has become PGI wines. The result is a sort of quality upgrade for many wine products. Moreover, the homogenization of the quality requirement for wine products with other food stuffs has led to a risk of consumer confusion towards new labels. Finally also the protection of wine products within international market is at the core of political debate (Chiodo, 2008). PDO/PGI wines represents one strategic element of Italian agri-food system. In 2013 wine export represent the 15% of total agri-food export. Among the first twenty food product exported, PDO and PGI wines play an important role (Inea, 2014). Moreover, the 48% of cultivated land is used for PDO/PGI wines. In the northern part of Italy the higher concentration of PDO is revealed. In most area of North of Italy, more than 70% of wine production is used for PDO wines. Some exceptions are represented by Toscana in the centre of Italy and by Sardegna in the South. Lombardy does not make an exception within this framework. The 80% of total wine production is represented by PDO/PGI wines (Sardone, 2013). Within such territory it is possible to highlight a negative trend of cultivated land. On the contrary the quantity of wine reveals a positive trend together with the price of PDO/PGI wines (Ismea, 2014). Such trends demonstrate the specialization of Lombardy wine production towards quality.

The production of quality wine in Lombardy is concentrated especially within the geographical areas of 'Oltrepò pavese' (more than 75% of cultivated land) and Brescia. The latter represents less than 10% of cultivated land, but the production counts for more than 16% of total wine production in Lombardy (Ismea, 2007). Within such territories the main innovations introduced in these last decades are related to the quality differentiation of products and production innovation related to the yield maximization. The first kind of innovation is related to the introduction of different of wines within the same quality certification scheme. In the PDO 'Oltrepò pavese', for example different types of wines have been introduced. The most important wines are represented by Bonarda, Barbera, Pinot Nero, Riesling Italico, which count for more than 80% of 'Oltrepò pavese' production. Within the province of Brescia, the innovations of the main product of excellence 'Franciacorta' PDO relate especially to the improvement of process attributes of such product. The main firms producing 'Franciacorta' have

strongly improved their production assets in the last twenty years especially in relation to the transformation and techniques.

In 2013 the European Parliament and the Council adopted a reform built with the aim of harmonising and simplifying the outlines of the CAP. This reform is part of the wider reform of the CAP for the period from 2014 to 2020. The regulatory frame of the 2008 reform is still preserved but some considerable changes were introduced together with some specifications concerning designations of origin and geographical indications. For the wine sector, it mostly restores the measures and approaches begun during the previous reform of 2008.

2. The innovation in the wine sector

The novelties which improved the quality of wine relate mainly to technological, and organizational innovation.

2.1. Technological innovations

With regard to technological innovations, from the sixties new packaging techniques are among the main drivers of novelties within the wine sector. During the sixties, the reduction of the dimension of the barrels (the *barrisques* in wood oak) giving more oxygen during the fermentation or the recourse to new giant tanks (in stainless steel or fiberglass) for conserving the product allowed producers to create new different types of wine having a better average quality and also a more competitive price. Moreover, the introduction of new technology for bulk wine transport has also affected the quality of wine sold at international level. In specific, the introduction of new packaging technique 'Flexitank' (big bag-in-box with a capacity of 16.000 to 24.000 litres) has progressively substituted steel containers. From the 2007, it has contributed to change bottled wine with bulk wine exports for some of the main wine exporting countries, i.e. Australia, the US and South Africa.

The consequence of this innovation is that the quality attributes of wine do not deteriorate because of reduced oxidation, a better preservation of organoleptic characteristics. By Flexitank it is possible to transfer wine in this new packaging from the areas of production and bottle it in the areas of consumption. This provides a minimization of freight costs and the possibility to sell wine with a brand of origin at reasonable prices. The implication of such innovations relate to an increased competition of the European wine sector which has to compete with an increased number of quality wines within the same market.

The introduction of this new technology has both positive and negative effects. With regard to positive effects, a cost reduction, a minimization of environmental costs due to lower wine transports certainly play an important role. With regard to negative effects, the augmentation of unemployment and the economic consequences on the glass industry have been acknowledged.

In addition to packaging advances, different innovations related to the wine traceability have also characterized the evolution of the quality characteristics of wine products. Among these, the Quick Response (QR) code, has been recently adopted within the food industry as a two-dimensional barcode (Tarjan et al., 2015). The QR collects a higher quantity of information than the one-dimensional code, and it can be incorporated into users' smartphone applications. This implies a simplification of the use of such technology for consumers because with the smartphone consumers can scan and decipher product information (Yeong and Woo, 2016). The introduction of QR technology lead to an increase of product knowledge and to the possibility to reduce of market failure associated to the information asymmetry between producers and consumers. This is important for experiential products, like wine (Wilson and Quinton, 2012).

2.2. The organizational innovations

With regard to organizational innovations of the wine sector, different elements of novelty have been introduced in the market. Such novelties relate mainly to changes in the organization of wine supply chain. Among these, the major variations depend from the implementation of sustainability aspects within the supply chain; the adoption of voluntary safety and quality standards; the role of producers and retailers in the management of vertical relationships.

Sustainability of wine production plays a strategic role at international level (Klohr et al., 2013). Different initiatives have been developed all over the world to promote the sustainability of wine supply chain. The first was launched in California in 1992 (Integrated Pest Management Programme). Later, many countries started to supported sustainability, especially those countries that belong to the “New world” of wine, such as “California Sustainable Winegrowing Program” in California, United States, “Entwine” in Australia and “Sustainable Winegrowing in New Zealand”. These initiatives bring to the implementation of voluntary standards for environmental, social and economic sustainability of the wine production. Some initiatives related to sustainable-related wine supply chains have been improved also within the European territory. One example is the French “Vignerons en Développement Durable” program, a collective brand for the sustainable viticulture based on the subscription of regulations composed by responsibilities with the aim of reaching goals connected to the sustainability. Another example is “V.i.v.a. Sustainable Wine”, that has been developed by the Italian Ministry of the Environment with the collaboration of several Universities and research centers. The aim of this program is the evaluation of the company’s performance from the environmental, social and economic perspective, and also of the communication tools used to reach the final consumer through the use of the QR code that allows identifying the company results with respect to four indicators (Air, Water, Vineyard, Territory).

With regard to the adoption of safety and quality schemes, the adoption of voluntary schemes, can refer both to public and private standards. Public standards relate to the recognition of wine origin through

the PDO/PGI certifications and environmental-friendly wine attributes through Organic standard. Private standards are linked to holistic approaches to renewable agriculture through biodynamic procedures (Demeter) or to the adoption of standards which aim at reducing unfair practices among wine operators. Such rules refer to traceability schemes which entail a higher complexity compared to the mandatory scheme introduced by Regulation No. 178/2002. In specific, these standards, like for example, ISO 22005, refer to traceability standards, whose system has a high level of depth, breadth and precision (Golan et al., 2004). Traceability depth refer to the sectors of the wine supply chain which are involved by the system. The breadth of the system refer to the amount of information traced. The precision of the traceability refer to the probability to reconstruct the complete history of a certain product and it refer to the dimension of the tracking unit used to trace products. The higher the breadth, depth and precision of traceability, the higher its complexity, and the higher the probability to efficiently manage unfair practices and exogenous shocks within the wine supply chain (Wu et al., 2012; Manning & Soon, 2014; Tähtkäpää et al., 2015). In terms of variations in the organization of supply chain driven by these voluntary systems, an increase in transaction transparency and in the bilateral dependency of economic agents is revealed (Banterle and Stranieri, 2008). Indeed, the introduction of these voluntary standards increase the supply chain efficiency due to a strengthening of vertical relationships and the reduction of transaction information asymmetry. However, the adoption of complex traceability can face some difficulties, which are associated to the costs for its adoption, the type of product considered, and to the complexity of the supply chains (Canavari et al., 2010). Moreover, the increase of transparency offered by complex traceability can also cause opposing effects within the supply chain, because of the presence of different interests among food firms and their tendency to behave opportunistically during transactions (Ringsberg, 2014). This implies that the decision on the voluntary traceability for wine producers depends from the firms' strategy, i.e. from their strategic incentives towards the implementation of traceability (Karlsen et al., 2013).

With regard to the role of producers in the organizational innovation of the supply chain, it is possible to reveal an increasing role of the producers associations within the wine sector. Such forms of supply chain organization imply an increase in supply chain coordination due to the integration of the production and processing phase. Moreover, a strengthening of vertical relationships is also revealed due to the introduction of supply chain agreements, which imply stringent production rules to be respected by all the member of the producer association.

Also retailers play an important role in the reorganization of wine supply chains. The strategic role of food retailers within the supply chain is due to different aspects, among which their strategic position at the end of the supply chain and has their big dimensions compared to wine producers and processors.

With regard to the first aspect, the direct connection with consumers allow them to quickly perceive their preferences and needs. This permits to reach information about market changes more quickly than the other actors of wine supply chain and to have more available information during negotiations. Moreover, the food retailing is characterized by some big firms which concentrate a high percentage of food supply. On the opposite most of wine producers and processors are of small dimensions. More precisely, the system of wine production is based on about 55.000 operators subdivided into: producers-winemakers, winemakers and wine growers' associations. The first and the last category of firms are example of supply chain integration, whereas the second type of firms is part of supply chains mainly organized through hybrid forms of transacting, such as contracts and similar agreements. In more than 90% of wine firms present in the Italian territory is represented by producer-winemakers even if they produce only $\frac{1}{4}$ of total national wine production. This entail a power asymmetry between retailers and most of the agent of the wine supply chain and a progressive affirmation of retailers power that act as the leader of the wine supply chain, coordinating the activities of the other agents.

Currently retailers centralize information and production flows of the supply chain in order to better monitor activities and to guarantee a higher degree of food safety and quality. To reach this goal they introduce private standards which aim at standardizing quality procedures within the food supply chains. BRC (British Retailers Consortium) and IFS (International Food Standard) are two example of existing retailer standards for the efficient management of the supply chain. In specific, BRC was introduced by retailers in order to standardize the rules for suppliers with regard to food safety, food quality and other parameters (Contato, 2007). This standard also introduces rules related to environmental and social sustainability. The environmental aspects relate to a reduced use of chemicals in production processes, and to an efficient waste and water management within the food supply chain. The social aspect of this certification are based on the respect of work conditions with regard to labour rights and work safety issues.

3. The demand of wine

World wine consumption has been greatly reduced from mid-nineties. Since then, a high degree of concentration of wine demand worldwide is revealed. In Europe, the highest levels of individual consumption are concentrated in European countries with a strong wine tradition, such as France and Italy. Other European countries, like, for example Germany and Greece, consume limited amounts of wine. The northern European countries do not have any tradition on wine production but they reveal a quite positive trends from the end of nineties' (Eurostat, 2009). Globally, the dynamics of wine consumption is similar to those that characterize the north of Europe, where the appearance of wine and a relative consumption are recent phenomena. In specific, some countries register a considerable

increase in the demand of wine in the last years, like, USA, Russia, Australia, South Africa, Argentina, Canada, Brazil, Chile and Japan.

The negative trend in the demand of wine is mainly related to the changes in consumers lifestyles and related diets. Few decades ago, the consumption of wine in producers countries was part of the everyday diet because it was an important part of the caloric intake necessary to perform work activities. Recently, wine has become matter of occasional consumption. The growing attention to health-related aspects and the increasing number of sedentary lifestyles have led to a decrease in the demand of wine (Hertzberg and Malorigio 2008).

The increasing competition in wine production and the progressively decrease in the consumption has stimulated the necessity to analyze consumer preferences towards quality attributes of wine. Literature has reveals different determinants affecting consumers attitudes towards wine consumption. Among individual factors, consumer involvement and product knowledge are found to affect consumer's preferences (Barber et al., 2009). Moreover, different studies concentrated the attention on the effects of different product quality attributes on wine consumer's preferences. Wine quality attributes are divided into extrinsic and intrinsic. Extrinsic attributes are those characteristics that can be changed without changing the product itself. Examples of extrinsic features are price, packaging, labelling and brand name. As opposed to extrinsic cues, the intrinsic ones are directly connected to the product, to the processing method and to the perception of it (e.g. grape variety, alcohol content, product sensory characteristics, etc.).

Price of wine is considered as an important trait to take into account above all when the other characteristics of the product are not available, or when it is difficult to evaluate the quality of the product. Benfratello et al. (2009) added that wine preferences are affected mainly by three categories: sensorial variables, objective traits and reputational attributes of wine producers. The first category group product characteristics which are not available to consumer before purchase, but only after the product tasting. Wine's aroma, body, finish and harmony of components are among the product characteristics which can be grouped into this category. The role of wine's sensorial characteristics is opposed to observable "objective" attributes such as price, origin, denomination of origin, grape variety, producer or bottle's brand, which usually are attached to the label (Landon and Smith, 1997). The importance of the brand in this sector appears to be smaller than in the case of other foodstuffs and usually it is attribute more to the reputation category rather than to the objective one (Frick and Simmons, 2013). Reputation instead, represents expectations about wine quality, built up through past experiences with the producer, the wine's brand and the designation of origin.

In the last years, many studies have underlined how consumers are more and more interested about sustainable products. Nowadays in the wine sector, sustainability has become one of the primary concerns. However, the sustainability is not considered as one of the main attributes that can influence

consumers' choice. In specific, the understanding of which among the sustainability attributes would attract consumer's attention is important to avoid the risk of information overload. With regard to wine attributes, current research shows that many labelled information have to compete with other quality attributes which are considered important element during wine purchase, such as price, the brand, the product originality often receive only limited attention (Drichoutis et al., 2006) and consideration in food choices (Grunert et al., 2010), and even if attended, they may confuse consumers in their purchasing decisions (Kapsak et al., 2008). The understanding of consumer interest in which kind of sustainability attributes may attract consumer attention can address firms' strategies concerning the quality differentiation of wine products (Golan *et al.*, 2001). Labelling only the most important information helps wine producers to effectively differentiate their products from competitors.

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