



Title: **“The present and future of the international wine industry”**

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Wine authorities in the UC Davis Department of Viticulture & Enology share their views on the future of the international wine business in an equally authoritative journal.

- Today, as in antiquity, wine is an integral component of the culture of many countries, both prosperous and impoverished. Wine is a unique commodity, and unlike other foods, its attraction relies upon “a subtle array of shifting sensations that make its charm difficult to define”. In essence, wine producers are selling sensory experiences to the consumer.
- In the past, the definition of quality was the domain of the wine producer, and consumers who did not like a particular wine were often made to feel uncultured. Today, with rapid access to information and a more sophisticated understanding of product value, the definition of quality has shifted to the consumer. The sensory aspect of a wine is no longer the only component of quality. External factors, such as the bottle and label design, the perception of healthfulness, and whether the wine was produced in an environmental sustainable manner, are all important for the modern consumer.
- **Economics of wine production.** The wine industry is a composite of several individual market segments: from economy, to premium, ultra-premium, and artisan wines. The economy category (wines that retail for less than \$7) comprises 70% of the wine market in the US, whereas the latter two categories comprise only 2-3%.
- In recent years, wine consumption has declined in the traditional wine producing and consuming countries, while competition has emerged from “New World” nations. In the past 30 years, France, Italy and Spain, which in 2001 combined to produce more than half of the world’s wine, saw their *per capita* consumption fall by half. On the other extreme, New World producers moved from 2% to 15% of the world export market in the past 20 years.
- A critical factor that fuelled US consumption of wine was a 1991 study –coined the “French Paradox”- that described the relationship between the high intake of fats in the French diet and the low incidence of heart disease. Its author had no explanation for the paradox at the time, but later authors have proposed that the natural antioxidant compounds of wine, fruits and vegetables in the Mediterranean diet might protect against heart disease. The French paradox had a profound impact on the international wine industry, since consumers began to look at wine differently, and were suddenly willing to pay more for a product because of its perceived health benefit.
- **Enology in the 21st century.** Besides a science, wine has long been considered an art, and as with all forms of art, the term “quality” is subjective. In contrast to other commodities, the region of production, the artistic reputation of the producer and the conditions of production are important

factors in the perceived value of a wine. The recently completed human genome project, along with advances in the field of neurobiology, are all helping us understand the basis of preference and the subjective definition of quality. For example, 1) two percent of the human genome is devoted to olfactory receptors, 2) there is a strong connection between odor perception and emotions, and 3) adverse reactions to alcoholic beverages seem to have a genetic component –for instance, there are individual variations in the gene for aldehyde dehydrogenase, the enzyme that regulates the oxidation of aldehydes, which is considered to be a detoxification reaction.

- Even though sensory analysis was initially used as a component of quality control, today it has become a sophisticated field that relies on human tasters as analytical tools. Using techniques like *descriptive analysis*, researchers are creating flavor profiles that can accurately describe differences among wines.
- Similarly, chemical analysis, which was initially limited mainly to detection of defect compounds, is now being used to understand the subtle nuances associated with varietal flavor. Recent efforts of flavor chemists have been focused on linking chemical and sensory measurements of flavor. Furthermore, researchers are using sophisticated tools -like multivariate analysis and artificial neural networks- to relate the chemical and sensory information to the subjective preferences of wine consumers.
- **Sustaining viticulture in the 21st century.** International associations of governments, scientists, and producers are trying to reach a consensus on the practices that should be allowed to produce wine destined for the international market. These associations are developing, for example, farming guidelines that limit the impact of vineyard development issues. Controlling the introduction of new pests, besides managing the existing ones with increased attention to public concerns, has become one of the greatest challenges facing viticulture. The authors mention the examples of phylloxera and the glassy-winged sharpshooter. The latter is still largely unsolved, since the insect vector is now established in Southern California, and the causal agent –the bacteria *Xylella fastidiosa* – is widely spread in its native California vegetation. Another example is Pierce’s disease, for which classical breeding methods are being used in table grapes to select for resistant genes.
- However, wine production relies heavily on classic *V. vinifera* grapes that we do not want to change by breeding. Therefore, classical breeding is not an option for wine grapes. Instead, we would need to incorporate desirable genes via genetic engineering. Researchers are also concentrating their efforts on understanding the mechanisms, genetics, and expression of disease resistance. This will lead to the development of *V. vinifera* grapes capable of being grown without need for pesticides or resistant rootstocks.
- **The future of the wine industry.** The new challenge to wine producers is “to understand the fundamental motivation behind consumer choice and to produce wines of enhanced attractiveness while simultaneously developing and implementing sustainable production practices for both grape growing and winemaking”. According to the current authors, the “French Paradox” had as much impact on the fields of nutrition and preventive medicine as it had on the food and beverage industries. From the experience of the wine industry, the future of wine as food can be defined as follows: “a blending of nutritional benefits and sound environmental practices with a human perception of quality.”

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