

New Technologies and Wine Law: European lessons to the new world of wine (NWW)

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The entry into force of the U-LABEL regulation in the EU ((2021/2117, scheduled for December 8, 2023), could foster a technological gap in the viticulture of emerging countries, where the awareness of climatic qualities and paedological conditions of each viticultural region is also increasing. Nowadays, wine rules for consumption might create incentives for transparency and wine traceability, demanding more and better information from winegrowers. The new technological support includes the evocation of human factors, biodiversity and protection of a particular landscape. All these elements might be materialized into relevant data, counting massive digital support. The aim of my contribution is to suggest such data is likely to be framed by law.

Emerging wine countries should take into account if the gap between the old and new world remains, the adoption of geographical indication criteria might be postponed, taking apart priorities through commercial but not cultural relevance out of the industry. The European wine equation would drift towards complexity and geographic origin as a communication element, while the New World of wine (NWW) trend would continue to call for fewer rules (which would also mean less protection for producers and less certainty for consumers). More room for fraud, for imitation, and an open space for *free-riders*. Whether reluctancy to add identity to the value chain of wine keeps growing, the gap might increase.

But the equation is not always dependant on rule enforcement or on producer's strategies. It seems also dependant on consumer's behavior. According to the new QR code for wine labels starts to function all over the UE, and once collecting data is achieved in a more robust manner, the ancient world of wine market shall increasingly meet more informed consumers. A more robust data should provide a wider range of options, both to winegrowers than to consumers. But adding a new piece to the puzzle: AI might do the job of collecting data. Not formularies; not consumers; neither the State.

By guaranteeing conditions of quality and origin, and by making mechanisms available to enforce them (such as conditioning subsidies to responsive producers), the EU might be creating a virtuous circle based on incentives. The wine sector preserves its qualities to develop regions and to highlight its symbolic capital. The aim is to foster markets to be segmented, and an equivalent amount of producers to surge throughout the segments. But to achieve that segmentation, new trends in wine management and wine law should meet, all related with collecting and interpreting data.

Digital modalities analyzed in this paper are compatible with artificial intelligence (AI) means as general-use technologies. As a vehicle of public interest and not only as a commercial platform. An AI inspired by European trends could allow consumers from emerging countries to gain access to better elements to choose (such as repercussions on health, respect for the environment and the landscape, or respect for working conditions). A better knowledge of wineries would increase the value chain, due to empathy towards winegrowers who adhere to socially and environmentally responsible practices.

Regulations implemented by the EU, promoting data ethics, might be exported to new world of wine countries as specific implementation tools for own national contexts. Data ethics could be disseminated and implemented without being expensive or confusing, either among winemakers or consumers.

1 New technologies for winegrowers

The aim to adopt new technologies, even among small scale winegrowers, according to a legal point of view, seeks for a renewal of an ideal ecosystem between producers and consumers; i.e., an ecosystem of trust. Among the EU countries, according to "The Future of food and farming" general declaration (November 29th 2017), the European Commission, intended to reshape challenges and orientations of the Common Agricultural Policy (CAP) after 2020.

(no. 12): [T]he wine sector has achieved a balance between production supply, quality, consumer demand and exports on the world market, that balance is not yet sufficiently longstanding or stable, in particular when the wine sector is faced with serious market disturbances. In addition, there is a trend towards a continued decrease in wine consumption in the Union due to changes in consumer habits and lifestyle. As a consequence, in the long term the liberalisation of new vine plantings risks threatening the balance achieved so far between the supply capacity of the sector, a fair standard of living for producers and reasonable prices for consumers. This risks jeopardising the positive developments achieved through Union legislation and policies in recent decades.

It is meaningful to consumers to beware the origin of all kind of foodstuff; to create awareness of the place where food products come from. After the appearance of origin rules (PDOs and GIs) and the implementation of tasting committees, evaluating compliance of specificity

rules (*cahiers de charges*) by winegrowers,¹ the wine industry exacerbated diversification, based on *terroir* specificity (Nowak, 2020, chapter 36). Thus, biological components met technical mechanisms with which wines were grown and produced. So far, the broadest contrast between the NWW countries and the European wine law is linked to geography; i.e., to trace origin of wine and consumer rights.

In this first section I intend to describe how new technologies, including AI and the use of algorithms for predictable matters, should be built compatibility to geographical indication standards, as far as big data shared between producers and consumers, meets certain requirements. Among them, public interest has been addressed to provide better conditions to protect regional specificity. While more precise techniques to foster individual preferences, the correlate smaller scale of GI criteria, the small scale production increases the value chain for wine. In that sense, new technologies represent a growing asset not only for big companies or retailers, but even more for small scale wine makers.

1.1 The wine industry, digital source of public interest

Dominant views among wine consumers evolved all along the XX Century. Other than making part of daily food until the 1960's, wine moved between a mostly hedonistic merchandise and a status seeking product (Veblen 1899; Hebdige 1988) to a tribalist reflect to create a collective costume, enacting own social membership and class allegiances (Maffesoli, 1996). Nowadays, such elaborated reasoning has evolved to more specific or personal motives, approaching the ancient and the NWW consumers. Wine goes away from the idea of being a commodity; a fungible good likely to be produced to the biggest industrial scale, at the cheapest costs of production. For instance, consumer awareness to comply to environmental or health repercussions related to wine consumption is increasing the willingness to pay index per bottle, to mitigate healthcare public expenses or carbon footprint (Leers, 2022: 171-217). Despite this, the establishment of relevant measures to compensate the aftermentioned effects are no longer dependent in an homogenous industrial sector, providing goods to a stable mass of consumers.

Nowadays, wine uniformity and higher yields are no longer assets contributing to the value chain for the wine industry; to meet regional segmentation, the aim of a growing number of winegrowers concerns the individualization of the offer; and that is what AI and the use of algorithms tend to provide, according to the use of digital tools conceived for all economic purposes (Crafts, 2021: 523-525). In that sense, the linkage between identity and culture has been moving towards the reproduction of individual preferences and everyday life. Big scale consumption is not anymore a liberating or

social marker; neither the search of identity or social status as a priority.

In contemporary terms, wine consumers seem to be more aware of transparency related with environmental concerns; or with social governance or health risks attained after the use of pesticides in the vineyard. Younger consumers are more likely to require precise and trustful information in order to choose the range of products they are willing to acquire. Selecting wine becomes a more informed process. (Ward and Martens 2000). In the other hand, winegrowers are very much constrained by a complex set of rules, conceived to provide trustworthy and more detailed information about what they produce. But few of those producers dispose of capabilities to measure satisfaction stands among costumers through questionnaires or other traditional means.

For transparency reasons, a growing segment of consumers is likely to manifest a broader acceptance of wineries respecting environmental and social obligations. On how producers were to comply to landscape or to carbon footprint burden, compensating local inhabitants accordingly. In order to increase the enforcement skills of regulators and attorneys, this kind of workload starts to be let to AI mechanisms (Legg and Bell, 2020: 195). As a consequence, machine learning seems to make wine production more adaptable to further challenges in the sector, as far as a higher scale of production doesn't seem to recover industrial patterns, which are apparently out of date.

For parcel wines, sales strategies seem linked to each winegrower and winery's identities. As usual, an average consumer interested on *terroir* wines seems attracted to concrete elements, such as grape varieties; or to winegrower technical skills; but in more recent stands, he's also willing to hear about the winegrower's story. In that sense, marketing should have new elements to promote, other than giving away a piece of that region to every consumer, in general, and the wine grower's personal story in particular (Jaffrain, 2014: 32-35).

Not all consumers are wine connoisseurs; and not all wine growers are earnest story tellers. But it's frequent that a consumer may be willing to purchase if producers are able to communicate a true story; a story consumers can trust; the specificity owed by certain wines. What the winegrower expect is to connect with other stories; to captivate the individual background of every potential customer. Thus, according to winegrowers, knowing the sense of each wine means knowing its origin. From the consumer's perspective, origin might be a matter of curiosity, but also, a matter of trust. New technologies, such as AI, can be useful to trace origin, and trust. But to make it functional, a very massive amount of data is required.

For the segment of young consumers, wine consumption becomes a rather intimate activity linked to land and empathy. Wine intelligence has been conceived as a marketing technique structured in circular economic terms, where tendencies such as Green consumption becomes a common objective. This type of digital initiatives meet a growing effect between young consumers, which willingness to pay for RSE wines

¹ PDO and GI rules; the first of them known as AOC (Appellation d'Origine Contrôlée) rules, created under two different statutes: la loi du 6 mai 1919 and the décret-loi du 30 juillet 1935, in Jacquet, 2021: 113).

increased in 2020 between 55% and 70% in Canada, Sweden or the USA (Cukierman, QuénoI and Bouffard, 2021: 198-205).

Sustainable practices are growingly appreciated; wineries, retailers, even State monopolies (such as in Quebec, Sweden) or certain supermarket chains tend to adapt sustainability as part of their latest marketing strategies. But to be trustworthy, consumer needs to be reassured on traceability and truthfulness of local winegrowers's data. Sommeliers, gastronomic personnel, as well as wine tourism contribute all together to build local reputation; to get to know better their region through wine.

Sharing information and preferences among customers and producers should also make part of the equation. For that purpose, the State is concerned on contributing to build digital ecosystems, investing public funds to put together very different disciplines; such as academic and industrial expertise (cf the *Plan d'investissement d'avenir* launched by president Macron in France, november 8th 2021). Consumer's preferences to be collected as relevant data, become more and more determinant to create and add value through AI acceleration mechanisms. Recently, french government has disposed 1.2 BN€ for the responsive use of algorithms between 2022 and 2025 (Atif, Burgess and Ryl, 2022: 27-36). But there will be very few aspects to accelerate if wine makers do not evolve to a more emphatic perception of consumer needs.

1.2 Where wine law and agro-business standards meet

For the past 20 years, reluctance towards sharing data seemed to be rooted among the NWW countries. One of the reasons to refuse PDO or GI was rooted on a pretended rigidity and lacking of originality, marginalizing wine to the category of uniform product. As if complying with tipicity of wine regions would discard winegrowers talents (Baudouin, 2003) But in fact, regulatory agencies, such as INAO in France, fostered the extreme opposite effect. In fact, the origin rules are set and evolve after producer's initiatives to adapt *cahiers de charges*, validated by State representatives. As such, if the State permitted producers to better define diversity under a mostly decentralised path designed by PDOs, adapting the current functioning to private parties' interests, the wine sector is also a matter of public scope.

In terms of intellectual property rights, the public intention to diversify the industry has been the root of the French wine sector, as much as that aim had been accomplished in Italy and in Spain, the three countries owing the highest regional diversity in the world. Tipicity should not mean the effect to uniformize, but to better differentiate. In the other hand, the aim of regulators is far from achieving goals of unions of producers. The aim is to focus on the product itself.

Even while PDO and GI rules were set into law, for the first time in France between 1919 and 1935, other legal materials were added to the same set of rules: whether on how regional knowledge spread throughout

other producers; the aim was to provide objective elements to leave consumers the absolute freedom to choose, other than on marketing standards. *Terroir* and other geographic related criteria founding GIs and PDOs (such as *climats*, *pagos*, *vins de hauts lieux*, *premiers crus*) prevailed over branding or labeling standards. After the 1950's, the origin became the definitive wine standard.

Even though, industrialized winemaking prevailed as far as the use of chemical products in agriculture boomed during the 60's and the 70's (Adrian, 2021: 215-218). It was until the 1990's that agricultural techniques started to take a better concern of health and environmental concerns (Gingembre et Najim, 2021: 64). And technology started to be implemented in the ancient world of wine while the vineyard and the cellar became the perfect spot where all kind of innovations were to be launched. But still, innovation skills were better known among the NWW countries.

Wine innovation made a big difference in the US or Australia. Hence, instead of taking a particular interest for *terroir* or even provenance, the NWW developed performant oenological institutes such as the UC-Davis in California, the Roseworthy College in southern Australia, or Stellenbosch or Talca universities, in South Africa and Chile. Technological revolution developed industrial expertise, providing very performant technology into agriculture and oenology: technological yeasts, irrigation and multiple techniques were installed to standardize wine production (Alward, 2014: 146-147) Up to the 2000's, the objective to provide the best quality (i.e. standardize wine) to the lowest prize (under 9€ per bottle) was apparently accomplished. But the economic effect was not as good as expected, while the main differentiation criteria among consumers was determined by the prize. Retailers put pressure on producers to reduce margins; and then, profit to share with producers tended to shrink. After 2008 crisis, several wine producers went bankruptcy or closed down, mostly in the NWW countries.

2 Consumer rights under AI ecosystems

Wine makers might choose the right incentives to foster the collection of accurate data to identify potential consumers, while differentiating their wines from other brands or regions, nevermind if countries dispose or not of geographical indications of origin (PDOs or GIs). But in order to build such a digital ecosystem, a rather decentralised one, consumers must be taken seriously, exerting an active and demanding role upon producers. A more informed consumer prompts transparency standards, which seem more feasible under a Web3 environment.

In order to meet minimal conditions to improve transparency patterns, producers should comply to share how their wine is made. Thus, instead of opting to function under *permissioned data* environments -where codes of access are required, and the identification of users is likely to affect privacy rights- (Chatue-Diop, 2023: 36-38) the sense of Web3 is based on big data

standards. Hence, the development of functional tools for sharing information is conditioned to turn down wine makers reluctant to new technologies. Lacking an active role fostered by producers, AI tools might not make any sense to tackle present challenges, such as adaptation measures required after climate change; or to avoid imitation or counterfitting on export markets; or to provide trustful information on health repercussions.

2.1 European incentives to foster transparency: Reassessing consumer's role

Open data might be an adequate tool to evaluate the wine ecosystem and to make it available to consumers, regardless of the number of consumers eager to share personal data (i.e., while using digital platforms, such as *vivino*). Digital register non dependant on customer's choice (i.e. tracing export or import of rosé wine from Patagonia to Florida) might translate consumption into a magnifying glass effect, in order to reassure free trade (i.e., on avoiding counterfitting or imitation) while respecting privacy rights of consumers. So, instead of setting a protectionist framework for domestic markets or finding other commercial restrictions to prevent from fraud, Web3 tracing solutions should offer a myriad of technological options to producers, permitting to choose the best legal framework adapted to fair play standards. Trustful data may transmit ethical behaviors and shared responsibilities between producers and public agents related with the wine industry.

According to the current European wine equation, the collection of massive data (non referred to individual habits of consumption but to the market in broad terms) makes it possible to approach producers to consumers, within a cycle where the data is built back and updated for the benefit of all the communities involved. But in both contexts of the ancient and the NWW countries, common objectives meet: collecting data and giving it functionality through algorithms is growing all over the world.

Among the ancient world of wine countries, winegrowers have lived different and even contradictory stages in corporative standards. From the early 1900's, after a deliberate decision to industrialize the national wine sector following the filoxera crisis, agricultural priorities headed to acquire technical and financial aid to local producers. The agro-business strategy in place, promoted the highest yield in every region, despite what consumers might expect (Ansaloni and Smith, 2021: 45-48). Quality was at stake while an industrialized profile of wine was intended to make part agrifood standards.

By the same token, wine cooperatives made part of regional pride, as far as land owners would be payed by wine merchants or by local cooperatives, acquiring individual production by the kilo. In exchange, cooperatives achieved the benefits of economies of scale to reduce costs (Le Bras, 2015, 237-242). Sinergy headed to high productivity. Wine consumption campaigns were even lauched in France or Spain by State agents. Table wines were served to minors in public school cafeterías between the 1930's and up to first restrictions, happening

in france until 1958 (Howard, 2004: 197-203) But that situation changed, for good.

A half century later, a silent revolution has been taking place (Gingembre and Najim, 2021: 89-98), where personal stories meet. The personal story of specific winegrowers meets the personal story of regular consumers.

In regulatory terms, such a wine revolution had its own legal profile. In fact, it has been a half century since the Common Agricultural Policy of the UE (CAP) seek for agricultural intensification as a preminent sign among the UE strategic developments. Viticulture entered the category of agrifood regulatory framework (Bérard and Marchenay, 2004). More recently, the value chain seems clearly repositioned towards IG wines. During 2022, despite a considerably reduction of exports by volume, economic recovery after Covid was due to an increase of export sales based on quality wines, geographically referenced and imposing reduced yields. "In terms of value, France remains the first exporter at world level in 2022 with 12.3 bn EUR (+10.9% / 2021), followed by Italy (7.8 bn EUR, +10.1% / 2021) and Spain (3.0 bn EUR, +3.1% / 2021). These 3 countries account for 61% of the global exports in value." In the other extreme, the NWW countries starting to redress industrial strategies to follow new geographical quality standards, have improved economic performance. "Chile (fourth exporter in the world) has experienced a decrease of 4% in volume of wine exported compared to 2021 (8.3 mhl) and a 9% increase in value (1.8 bn EUR)" (OIV, 2023).

2.2 The european virtuous circle of origin protection vs new world's fictional flexibility

In the European wine equation, the collection of data should foster and bring together producers and consumers, within a cycle where data are consolidated and updated for the benefit of all the communities involved.

The origin equation is perfectly applicable to colombian coffee producers, or to japanese tea growers, linking production to geography; to the land, to history, to tradition, either to culture (Bérard and Marchenay, 2008).

For Frédérique Barnier, director of Maison Jadot in Burgundy, the AOC scheme is about to meet a critical period, while specifications have not been adapted as quick as climate change has evolved lately. Planting the same amount of vines per hectare seems no longer reasonable, compared to 20 or even 10 years before; ends and means no longer correspond, while ends are defined prior to means: ends (to keep producing the same amount and type of fine wines) despite complete different means (i.e., climate, but also fertilizers, irrigation conditions, plant disease, etc). Individual effort invested by producers should meet collective data.

While no certainty is clear for anyone, according to climate behavior, producers shall learn from uncertainty. Adaptation is needed; Jean Yvez Bizot, producer in Vosne-Romanée made a parallel between natural wine and the 1863 *Salon de Réfusés*, organized by modern

painters in Paris (2021: 279); this new trend might be opening what comes next for the wine industry; maybe merging legal criteria, to meet something intermediate; a more imaginative option between the ancient and the NWW countries. Regulation agencies (like INAO in France or the Spanish CECRV) shall adapt and permit new debates, while producers might foresee what they need and expect from the regulation agencies (Soisson, 2017: 22).

But geographical identities are not intended to compete with AI or other digital tools, but to share advantages. Europeans seem to take a step forward to embrace technology for confronting the very challenging years to come for the wine industry.

The NWW countries, remaining on the other side of such technological gap, might use AI technology as well, to better trace the provenance of products. New technologies are not a magic element to improve conditions of free competition or to achieve the lowest price of wine markets. Digital tools might also favor a bigger concentration and lower defense of small winegrowers. But either for parcel wines than for a rather industrial forms of production, digitalization of wine might contribute to create a more harmonic ecosystem, including consumer as the main provider of data.

Reluctancy to create PDOs among the new world of wine producers pass by self-regulation essence of the sector. Lacking public funds to reinvest throughout the wine industry, regulatory councils might trace regional specification compliance through QR code commercial surveillance.

Incentives to persuade winegrowers to share their once viewed as industrial secrets related with viticultural and oenological procedure, should be overturned for good after specificity given by *terroir*. The unique character of every piece of land combined with human capabilities to transform the environment, turns meaningless to try to keep cloudiness about techniques and better practices for wine making; and to hide that information to potential consumers. Transparency to fight industrial secrets is a very bold consideration and trust to consumer preferences. The EU is heading towards that direction while assembling big data, intending to approach producers and consumers.² Then, among consumers, incentives can provide special offers and meaning of belonging to certain groups; like special invitations to wine tasting or other groups (like the club of Jerez wine amateurs). Producers and retailers can better understand how are consumer's preferences evolving throughout the years. And they leave additional motives to consumers to keep sharing their personal data and looking for potential amateurs among their own relatives and Friends. Cuisine lessons; advice for pairing wine and food and the like. Geographical reference to provide to consumers, about where you can find a wine you tasted in a cellar you visited recently; recipes and cuisine tips. Even specific information about the best time of the year to consume a certain wine, according with seasonal fish or vegetables available in the market.

² (<https://digital-strategy.ec.europa.eu/en/policies/blockchain-strategy>).

And all of this massive information is likely to be stored in blockchain support, making it relevant after further interpretation of data. Because as it was already mentioned, algorithms need massive and faithful data collection to make decisions predictable. Lacking enough data, any algorithm can provide of any modelling or predictability potential to any human activity. Because what every producer is seeking is consumer's attention: on how his wine can be special. The idea of creating a consensual community; to create empathy; to get interested of a winemaker's personal story... in sum, to individualize the offer.

3 Technological tools to trace origin: Contrasting worlds

Reluctancy to adopt origin rules to distinguish wine regions is still in place among many of the NWW producers. I'll propose whether reframing AI instruments might offer technological incentives to find a renewal of strategies and incentives to share data, based on regional identities. Access to massive information, merging producer and consumer behavior, might determine assets to better foresee and planify wine growers schedule, from planting vines to wine tasting, offering further readings to existing data from retailers and consumers, intended to make choices on the basis of knowledge; moved from the ideal pairing for regional gastronomy, or either by personal preferences registered in your cellphone according to my regular consumption and so on.

Data mining could provide relevant information to wine producers and retailers in order to build predictive models, on whether to produce or distribute rosé wines in a certain tourist zone instead of red, according to weather forecasts or even to the affluence of certain nationalities expected during the following holiday seasons for the years to come (Godfellow, Bengio and Courville, 2016). All this collected data should make part of legal instruments, such as smart contracts advancing the scope of data required or other predictive models cherished by producers or retailers. As the interest of data is addressed to machine learning, while without trustful data, no effective algorithm might be designed. But at the end, more accurate data should also benefit consumer through transparency and traceability of wines sold in specific market.

3.1 Wine zoning: First step to a geographical approach to AI mechanisms

IA technological developments have evolved rapidly since the 1980's; for agriculture purposes, a first stage happened as the appearance of GIS (geographical information systems), permitted to recover relevant data to create intelligent models for agriculture; i.e. to predict further weather conditions (frosts or hail) or to improve productivity at small scale. Intelligent machines started to be conceived as a next step in the progression of the automation of agricultural production. But for that, a big amount of data was needed, to picture an exact frame of geographical conditions at every zone of production.

Despite resistance to share information (from consumers as well), data started to flow, to a point where consumers shared their own buying preferences. Such effect appeared even without knowing nor admitting to share that information, and as long as any personal identification was provoked by commercial agents. A second step appeared, as technological obstacles have been tackled, to a point where smart systems were no longer rare objects. Thus, several stages happened to meet AI revolution on geographical grounds (Openshaw, 1997: 5-12). And there is no reason to avoid those technological framework and progression could be applicable to the wine industry, making part of legal standards to be taken into consideration by winegrowers.

First came intelligent systems; then, cost reduction to new technologies; finally, an awareness path among users (of convenience to adopt such tools). As far as wine growers are agricultural producers, one of the key elements to collect data were to be linked to geography.

Computers started developing calculation capacities to recognize relevant objects; but that is not new. Since the 1990's, a new style of geography relevance has been conceived; one that is highly computational (Openshaw, 1994b). Such mathematical capacities, envisioned as the best adaptation tool to IT dominated world of the XXI Century, have been focused to prevent very complex events, such as climatic or market variations. Those tools advance further results in slower terms than expected as far as building systems based on common sense knowledge is extremely difficult to achieve (Portinale, 2022: 7). To put it in other terms, it's easier to build a computer system trained to beat the chess world champion than to simulate or generate equivalent sensory capabilities of a 2 year old baby.

Availability of big data is not the only source of AI possibilities for the years to come.

Zoning concerns the optimal partitioning of space for a variety of purposes and reasons of interest; for example, wine production. The capacity to clearly define internal boundaries; to determine recent and further evolution (i.e. for the distribution of water); to distribute inspection of ideal yield measurement according to weather forecast, whenever needed. The availability of data adapted to small scale areas permits users to better define their own zone as far as a robust set of data is aggregated. A combination of geographical patterns might optimize conditions to every cycle of agricultural production, while preserving confidential data in order to trace predictable aspects for the whole zone (Rao, 1995: 427). So, how could this AI objectives be materialized into legal elements, protecting at once individual and collective interests?

3.2 Three AI legal uses for wine: Deep learning, data mining; market diversification

The use of computer and mathematical techniques concerning AI should make contracts and other legal materials affecting winegrowers far more predictable and comprehensible. But in order to make those systems work, a big amount of patterns must be previously

defined or coded; even though, a considerable degree of uncertainty remains while translating rules into mathematical forms (Ma, 2022: 155). The inclusion of previous experience is always required in order to widen predictability of technologies.

As a consequence of technology and data mining, the appearance of intelligent tools and computer systems contributing to adapt to a more complex managerial task force. Very complex sensors are being developed for precision agriculture in order to connect a myriad of data with satellite information (Pantazi et al. 2020, chapter 3). According to technological tools of this kind, IA is relevant to geography, to predict agricultural practices and changing conditions (i.e. before and after climate change or the appearance of biological plant disease). But it might be further than indicative, as geographical specifications or *cahiers de charges* might impose digital platforms conceived to assemble information in real time, to keep it confidential among consumers and to share results among winegrowers, in order to prevent sudden changes to physical factors in the future (Pantazi, et al. 2020, chapter 1).

Agricultural prediction systems have been structured under the premise of Artificial neural networks (ANNs), which simulate a biological structure, simulating nodes or network of neurons in a brain after a multiple scope of relevant interconnections. All this flow of information, pertinently transmitted to other neurons tends to process large amounts of data, drawing forecasts in short periods of time. After machine learning process, similar to synapsis in a biological brain, data sharing contributes to predictive architecture and to the ability to learn and store information, generalizing information and sharing relevant data into groups. As such, prediction performance becomes more accurate and more efficient in the long term (Zou, 2022: 41-44).

Actors of e-commerce use AI at most of the steps of creation of value chain. AI applications become cheaper and easier to find; far from the beginning, while AI tools were limited to a small group of traders. But it is still an adequate manner to differentiate qualities among competitors. In a near future, the risk is to wait too long until AI strategies are effective.

But in present conditions, there's few incentives to a regular consumer to manifest own preferences on wine. I might not want people to know what I like; but if I found an incentive (i.e. to receive real time info about where to consume, what new regions), I might be interested on feed my Vivino platform. But what if I didn't even have to fill in the info? What if it were to be done automatically, while registering my monthly purchase history report, in which I shouldn't even were to share my identity? QR offers options to create "digital identities": consumer should not have to share its personal data to provide with relevant choices.

Once providers learn to create their own digital portfolio, new conditions could appear to try other promising forms of digital wine technologies such as NFT or tracing devices for transportation. The digital wine world is no longer artificial; it is real.

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