

Natural Wine: the Conundrum

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Despite the prominent rise of the so-called modern *natural wine movement* (Monroe 2019, Gordon 2016, McCoy 2018) that started with several bright-eyed winemakers (Goode and Harrop 2011, Legeron 2018, Feiring 2019) in the 1970s in Morgon, and trickled to every major hub of the world during the past decade, the widespread confusion among consumers around *natural wine* is palpable (González and Parga-Dans 2020) and not unwarranted. Reasons abound ranging from lack of legislation around terminology (Legeron 2018) to widespread misconception between being natural and organic biodynamic (Steiner 2004, Waldin 2002, Joly 2011), from various certification bodies and associations clamouring for authority (Moscovici and Reed 2018, Jones and Grandjean 2018), to the general consumer unawareness of disparate marketing foci regarding sustainable vine-growing and winemaking (Janssen and Hamm 2012), among others.

Therefore, there comes the long-standing conundrum in the center of this movement. On one hand, earnest natural wine-makers try to make across to consumers with labeling or marketing how they differ from large-scale industrial producers who adopt different philosophies of vine-growing and winemaking for disparate end goals. On the other hand, authoritative legal bodies, given no legal definition of *natural wine*, punish winemakers for putting unverifiable terms on labels that could potentially mislead consumers and hurt other producers (Legeron 2018). The current paper seeks to provide reasons why, and solutions to the conundrum from three perspectives: (1) the definitions of natural wine, in terms of vine-growing and winemaking in Section 1; (2) the challenges faced by natural wine-makers in Section 2; and (3) marketing natural wines in Section 3.

1. What is Natural Wine?

The terminology “natural wine” has long been controversial — some even dismiss it as a misnomer in favor of “Wine of Nature”, or “Authentic Wine”, among others, due to

the unintended connotation that industrial wines are unnatural, when rather, as Goode and Harrop (2011), Legeron (2018), and Feiring (2019) all pointed out, the “naturalness” of a wine is most usefully measured on a spectrum touching many aspects of the grape through its life cycle: vine growing, harvesting, processing, aging, bottling. “Adding as little, and performing as few manipulations as possible,” is how David Lille, owner of Chamber Street Wine in Manhattan known for its natural wine collection, put it, “Over the course of decades’ visiting and tasting, we consistently find such wines more vibrant. They simply taste better.” Such a sentiment is shared among natural wine advocates — prominent sommeliers such as Pascaline Lepeltier (Feiring and Lepeltier 2017), wine writers such as Alice Feiring (Feiring 2011, Feiring 2019) and Aaron Ayscough (Ayscough 2010), influential importers such as Kermit Lynch (Lynch 2004, Lynch 2013), as well as natural winemakers and farmers who embrace the ideology in their daily operations, to the point where it appears that the natural wine has become an acquired taste — sometimes mousy, sometimes hazy, sometimes funky with noticeable volatile acidity and Brettanomyces, and yet sometimes clean, pure and elegant. The taste of natural wine is arguably much less linear, in that the wine evolves in the bottle and the glass after being opened, as well as less uniform, in that greater vintage and bottle variations are expected. Such has turned some consumers off, but is in turn only natural because of the minimal addition and manipulation in the vineyard and cellar.

Without a unified legal definition of “natural wine”, it has been up to certification bodies and associations to promote and advocate their versions of interpretation. Table 4 in Appendix aggregates what defines “natural wine” from official websites. Despite the lack of uniformity, all the definitions converge on messages such as organic or biodynamic agriculture in the vineyard, no additives or sulphites added in the winery, little intervention, etc.

Unlike conventional farming where synthetic additions such as chemical herbicides or pesticides and machinery are ubiquitous, leaving the growers with compacted soils and a bare and fragile vineyard, organic, biodynamic, and natural farming form a progression with each placing more trust in the natural ecosystem. Table 1 summarizes and compares organic, biodynamic, and natural farming with respect to philosophy, origin, practices, limitations, and relevant certifications based on Legeron (2018), Goode and Harrop (2011), and Feiring (2019). Compared to the spiritual emphasis of biodynamic farming or the ecological focus of organic farming, natural farming puts more trust in a self-sustaining, self-sufficient, and naturally-balanced ecosystem that self-regulates. The natural non-invasive approach to vines

and all the living organisms represents ultimate respect for nature, letting nature take its course such that *terrior* — the sense of place, its originality or singularity — can be expressed to its fullest, which in turn, makes vines more resilient in inclement conditions.

Farming	Organic	Biodynamic	Natural
Origin	Albert Howard F.H. King Walter James Rudolf Steiner	Rudolf Steiner	Fukuoka (1975) Bill Mollison David Holmgren
Philosophy	a better agricultural system with the use of animal manures, cover crops, crop rotation, and biologically based pest control	spiritual, homeopathic, connect with nature’s rhythms and the universe; polyculture, animal husbandry	permaculture, ”do-nothing agriculture”: minimal intervention; ”nothing added and nothing taken away”
Practice	ecologically based pest controls and fertilizers derived from animal, plant wastes and nitrogen-fixing cover crops	vineyard treatments organized according to the season, location of the constellations, and phases of the moon; dung, nettle, silica, chamomile, etc. made into dynamized teas buried as composts	use beneficial plants and animals in the vineyards to create a resilient ecosystem; handpick, dry-farm , cultivate living soils with biodiversity
Limitation	sometimes toxic despite organic: Bordeaux mixture	disbelievers argue it’s not scientific and has limited efficacy; copper and sulfur usage as fungicides allowed; difficult in wet vintages and regions	free-form, up to individual interpretation, can be risky & costly as an upfront investment
Certification	USDA Organic, CCOF, EU Organic, AB and Ecocert, BioGro	Demeter, Respekt-BIODYN, Biodyvin, Certified Biodynamic, AgribioDinamica	NA

Table 1: Comparisons between Organic, Biodynamic, and Natural Farming

In David Bird, MW (Bird 2011)’s words: “modern winemaking a lot about using SO₂, controlling fermentation and temperatures. But there is an alternative way, and it is better.” Indeed, in 2008 Demeter expanded guidelines of vineyard practices to include wine

production in the cellar, after the widespread criticism of biodynamic winemakers as “like fairies in the vineyard but orcs in the cellar” (Jason Lett, Eyrie). In Table 2, a comparison of conventional and natural winemaking practices in the cellar covering various aspects of winemaking from crushing to aging and bottling, is presented by consolidating information in Goode and Harrop (2011), Legeron (2018), and Feiring (2019). It is of course not without exceptions and the table of comparison and summarization could easily be regarded as (over-)generalization. However, it does more or less represent the current status of the natural wine movement manifested in existing literature and publications, with some notable omissions¹.

And then there is the change in taste in natural wine compared to conventionally made wine, which even though anecdotal, perhaps best put by Jasper Morris, MW on comparing wines by Dominique Lafon before and after his switch to biodynamic or natural approaches: “First, there is enhanced purity. Second, there is greater minerality. Third, precise vineyard definition is clearer and more focused.” Such comments are echoed by Dominique himself: “Each wine becomes more typical of each vineyard. It is very satisfying.” (Goode and Harrop 2011).

2. Challenges Faced by Natural Wine Producers

2.1 Production Challenges

It appears the main emphasis of natural winemakers is on what happens in the winery (Goode and Harrop 2011). While many do practice organic or biodynamic viticulture, some work conventionally or source from grape growers whose practices are out of winemakers’ direct control. However, increasingly more commonly, a natural approach in the winery is coupled with that in the vineyard to promote living soils and make without agrochemicals. It is not without major setbacks for some winemakers due to climate, financial structure, and scale, to name just a few. Take Bordeaux as a concrete example, Waldin (2002) enumerated at least three main reasons why it is particularly challenging for a top Bordeaux chateau to succeed in organic or biodynamic farming. First, the corporate structure of shareholders in decision-

¹Omissions of controversies and debates include (1) natural wine movement largely ignored and sometimes runs counter to sustainability in terms of carbon footprints; (2) the legitimacy of natural yeasts; (3) whether grafting onto American rootstocks is *natural*, or if ungrafted pre-phyloxera vines represent the epitome of *naturalness*; (4) whether zero dosage in traditional sparkling wine is more natural, among many other topics.

Process	Conventional	Natural
Crushing	Various machines/processes possible of different intensity, speed, and stem inclusion	<i>pigeage a pied</i> , whole cluster, and destemming sometimes preferred
Skin Contact Maceration	Duration and methods depend on style	Some prefer long period of skin contact and/or maceration
Fermentation	Temperature control	No temperature regulation
	Malolactic fermentation sometimes blocked or jumpstarted with bacteria inoculation	Blocking or bacteria inoculation not used, thus resulting in greater variance in wine style
	Cultured yeasts, yeast additives, cultured bacteria, yeast additives, nutrients, enzymes, etc.	Native/indigenous yeast only. NO added cultured yeast strains, nutrients, bacteria, enzymes, etc. <i>pied de cuve</i> sometimes used
Fining	Isinglass, PVPP, albumin, tannins, yeast lees, Bentonite, gelatin, casein, etc.	None
Filtering	Dialysis, micro-oxygenation, reverse osmosis, spinning cone, etc.	Sedimentation or racking
Adjustment	Chaptalization, acidification, reverse osmosis, thermovinification, flash detente, etc.	None
Aging	Various kinds of vessels, oak alternatives such as oak chips, staves, etc.	Vessels that least impact wine; toasted new oak shunned, oak alternatives not used; amphorae or clay vessels preferred
Élevage	Various additives and machines used depending on style	Skin contact, <i>sur lie</i> , <i>batonnage</i> , etc. for an extended period more common
Bottling Closure	Bottling line, outsource to bottlers, etc.	Hand bottling preferred
Additives	Over 72 legally permissible additives including some in this table	None
Sulfur	Usually used at crushing, after malolactic fermentation has finished, during maturation especially racking, and bottling	None, or bare minimum during bottling

Table 2: Conventional Winemaking vs. Natural Winemaking in the Cellar

making makes it more risk-averse² and less likely to experiment with organics/biodynamics; second, the wet Atlantic climate makes it prone to fungal and trunk diseases that could risk dramatic losses of yields without spraying; third, due to the sheer scale of many Bordeaux estates, it leaves little room of trial and error, which is often inevitable in transition.

With most of the natural winemaking processes labor-intensive and time-consuming, such as sedimentation as opposed to centrifuge, hand bottling as opposed to machine bottling, native yeasts as opposed to cultured yeasts that ensure immediate and steady fermentation, etc., natural winemakers could face greater financial constraints and operational inflexibility than conventional winemakers, which would ripple through processes and compound over time. The larger the volume, the greater the associated technical, operational, and financial risks he would be facing, which in effect puts an invisible ceiling on the scale of natural winemaking.

Sulfur dioxide (SO₂), widely used in multiple stages of winemaking as a microbicide and antioxidant, when eliminated or restricted to a bare minimum, could pose a series of challenges in the cellar as wines would be more prone to microbial spoilage, thus at greater risks of potential bacteria, yeasts, and off-flavors in the final product; and more prone to oxidation, prompting alternative preventive measures in place.

Unlike cultured yeasts designed to either facilitate a healthy start of alcoholic fermentation or better handle challenging circumstances such as low pH, high temperature, or high alcohol ambiances, native yeasts can easily result in stuck fermentation, or undesirable flavor compounds. Therefore, additional challenges in natural fermentation require a greater amount of experience, closer monitoring, and perhaps trial and error on the part of winemakers, partly due to vintage variations.

No adjustments such as chaptalization, acidification, or reverse osmosis inevitably put greater pressure on natural winemakers to ensure picking at the optimal ripeness, acidity, and thus alcohol level since there's no way to salvage later in the process.

No additives or fining or filtering also creates some challenges, which perhaps is best demonstrated by brown-colored and/or cloudy natural wines that are not uncommon in the market. Such would not necessarily be challenges if the wines taste fresh and vibrant regardless, and/or consumers do not care if it's brown-colored or cloudy, which more often

²It has been documented in behavioral economics and social psychology that groups can be systematically more risk-averse than individual in decision-making (McGuire, Kiesler and Siegel 1987, Ertac and Gurdal 2012).

than not do not appear to be the case (Galati, Schifani, Crescimanno and Migliore 2019, Migliore, Thrassou, Crescimanno, Schifani and Galati 2020).

2.2 Marketing Challenges

Natural winemakers that take the principles to their hearts take all the necessary measures detailed in Section 1 meticulously and persistently. To distinguish their final products from those from industrial winemakers requires more than a simple statement of “natural wine” on the label, which depending on the context, might not even be legal. Zero or minimal sulfur usage appears the consensus in the current natural wine scene, but focusing on it alone opens the door to system rigging from industrial winemakers making wines without sulfur addition but other harmful chemical additives and yet labeling their products as natural. Table 3 represents a simplified example that illustrates the challenges in a strategic game against phony natural winemakers. A natural winemaker can choose to label her wines as natural or not. A phony natural winemaker with low standards or an industrial winemaker can choose to label his wine as natural too, being manipulative as in the aforementioned sulfur trick or outright deceitful. From the perspective of an industrial winemaker, if the natural winemaker chooses to label her wines as natural, the industrial winemaker’s payoff³ could be either 10 if he decides to label his industrial wines as natural too, hopefully fooling some uninitiated consumers and stealing some revenue, or 5 if he does not label his wine as natural. Between these two possibilities (10 vs 5), a revenue-driven industrial winemaker would choose to label his wines as natural too (since $10 > 5$). On the other hand, if a natural winemaker does not label her wines as natural, the industrial winemaker, going through the same deduction, would still opt for labeling his wine as natural (since $20 > 5$). Therefore, regardless of the natural winemakers’ decisions, the phony or industrial winemakers always have incentives to label their wines as natural even when it’s far from the truth. Therefore, a claim or a label of natural wine becomes the unverifiable cheap talk only the uninitiated fall for. This is perhaps part of the reason why some natural winemakers never bother with certification and how consumers could easily get lost in conflicting marketing materials about natural wine.

³Payoff represents the value of the monetary reward, used as proxies for profit, or revenue, or other economic or financial measures of interest. The values in the table are for illustrative purposes only.

Payoff (Natural, Industrial)		Industrial Winemaker	
		Label Natural Wine	Not Label Natural Wine
Natural Winemaker	Label Natural Wine	(5, 10)	(10,5)
	Not Label Natural Wine	(0, 20)	(5, 5)

Table 3: An Illustration of Natural Winemakers’ Challenges in a Game-theoretic Framework

3. Marketing Natural Wines

Wine, as a canonical example of *experience goods*⁴, the quality of which can only be evaluated after purchase, is especially reliant on different forms of marketing to convey information about product characteristics to target consumers. There are several attributes that define experience goods (Andersson and Andersson 2013): *consumer learning, subjectivity, location and context dependence, personalization, interdependence, etc.*

The ability to distinguish quality wine and natural wine through aroma and bouquet on the part of consumers is not only because of “a good palate“, but first and foremost a long process of experiential learning. It is through consumer learning that the product quality information can be more precisely conveyed and thus certain product characteristics appreciated in the form of increased willingness to pay (Villas-Boas 2004), especially in face of market competitions (Villas-Boas 2006). Therefore, marketing investment in consumer education in the form of seminars, workshops, and symposiums could gain the product an informational advantage against competitors by increasing consumer exposure, thus expanding market share and increasing revenue.

Subjectivity is inherent to the consumption of experience goods so that it is important marketers use other cues to positively influence the subjective expectations of natural wine from consumers. Reputation (Ali and Nauges 2007), expert opinions (Hilger, Rafert and Villas-Boas 2011), and consumer reviews (Yu, Debo and Kapuscinski 2016), among others, have also been shown to play significant roles in particular contexts. Therefore, marketing mix and strategies that revolve around building producer reputation, inviting expert endorsement, gathering widespread consumer word-of-mouth, and so forth, could pay great dividends in market penetration of natural wines in the global wine scene. For instance, social media marketing, expert endorsement, and content marketing that features story-telling and greater consumer engagement could prove especially effective for marketing natural wines. Well-crafted visual and video content in the form of education, virtual tourism, and

⁴Examples of experience goods include automobiles, restaurants, movies, and wine.

entertainment, coupled with matching bundles of natural wine proves to be another creative and non-invasive point of sale system that maintains a steadily growing high-engagement consumer base and thus a steady stream of revenue. For example, SommTV — a streaming platform focused on curated food and wine content with wine bundles and other merchants, demonstrates its effectiveness in engaging, educating and persuading consumers.

Such marketing mix and strategies, however, require tailoring not only for individual markets with distinct cultural background, consumer population, competition, and potential, but also for individuals with different budgets and preferences. Accurate product positioning, consumer segmenting, and targeting require extensive market research to understand consumer preferences, needs, and wants. The philosophy of natural wine, the underlying holistic, self-sustained, and self-sufficient ecosystem would mostly likely resonate with environment-savvy consumers who care for farm-to-table, green agriculture, and offsetting carbon footprints, etc. The minimal intervention of natural wine, which results in greater vintage variations and nonlinear wines, could potentially speak to adventurous consumers who are variety-seeking, embrace surprises, and don't expect strict style consistency from their wines. The artisan nature of most natural wines at small production, coupled with stories and principles, is likely up the alley of high-engagement consumers that are rarity-seeking, prefer *conspicuous consumption* (Leibenstein 1950, Bagwell and Bernheim 1996) that signals *social capital* (Bourdieu 1986), and value *experience goods* over *search goods*.

The effect of location and context dependence on the consumption of experience goods is well-documented in contexts (Milliman 1986, North, Hargreaves and McKendrick 1999, Huang, Lurie and Mitra 2009), informing the significance of channel selection and communication methods. Meticulously-selected marketing channels and communication methods optimized for a greater reach and persuasion towards target consumers are essential in successful penetration of natural wines in consumer markets. Distribution channels such as online marketplaces, boutique wine stores and natural wine bars in areas where target consumers are provide prime opportunities of price premium (Migliore et al. 2020).

Interdependencies between producers and consumers are an important aspect of goods with pronounced experiential characteristics (Andersson and Andersson 2013). Establishing trusting relationships with target consumers by coupling retailing with wine tourism, improving consumer engagement via wine clubs and social media marketing, and facilitating transparent multi-way communication channels among all parties are among many ways to leverage interdependency in favor of natural winemakers and marketers.

Natural wine, furthermore, as a canonical example of *credence goods*⁵ (Darby and Karni 1973, Dulleck and Kerschbamer 2006), where producers as experts know about product characteristics such as details of minimal intervention in the winery and vineyard, but it is rather difficult and sometimes almost impossible for consumers to verify, even after purchase.

Moral hazard and adverse selection under information asymmetry have long been identified as the major issues with credence goods markets (Emons 1997, Finkelstein and Poterba 2004). For instance, an expert producer might have an incentive to deceive natural-wine-seeking consumers, by claiming natural practices in the vineyard and winery. Without expert domain knowledge, it is almost impossible for consumers to identify loopholes or hidden information from such claims. A robust finding in this literature is that *liability*⁶ and *verifiability*⁷ appear important institutional factors for experts' behavior, while *reputation* and *competition* are important market factors (Dulleck and Kerschbamer 2006). On the part of producers, transparency in the form of credible and detailed storytelling, and direct multi-way communication channels between all parties could help enhance both *liability* and *verifiability*, as well as building *reputation* and *trusting* relationships (Fong, Liu and Meng 2018), thus gaining a competitive advantage in the market by fostering stronger bonds with high engagement consumers, and receiving immediate and unfiltered feedback for potential improvement.

Pricing of experience goods and credence goods have been shown to depend to a large extent on reputation (Ali and Nauges 2007), trustworthiness (Gabszewicz and Resende 2012), marketing signals (Milgrom and Roberts 1986, Bergemann and Välimäki 2006, Jiang, Ni and Srinivasan 2014, Chen and Jiang 2017, Chen and Jiang 2018, Dubois and Nauges 2010), consumer perception of quality (Shapiro 1983, Dubois and Nauges 2010, Gabszewicz and Resende 2012). Dynamic pricing strategies contingent on time, location, context, consumers' tastes based on the premise of establishing a reputation and trusting relationships have been proposed (Shapiro 1983, Bergemann and Välimäki 2006). For natural wines, a slight premium on natural wine and increased willingness-to-pay have been documented (Galati et al. 2019, Migliore et al. 2020). Natural winemakers could strive to build trust and reputation, thus increasing consumer perception of quality levels, which have been found to be linked to

⁵Coined in Darby and Karni (1973). Examples of credence goods include expert services provided by medical doctors, lawyers, repair professions like auto mechanics and appliance service-persons.

⁶Liability: the necessity for the seller to provide a good of sufficient quality to meet a consumer's needs (Dulleck, Kerschbamer and Sutter 2011); alternatively, liability refers to the legal environment in which the seller is liable for fixing consumers' problems after charging them the price (Fong and Liu 2018).

⁷Verifiability: the necessity for the seller's claims to be binding by way of institutions or contracts.

price premiums.

4. Conclusion

After all, there appears enough evidence that there is a benefit to following a more natural viticultural and winemaking practice, thus benefiting the environment and meanwhile rewarding the consumer by delivering wines with more texture, balance, complexity, and longevity.

5. Appendix

Institute	Country	Definition
Association des Vins Naturels	France	A wine whose grapes come from organic or biodynamic agriculture, vinified and bottled without any input or additives.
Renaissance des Appellations	France	Organic and or biodynamic agriculture on the whole vineyard, thus wine comes from a living soil, not treated with chemicals; in the cellar no actions would change the full expression of the AOC's taste.
S.A.I.N.S.	France	Natural wine without no inputs and no sulphites added.
VinNatur	Italy	NA
Raw Wine	US, UK, Germany	Farmed organically (biodynamically, using permaculture or the like) and made (or rather transformed) without adding or removing anything in the cellar. No additives or processing aids are used, and "intervention" in the naturally occurring fermentation process is kept to a minimum. As such neither fining nor (tight) filtration are used. The result is a living wine — wholesome and full of naturally occurring microbiology.

Table 4: Definitions of *Natural Wine* by Relevant Associations

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(excluding footnotes, references (inserted in text and bibliography), and appendix)

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