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Digital Technology Becomes Essential to the Wine Industry

Future growth hinges on digital integration, skills investment, and global coordination

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In a year marked by extreme climate events, falling consumption, and sustained economic pressure, the global wine industry in 2024 has reached what many experts now call a digital crossroads. According to the comprehensive report published by Vinetur on May 9, 2025, titled "The Digital Vine: Technology and Digitalization in the Global Wine Industry – 2024 Review and Future Trajectories", the sector faces its most

volatile period in over half a century, pushing digital transformation from optional to essential.

Data from the International Organisation of Vine and Wine (OIV) highlights a grim backdrop: global wine production fell to a 60-year low of 225.8 million hectoliters, down nearly 5% from 2023. Consumption, now at 214.2 million hectoliters, also hit its lowest level since 1961, driven by price sensitivity and generational shifts in drinking habits. The vineyard surface area continued its decline for the fourth consecutive year, reaching 7.1 million hectares. While international trade remained relatively stable in volume at 99.8 million hectoliters, its value slightly dipped to €35.9 billion, with prices holding steady at a record €3.60 per liter.

Against this backdrop, the wine sector is leaning more heavily on technology to stabilize business operations, engage new consumers, and protect against future disruptions. Technologies such as Artificial Intelligence (AI), Big Data, and Cloud Computing are beginning to find traction beyond administrative functions and into the vineyard and winery, though uptake remains uneven.

The report notes that the industry's digital maturity remains average compared to other sectors, with strong adoption in finance and marketing but slower progress in production and viticulture. Enterprise Resource Planning (ERP) systems are widely used by over 75% of businesses for accounting and management, and about half of all producers employ digital tools for marketing and customer engagement. However, less than 40% of wine producers use digital tools in vineyard operations, despite growing interest.

Precision viticulture is gradually gaining ground, enabled by sensor technologies, drones, and GIS mapping. These tools are delivering targeted resource use and moderate improvements in grape quality, with studies in Italy and Cyprus reporting increased efficiency and reductions in chemical use. Nonetheless, the return on investment in AI for vineyard use remains uncertain for many. In the United States, 74% of AI users reported little to no improvement in grape quality and 76% saw minimal cost savings.

Cloud Computing has emerged as a key enabler, especially for small and medium-sized enterprises (SMEs) seeking affordable access to advanced systems. Cloud platforms are now hosting winery management software, helping with regulatory compliance, and enabling data-driven decisions. Firms like Deep Sky Vineyard and Union Wine Co. report significant improvements in efficiency, water savings, and data accuracy after migrating to platforms like Google Cloud and AWS.

Blockchain technology, while still in early stages, holds promise for anti-counterfeiting and provenance in high-value wine segments. Pilot projects like TRACEWINDU are exploring the use of QR-coded labels to link consumers to traceability data, though the challenge remains in driving consumer adoption and ensuring cost-effectiveness.

Digital marketing and direct-to-consumer (D2C) sales are seeing stronger integration, with wineries using CRM systems, e-commerce platforms, and AI-driven content tools to personalize outreach and reduce reliance on traditional distribution. The market for online wine sales is projected to grow by over $13 billion between 2024 and 2029. However, only 15% of wine businesses are planning new digital marketing investments in 2025, potentially overlooking opportunities in a saturated online space.

Meanwhile, automation and robotics are beginning to transform vineyard and winery tasks, with autonomous tractors, robotic pruners, and AI-powered grape sorters deployed to offset labor shortages. Yet adoption remains low—just 3% in U.S. vineyards—due to high capital costs and limited operator expertise.

Cybersecurity has become a growing concern as digitalization increases the attack surface. Data breaches like the one reported by Crimson Wine Group in June 2024 affected over 26,000 individuals, highlighting the vulnerability of small and midsize producers with limited IT infrastructure. Experts emphasize the need for strict access control, real-time monitoring, and third-party risk management to prevent operational disruption and loss of consumer trust.

On a broader scale, sustainability concerns continue to influence technological investment. Consumers are increasingly favoring brands with ecological credentials, and many wineries are using technology to meet this demand while reducing environmental impacts. This includes smart irrigation systems, energy-efficient

production, and renewable energy adoption. In Italy, precision viticulture helped cut greenhouse gas emissions by over 30% in some regions.

Despite significant challenges—such as the skills gap, high investment costs, and resistance to change—the report projects robust growth for agritech, e-commerce, AI, and robotics in the wine sector through 2030. The global agritech market is expected to quadruple to $34.8 billion by 2034, while the precision viticulture market could grow to nearly $4.6 billion in the same period.

Technology Adoption in the Global Wine Industry (2024)

Technology	USA	France	Italy	Spain	Australia	Chile	Argentina	South Africa	Germany	China
AI & Big Data (General)	High	Medium	Medium	Medium	Medium	Medium	Low-Medium	Low-Medium	Medium	Medium
Precision Viticulture	High	Medium-High	Medium-High	Medium-High	High	Medium	Low-Medium	Low-Medium	Medium	Medium
Cloud Computing	Very High	High	High	High	High	Medium-High	Medium	Medium	High	High
Blockchain (Traceability)	Medium	Low-Medium	Medium	Low-Medium	Medium	Low-Medium	Low	Low-Medium	Low	Low-Medium
Cybersecurity Maturity	High	Medium-High	Medium	Medium	Medium-High	Medium	Low-Medium	Low-Medium	Medium-High	Medium
E-commerce / D2C	Very High	Medium-High	Medium	Medium	High	Medium	Low-Medium	Medium	Medium-High	High
ERP Systems (General)	Very High	High	High	High	High	Medium-High	Medium	Medium	High	Medium-High
Winery-Specific ERP	High	Medium	Medium	Medium	Medium-High	Medium	Low-Medium	Low-Medium	Medium	Low-Medium
Digital Marketing	High	Medium	Medium	Low-Medium	Medium	Low-Medium	Low	Low	Medium	Medium-High
Vineyard Robotics	Medium	Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low	Low	Low-Medium	Low-Medium
Winery Automation	Medium	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low	Low	Low-Medium	Low-Medium

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A comparative analysis of ten major wine-producing countries reveals varying levels of digital adoption. The United States leads in D2C, AI marketing tools, and cloud computing, while France and Italy show strong momentum in ERP and sustainability-linked innovations. Chile and South Africa are advancing with sustainability programs and targeted research initiatives. Countries like Argentina and Spain are investing in precision agriculture to boost competitiveness amid climate challenges.

The Vinetur report emphasizes that future success in the global wine sector will hinge on coordinated digital strategies, investment in human capital, and the integration of technologies across the entire value chain. Organizations like the OIV are expected to play a critical role in guiding this transition through standard-setting, research funding, and trade facilitation.