

- **The nature of global viticulture**

Wine has been produced and consumed for at least 500 years. It is thought to have been originally grown in the region stretching from Spain to Central Africa.

The global wine industry has two distinct activities:

- Viticulture - the cultivation and harvesting of grapes
- Winemaking - the production of an alcoholic beverage via the crushing and fermentation of grapes

The features of viticulture include:

- Site selection
- Species selection
- Vine management
 - Pest control
 - Fertilisers
 - Irrigation

Lifecycle of the grapevine:

- Autumn - Winter
 - Vines are pruned after harvesting while they are dormant. Soil is ploughed to aerate.
- Spring
 - Budburst
 - Shortly after budburst the vines flower and the small grape clusters appear
- Summer
 - Fruit growth
 - Fruits grow and ripen until optimal fruit/sugar and acid balance is achieved
 - Vineyards are weeded and trimmed to allow airflow throughout vines
- Late Summer - Early Autumn
 - Vintage time
 - Grapes are picked and transported to the winery where the winemaking process begins.

The features of winemaking include:

- Crushing grapes and allowing fermentation
 - Sugars in grape juice turn into alcohol over time
- Some wines are transferred to oak barrels to age and add flavour
- Some wines are bottled directly

Winemaking process:

1. Grapes are picked and crushed
2. Juices are fermented (1-2 weeks)
 - a. White wines - skins are removed
 - b. Red wines - skins are left with juices
3. Wines can now be transferred to oak barrels to age and develop flavours
 - a. Some are transferred to metal vats if the wine maker does not want the oak flavour
4. Wine is transferred to bottles

- **Spatial patterns**

The spatial patterns of the industry consist of patterns of production and patterns of consumption.

- ***Patterns of Production***

The top 4 producers are:

1. France
2. Italy
3. Spain
4. USA

The top 4 wine producing countries account for 43% of grape production and 58% of wine production.

Wine can be produced at around 30-50° latitude north and south of the equator.

There has been an increase in production within New World wine countries and a decrease among the Old World wine producers. Whilst Old World wine countries still produce and consume the largest volumes, they are decreasing rapidly. New World wine countries such as China are growing quickly in both production and consumption.

- **Patterns of Consumption**

1. USA
2. France
3. Italy
4. Germany
5. China

There is a rise in New World consumers such as China.

● **New World and Old World Wines**

Old World Wines

- Usually made using grapes grown on a particular vineyard or in a specific geographical region that characterises the wine
- The word 'terroir' captures every component of the environment of a vineyard, including its:
 - Temperature
 - Local microclimates
 - Humidity
 - Aspect and exposure to sunlight
 - Soil moisture content

It basically means that the same type of grape can taste different depending on its terroir.

- Some Old World wine countries are France, Spain and Italy (basically Europe)

New World Wines

- Innovative wine mass production due to new technologies
- Consists of grape variety and mechanical methods of production
- Some New World wine producing countries are Australia, New Zealand and China

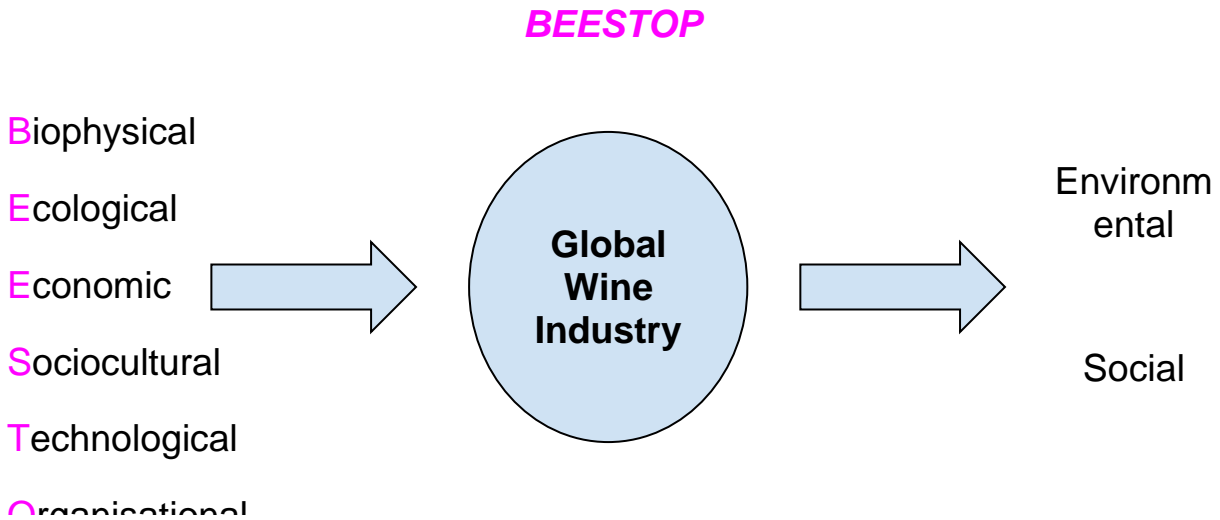
Branded and Estate Wines

Branded (New World)	Estate (Old World)
<ul style="list-style-type: none">● Associated with variety of grapes● Large scale with industrial harvesting● AKA blended wines● Tailored to meet mass market consumer demand● Made in bulk, making it more affordable	<ul style="list-style-type: none">- Associated with piece of land- Small scale and vineyard based- Shows true diversity- Higher prices

- **Future Challenges/Directions facing the Global Wine Industry**

- Tensions between traditional and new world production
- Changes in spatial patterns of production and consumption
- Changes in consumer taste
- Competition from other alcoholic beverages such as beer
- Globalisation and the emergence of global wine business
- Increasing dominance of Coles and Woolworths
- Ecological sustainability (minimising environmental damage)
- Climate change

- **Factors explaining the Nature, Spatial Patterns and Future Directions**



- **Biophysical Factors**

Site selection is vital in wine production. Grape varieties need to suit the geographic area.

Interactions between factors such as soil, slope, aspect and climate play an important role in developing wine character.

The geographic location combined with the cultural context give rise to a distinctive product.

Climate

- Temperature
 - Ideal temp is 19°C (white) and 21°C (red). Temp influences colour and growth
- Sunlight
 - Determines rate of photosynthesis and plant growth
- Rainfall
 - Approx. 700mm per year is ideal. Heavy rainfall can damage crop and erode soil
- Frost
 - Vines can be damaged in temps under 1°C. Frost damage can be alleviated by soil management, irrigation and vine training patterns. Frost can pose a problem for viticulturists in the growing and harvesting seasons (spring, summer, autumn). In winter, frost is not an issue as vines are dormant, however when fruit is growing frost can burn the vines and fruit, leading to an off-tasting wine.
- Mediterranean climate

- Wet winters and dry summers are ideal for grape growing. This is mainly due to low humidity levels in summer, increasing the wine flavour through stress.

Insects and diseases

- Phylloxera
 - A tiny insect that kills the roots and vines of grape plants.
 - Almost destroyed the global wine industry
 - Minimised through preventative grafted vinestock
- Powdery Mildew
 - A fungus that can destroy vines. It prevents photosynthesis
 - It is common when there is too much moisture and the vines don't dry out. It is not an issue in places with low humidity
 - Mildew can be stopped by:
 - Increasing airflow through:
 - Trimming the leaves and bunches of grapes
 - Double trellis
 - Spraying crops with fungicides

Soil

- The best soil for growing grapes is often the rockiest, least fertile soils as these drain well and don't hold water at the root of the vine, putting the grapes under stress and maximising flavour.
- The typical viticulture soils are limestone, granite, slate, gravel and clay.
- The soil also adds flavour to the wine, allowing wines to be characterised by growing region and terroir

The optimal climatic conditions for the growth of white and red grapes is based off its terroir. This refers to a constant temperature of 19°C (white) or 21°C (red). It is also important that humidity levels are low to prevent fungus and powdery mildew. The soil should be rough, infertile and drainable to stress the vines and give the grapes flavour. Fruit yield should be low, achieved by average levels of sunlight and low levels of rainfall around 700mm per season.

The optimal aspect of a vineyard in the northern hemisphere is south whereas this is north for the southern hemisphere. Vineyards need adequate amounts of sunlight.

Humidity is caused by low airflow and warm temperatures. This is a problem for grape growing in the warmer seasons and climates as fruits are harvested but could be jeopardised by powdery mildew.

Future directions

The future directions of the global wine industry are impacted by climate change in the following ways:

- Earlier harvesting dates
- Changing regions that are suitable for grape growing
 - Some warm/hot regions might become too hot (Hunter Valley)
 - Some cold areas might now become suitable to grow grapes
- Wineries need to adapt to the changing climate. They will need to change the variety of grapes grown so that they suit the new climate
 - Eg. changing from producing white wine to red wine in warmer areas

- ***Ecological Factors***

Refers to the ways the wine industry attempts to be more environmentally sustainable - response to changing societal values.

Sustainability - meeting present needs without compromising the ability of future generations to meet their needs

Ecological concerns include:

- Increasing pest resistance to chemical interventions
- Soil compaction and erosion (turbidity)
- Low levels of organic matter in soils
- Excessive water use
- Excessive use of nitrogen-based fertilisers and nitrate leaching (eutrophication)

Strategies used by organic vineyards to improve ecological sustainability:

- Ground cover crops between vine rows to reduce erosion and increase organic matter in the soil
- Increase nutrients in the soil via organic material rather than adding supplements (using leftover grape skins - pomace)
- Leaf removal to increase airflow in order to reduce mildew rather than using herbicides and fungicidal sprays
- Reduce sulphur dioxide in wine production, allowing natural yeast to ferment grape juice

Organic wine market is expected to grow at a rate of 10% per year for the next 5 years as millennials demand more ecologically sustainable wines

- **Economic Factors**

Economic factors that impact on the nature, spatial patterns and future directions of the wine industry are:

- Comparative advantage
- Consumer demand - economic cycle
- Exchange rates
- Global trade
- New export markets

Comparative Advantage

One wine producing nation has to give up less than another nation in order to produce wine, therefore having a comparative advantage. This advantage can come from:

- Natural conditions
- Location
 - Access to markets
- Labour
 - Skilled
 - Cost

France has a comparative advantage over the rest of the wine producing world due to its mediterranean climate and proximity to the mass global wine market. The climate in France is ideal for growing grapes with dry summers and appropriate soil. Furthermore, France is located within Europe, the largest market in the global wine industry.

Consumer Demand

Consumer demand is influenced by the economic cycle. Demand for expensive wines will be greater during an economic upturn with consumers then choosing cheaper wines during an economic downturn.

Exchange Rates

Wine exporters want the dollar to be as low as possible as it makes:

- Exports more attractive to overseas markets with cheaper prices
- Imports more expensive so consumers choose to purchase Australian wines domestically

However imported production inputs such as Oak barrels from the North America and France then become more expensive for Australian wine producers.

Global Trade

Global trade is dependent on trade barriers between nations - both tariffs and subsidies. Higher trade barriers lead to higher imported prices and therefore less global trade. Recently, trade agreements have been made with China, Japan and South Korea to decrease barriers.

Export Markets

Australia's 5 largest export markets are:

- China → \$848m up 63%
- USA → \$449m down 2%
- UK → \$348m down 2%
- Canada → \$187m down 3%
- Hong Kong → \$118m up 7%

Australian wine exports amounted to \$2.56 billion in 2017, up 15% compared to 2016.

Future Directions - Economic Factors

The global wine industry is affected by changing export markets. More specifically, the growth of Chinese consumption. As the middle class of China grows, they are demanding more wine, in particular, high quality red wines. This is impacting Australia's wine industry positively with exports to China growing 63% in 2017.

- Sociocultural Factors

Changing consumption patterns

Per capita consumption is decreasing in traditional nations such as France, Italy and Spain. However consumption is increasing in new world wine countries such as USA, Canada, Asia and the UK.

Consumption in France has dropped from 160 litres per person each year in 1965 to just 70 litres in 2005.

Changing lifestyles

Increases in wine tourism:

- Weddings at wineries
- People going for weekends and vacations to wine regions
- In recent years, wine tourism has grown enormously in popularity. Over 10% of international tourists visit wineries.
- There has been a noticeable increase in:
 - Wine tours
 - Wine festivals - Elton John, Jazz concerts, Opera in the vines
 - Winery weddings

Changing demographics of wine drinkers:

- Increasing amounts of younger people are enjoying wine - gen x / millennials
 - They want:
 - Wine that is easy to drink
 - Wine that has a lighter flavour
 - Wine that can be bought online and delivered to their door

- **Technological Factors**

Technology influences the global wine industry through:

- Grape growing - new harvesting tech, biotechnology (cloning), GIS
- Wine making - grape crushing machines, bottling technology
- Marketing - e-marketing → sales

New Harvesting Technology

- Harvesting rate = 415 bottles/min → Modern machinery
- New world wineries are more likely to use harvesting machines as they are generally larger and more commercial
- The use of harvesting technology has changed from low-end to high-end
- Newer machines are better equipped to handle difficult topography

Future predictions:

- Use of harvesting machines should increase because:
 - Machines are getting cheaper
 - Quality of machines is improving
 - Negative image of harvesting machines is decreasing

Biotechnology - cloning

- Cloning takes advantage of naturally occurring variations in grape varieties.
 - Eg. If a Shiraz grape starts to display a trait that the viticulturist likes, then that strain can be cloned to maintain those same characteristics
- Benefits:
 - Viticulturists can now not only select grape varieties that suit their region, but specific clones of that variety that has ideal characteristics for flavour and climate resilience

GIS - Geographic Information Systems

The use of drone technology allows viticulturists to survey vineyards from above. GIS is mainly influencing the global wine industry through:

- Satellite imagery
 - Provides infrared images of a vineyard, indicating heat and moisture levels. This helps the vigneron to improve quality as it informs about the correct areas to harvest.

Future predictions:

- Increasing adoption of tech by Old World vineyards
- Increasing use of GIS
 - Improving efficiency of vineyards as well as overcoming climate issues such as irrigation

- **Organisational Factors**

Refers to the regulatory framework in which the industry operates, including:

- Regulatory bodies that control the industry both domestic and international
- The changing ownership of wineries
- The changing nature of wine sales

Regulatory Bodies

Domestic and International organisations:

- International Organisation of Vine and Wine (OIV)
 - Paris based with 47 members including majority of wine producing and consuming countries
 - The OIV's role is to:
 - Provide a forum for concerns of producers/consumers
 - Assist other international organisations
 - Contribute to existing practices and standards
 - Eg. Wine Appellation Laws
 - An appellation is a legally defined and protected geographical indication used to identify where the grapes for a wine were grown.
 - I.e. Champagne
- Wine Australia
 - Provides assistance for Australian wineries for:
 - Export markets
 - R&D - info on grape varieties and climates
 - Legal aspects of international markets
 - Funded by membership levies and government subsidies
- Australian Trade Commission (AusTrade)
 - Promote exporting
 - Free Trade Agreements
 - Export market advice

Changing Ownership of Wineries

Globalisation has seen an increase in transnational corporations (TNCs) in the wine industry. TNC wineries are made up of mergers and acquisitions of smaller wineries.

Aus wine companies by revenue:

- Treasury Wine Estates - 13,000 hectares - 3,400 employees - 36m cases in 2017
 - Owns Penfolds, Wolf Blass, Lindemans
- Pernod Ricard Winemakers
- Accolade Wines

Increasing Concentration of Sales

Sales are dominated by both Coles and Woolworths with a combined market share of 80%.

Coles (Wesfamers):

- Liquorland
- Vintage Cellars
- First Choice Liquor

Woolworths:

- BWS
- Cellarmasters
- Dan Murphy's

Approx 20% of the wine sold in WW/Coles are owned by WW/Coles → not stated on labels

Implications of this:

- Pressure on suppliers to reduce prices. If they can't secure shelf space through the retailers then they may not be able to sell their wines.
- Private, hard to identify labels owned by Coles and Woolworths take up shelf space.
- **Political Factors**

International Factors

Protectionist policies have the largest impact on wine importing and exporting.

- Tariffs - taxes on imported goods therefore increasing price
- Subsidies - financial incentives for an industry to be more productive, lowering price

Free Trade Agreements

Australia has an FTA with South Korea, China and Japan, known as the KAFTA, CHAFTA and JAEPA.

This has allowed Australian wineries to produce more competitive wines in the global market as these countries will now sell the exported wine for cheaper than before.

Specific Problems Facing the Australian Wine Industry

- High tariffs on imported wines in Asia and South America
- High levels of domestic subsidies in EU - AUD \$2b in 2002
- Excessive regulation by EU for wine production and marketing.

In response, the Aus government is trying to create a fair and stable trade environment by:

- Work with the OIV and other international corporations to improve access to overseas
- Signing agreements to classify Aus wines as acceptable for other nations to then import
- Developing an international labelling agreement to simplify labelling between countries

- **Environmental, Social and Economic Impacts**

- ***Environmental***

Viticulturists are now aware of environmental impacts and incorporate a range of practices that promote positive impacts and eliminate negative impacts.

Negative impacts:

- Monocultures → loss of biodiversity → loss of habitat and food for native species
- Land clearing → loss of biodiversity → increase soil erosion = increase turbidity of rivers (Hunter River) → decreasing photosynthesis
- Irrigation and water use - water is a precious resource, especially in Aus - extensive water use can deplete groundwater resources and increase erosion.
 - Salinity - over irrigation can cause water tables to rise. This brings salt to the surface so plants can no longer survive.
- Pollution
 - Fertilisers - nitrogen-based fertilisers can be washed into rivers, causing algal blooms (eutrophication)
 - Pesticides - kill native insects vital to food chain and biodiversity. Runoff into waterways can also kill fish species.

Positive impacts:

- Although viticulture has mostly negative impacts on the environment, many winemakers are trying to reduce the impact their wineries have on the environment.
- This includes:
 - Organic winemaking - native grasses → increase biodiversity
 - Restricting agrichemicals + adding buffer zones and using tunnel sprayers helps to reduce agrichemical drift and runoff to soil + waterways.
 - Sustainable vineyard management - aimed at maximising grape quality + ensuring viticulture sustainability.
 - Advanced irrigation techniques - drip irrigation
 - GIS to maximise irrigation efficiency

- **Social**

The global wine industry has positive and negative impacts on society. These include the adoption of wine culture throughout the old and new world. There is a concern about anti-social behaviour and binge drinking associated with wine overconsumption.

Positive impacts:

- Viticulture requires a more highly skilled and trained workforce
- Increase in people wanting to learn about wine tasting and culture
 - Drinking wine is becoming more of a hobby/lifestyle
 - Increasing demand for wine appreciation tours/holidays

Negative impacts:

- Binge drinking
 - Leads to health issues such as alcoholism and impacts on the liver and brain. Can increase obesity and sleep deficiency. Can lead to injury and death through impaired reaction time (drink driving)
- Culture clash
 - There is a clash between wine regions and traditional agricultural industry (viticulture vs. farming). This is due to increasing tourism which can increase congestion in the area. Also, valuable land is being developed for hotels.
- Labour exploitation
 - Foreign grape pickers could be exploited on either a seasonal work visa or working holiday visa. These workers could be exploited due to their poor english skills and lack of knowledge of Aus laws. Fair Work Aus found Vanuatu workers on Aus farms were being overworked and underpaid.

- **Economic**

Positive impacts:

- Wine exports provide employment and incomes
 - Wine tourism provides an increasing diversity of jobs in wine regions.
 - The wine industry supports 172,736 full-time and part-time jobs, and contributes \$40.2 billion to the Aus economy.
 - Total exports were \$2.56 billion in FY18, up 20%
 - China contributed \$1.12 billion, up 55% → largest
 - USA contributed \$424 million, down 8% → 2nd largest

Negative impacts:

- Increasing concentration of ownership - globalisation has caused an increase in the number of small to medium wineries
 - Treasury wines
 - Casella wines

- Coles and Woolworths - Private label wines
- Due to political and tax incentives during the 1990s there is now a glut of wine (over-supply). This has forced the price of wine down and has caused many wineries to close down.