TRADE & INDUSTRIAL POLICY STRATEGIES

TIPS RESEARCH REPORT FOR

DEPARTMENT OF TRADE, INDUSTRY AND COMPETITION

MANAGING ECONOMIC RISKS LINKED TO CLIMATE CHANGE: SECURING MARKET ACCESS FOR SOUTH AFRICAN WINES

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JUNE 2020

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ABBREVIATIONS

BWI	Biodiversity and Wine Initiative
CCC	Confronting Climate Change
DALRRD	Department of Agriculture, Land Reform and Rural Development
DAFF	Department of Agriculture, Fisheries and Forestry
DEA	Department of Environmental Affairs
EC	European Commission
ESD	Effort Sharing Decision
EPA	European Partnership Agreement
EU	European Union
EU-ETS	European Union Emissions Trading System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
IPW	Integrated Production of Wine
LULUCF	Land Use, Land Use Change and Forestry
PEF	Product Environmental Footprint
PET	Polyethylene Terephthalate
SADC	Southern African Development Community
SADC-EU EPA	Southern African Development Community-European Union Economic Partnership Agreement
SAWIS	South African Wine Industry Information and Systems
TDCA	Trade, Development and Cooperation Agreement
UK	United Kingdom
US	United States
WWF	World Wide Fund for Nature

1. INTRODUCTION

The production of wine can be traced back to ancient civilizations. The earliest evidence of wine dates back to 6000 BC in Georgia, before its production expanded to Persia, Sicily, the Balkans and then ancient Greece, Thrace and Rome. In modern history, wine has been distinguished according to its origin as being either Old World or New World.[1] Traditionally, Old World wines were associated with higher standards of quality than their New World competitors, partly due to the more stringent regulation of wine production in these regions and the vaster experience of their cultivators. This perception no longer persists, especially since the 1976 Judgement of Paris,[2] which propelled New World wines as genuine competitors in the world wine market. The development of winemaking in South Africa is closely associated with the arrival of Jan van Riebeeck in the Dutch Cape Colony in 1659. Since then, winemaking has been through multiple evolutions and revolutions, with material shifts in production techniques, storage, transportation and taste.

With greenhouse gas (GHG) emissions coming to the fore of nations' climate policy concerns, the wine industry faces a new challenge. Viniculture (grape cultivation for winemaking), as an agricultural activity, is directly susceptible to climate change impacts due to grapevines being highly sensitive to the surrounding environment, such as changes in weather patterns. Due to weather pattern variation, in South Africa, the arable land suitable for viniculture could fall by over a third in the next 20 years, with vineyards that do not have access to irrigation being the most affected (DEA, 2015).

In addition, the industry is increasingly targeted by climate change response measures, aimed at reducing GHG emissions. Such measures are poised to significantly alter traditional methods of production. Domestic measures, such as carbon pricing, may directly or indirectly (through inputs) have negative impacts on the industry's cost structure and economic viability. Because wine is a highly traded good, international responses to climate change are expected to disrupt established patterns in the trading of wine products. Trade-related climate change response measures, such as shifts in import-export patterns, border carbon adjustments[3] or non-tariff barriers (such as standards), are increasingly more prevalent. Accordingly, "green protectionism", i.e. the justification of protectionist measures under the guise of addressing climate change and other environmental goals, is also becoming more prevalent internationally (Cosbey and Wooders, 2011; Du Plooy and Jooste, 2011; Jooste et al., 2009; Montmasson-Clair, 2016; TIPS, the dti and IDC, 2013).

South Africa is the world's sixth largest exporter of wine in volume, and has not been exempt from these trade impacts. The growing intersectionality of climate change and trade has seen the domestic

[1] Old World wine refers primarily to wine made in Europe (predominantly France, Italy, Spain and Portugal) but can also include other regions of the Mediterranean basin with long histories of winemaking such as North Africa and the Near East. New World wine refers to wine produced out of traditional wine producing nations of Europe and certain parts of the Middle East. New World regions include countries such as Argentina, New Zealand, South Africa and the United States (US).

[2] The Judgment of Paris refers to the Paris Wine Tasting of 1976, the first leading blind tasting wine competition in which two Californian wines ranked higher than French wines.

[3] A border carbon adjustment, a type of border tax adjustment, is a tax imposed on imported products equivalent to a carbon price imposed on the similar domestically produced product. It imposes charges on the GHG emissions associated with an imported product that are equivalent to the tax imposed on domestic industries producing like products as a result of climate change policies. Border carbon adjustments are specifically employed towards the prevention of carbon leakages and to ensure that domestic markets are not put at risk as a result of carbon compliance regulation, by ensuring that importers pay the price of the carbon content of their goods.

wine industry face dramatic changes in its operations over the past decade. This paper unpacks the green protectionism dynamics which have increasingly impacted the domestic wine value chain and stand to be a growing risk moving forward. The paper also explores the factors that make it particularly difficult and yet necessary for South African producers to adapt to this new genus of regulation.

These issues will be addressed as follows. Section 2 presents a synopsis of the various aspects that have shaped traditional trade patterns in the wine industry. Section 3 discusses the impact of changing regulations and policies by South Africa's main trading partners. Section 4 expounds on the possible ways forward in mitigating the effects of such regulatory change and Section 5 concludes.

Box 1: The wine value chain in South Africa

The South African wine industry is a noteworthy contributor to the domestic economy. Figure 1 depicts the different stages of the value chain. According to South African Wine Information and Systems (SAWIS), the industry contributed close to R36 billion to the country's gross domestic product (GDP) in 2019, i.e. about 1.2% of total GDP (SAWIS, 2019). The industry is heavily concentrated in the Western Cape, which produces 95% of South African wine (SAWIS, 2019).

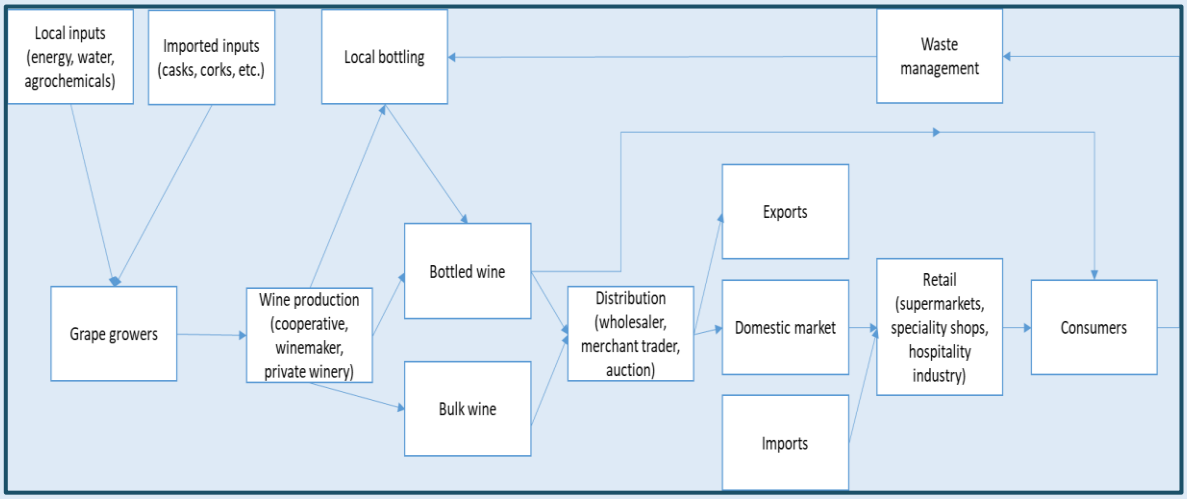
Employment creation by the wine industry naturally follows the production concentration, with employment concentrated in the Western Cape. In 2019, the industry employed 290 000 people throughout the wine value chain (SAWIS, 2019), accounting for 1.8% of total employment in the country. Overall, the sector aims to increase employment to 375 000 people by 2025 (Basson, 2020).

The wine value chain begins with the growing of wine grapes and, in this respect, wine-grape growers can be distinguished as follows: (1) small grape growers united in cooperatives who are often contracted to sell their entire crop to a particular cellar; (2) grape growers who sell their harvest as a raw material to winemaking companies; (3) grape growers who produce and sell their own wine in private cellars. The major inputs for wine-grape growing include grape seedlings, human capital, water and electricity. The next major process in the value chain is wine production. It involves operations, such as stemming, crushing, fermentation and finally storage, to facilitate the ageing of the wine product. This process may take several months to years depending on quality and type of wine to be produced. The primary inputs to this process include human capital, grape crushing equipment, filtering equipment, fermentation additives, packaging materials and wine fining agents. The packaging of finished wine products may be conducted at the production site, assigned to third parties or carried out by the offtaker. The finished wine is then distributed. The distribution step of the value chain is transport-related and can be referred to at a local, regional, national or international level, depending on the strategy and production capacity of the firm. The largest wine estates tend to distribute wine by themselves. Small- to medium-sized firms often pass distribution operations to specialised companies, which focus on food and beverage distribution and can promote numerous wineries at various markets. They mainly benefit from the economies of scale. Retailers connect distribution companies with the wine consumers. These include supermarkets, restaurants, wine bars and specialty shops.

The structure of the wine value chain presents significant opportunities for the uptake of unskilled labour particularly in the growing of grapes and the production of wine. The industry's labour-to-capital ratio (i.e. the number of jobs created per R1 million invested) is pegged at 4.64, which exceeds the agricultural average of 4.54, as well as that of the national economy at 2.94 (South African Wine and Brand Industry 2018). Similarly, the last industry study commissioned by SAWIS found that, in

2013, the labour-intensive production methods which are followed in primary agriculture resulted in 56% of the employment opportunities throughout the value chain being for unskilled labour, 29% semi-skilled workers and 15% skilled workers (Conningarth Economists, 2015).

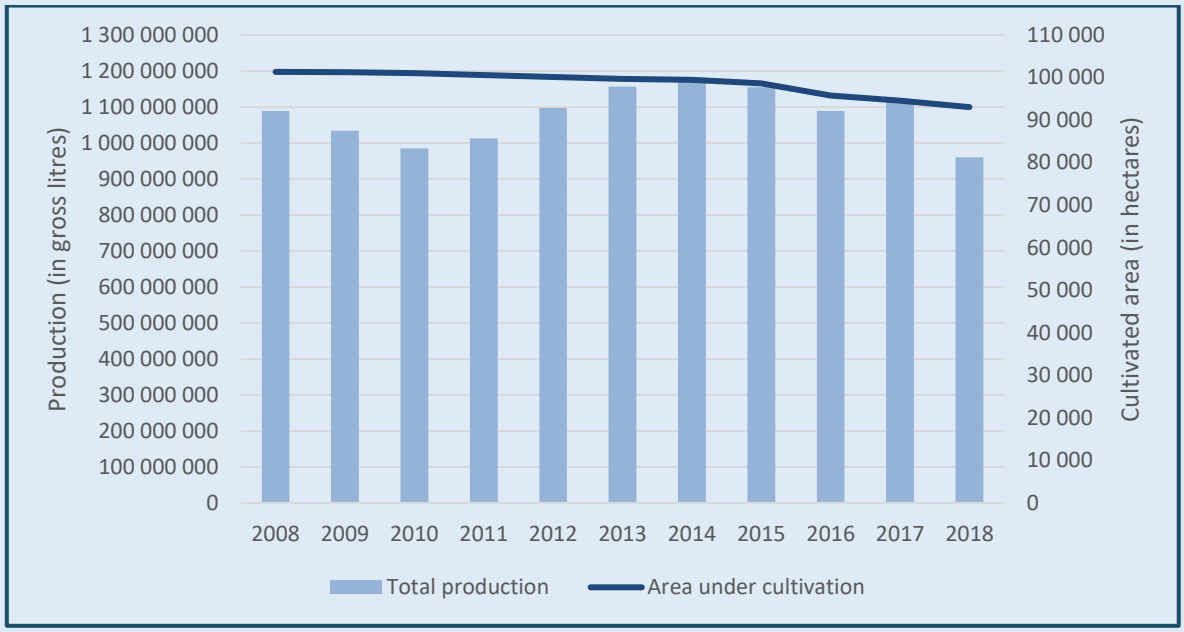
Figure 1: Wine value chain framework



Source: Authors

The domestic wine industry is, however, under stress. As illustrated in Figure 2, the total land area under cultivation has been progressively decreasing over the last decade. The decrease in local production over the last 10 years has been attributed to the effects of a weakening rand and global oversupply of wine, which have together driven down global prices (Vinpro, 2020). Production, which depends largely on weather conditions, has been erratic over the years. A sharp decline can furthermore be noted in 2018.

Figure 2: South Africa's wine production patterns



Source: Authors, based on data from SAWIS, Series on Total hectares wine grape vineyards planted and uprooted (excluding sultana), downloaded from SAWIS in January 2020 at http://www.sawis.co.za and Department of Agriculture, Fisheries and Forestry (DAFF), Abstract of agricultural statistics, Series on Wine produced – Total wine crop, downloaded from Quantec in January 2020 at www.easydata.co.za.

The significance of the decrease in the total cultivated area should however not be over-emphasized as there is a growing opinion that new technological advances which have improved agricultural efficiency, have allowed grape growers to maintain production volumes on less land (Conradie, Thirtle et el, 2019)

In addition to non-climate policy, issues surrounding land distribution, rising input costs and recent unfavourable climate conditions have placed pressure on the profitability of wine production (Vinpro, 2020). Regions, such as the Oliphant's River and the Klein Karoo, are still suffering from the after-effects of the three-year drought (2015-2017), while excessive rainfall in other areas has contributed to rot-related losses in recent harvest years.

According to Vinpro, a non-profit organization representing over 2 500 South African wine producers, cellars and industry stakeholders, the majority of wine grape producers realise a net farm income much lower than the R30 000 per hectare needed to farm sustainably. In 2020, Vinpro found that only 28% of its member wine grape producers made a profit in 2019. While this was an improvement compared to only 15% of members being profitable in 2015, this proportion remains drastically low. Simultaneously, the industry's average return on investment increased from less than 1% in 2015 to 4.8% in the 2019 harvest year. This is a positive development but remains lower than inflation and hides severe inequalities between winemakers.

In addition to the structural problems faced by the South African wine industry, the COVID-19 pandemic has placed further constraints on the industry. The lockdown imposed in South Africa came with the complete prohibition of the sale, production and transportation of alcohol for five weeks. Domestic sales were prohibited for a further three weeks. As a result, the wine industry suffered losses of about R500 million per week at the height of the lockdown. Furthermore, the lockdown started during peak season in the wine industry, deeply impacting farmers which did not complete their harvesting as well as the producers relying on their supply. The restrictions placed on the industry also threatened employment, particularly for contract or seasonal workers (Payi, 2020).

2. TRADE-RELATED IMPACTS ON THE WINE INDUSTRY

Over the past decade, the global wine sector has been subject to increasing policy and market pressure to reduce its carbon footprint. Several other trade-related trends have also modified the nature of the wine industry over the past decade. These trends have altered the global wine industry and New World countries, such as South Africa, have particularly struggled to mitigate negative impacts.

The South African wine industry is highly vulnerable to regulatory changes in its main exporting markets because of the country's geo-political positioning in relation to its main trading partners. Due to the country's heavy dependence on wine purchases from European retailers and the associated buyer power, South Africa's negotiating power in its trading relations with these countries is limited, and this places downward pressure on domestic revenues. This is exacerbated by the global oversupply of wine, which forces South Africa to comply with buyers' conditions to maintain market shares.

The South African wine industry has been most vulnerable to climate change response measures through its exports to the European Union (EU). The top five importers of South African wine, i.e. the United Kingdom (UK), Germany, France, the Netherlands and Denmark, are all subject to European climate change-related regulations. Within the EU, winemaking is regulated through three distinct

components of the EU climate change mitigation framework: the EU Emissions Trading Scheme (EU-ETS), the Effort Sharing Decision (ESD) and the Product Environmental Footprint (PEF).

First, while the EU-ETS[4] does not directly cover agriculture as a sector, the wine industry is impacted by a) the coverage of biomass in energy-generating facilities and the industrial production of ammonium nitrate used in agricultural fertilisers; and b) the pass-through of impacts on inputs, such electricity, agro-chemicals and transport services.[5]

Second, non-CO_2 emissions (e.g. CH_4 and N_2O) from agriculture are regulated under the ESD.[6] The ESD sets national emission targets for European member states for each year between 2013 and 2020 in the sectors of the economy not covered by the EU-ETS, such as agriculture. Insofar as the wine industry is involved, the ESD regulates the emissions from the energy used towards the growing of the grapes and the actual wine production.

Last, as part of the Single Market for Green Products Initiative,[7] the European Commission (EC) pioneered the PEF initiative, which aims to introduce a standardised method of ascertaining the sustainability of a product traded within the EU, in order to increase the comparability of like products.[8] In 2018, the EC launched the pilot phase for still and sparkling wine. The pilot phase will end in 2020 and, from there on, the established guidelines will be used towards the shaping of harmonised methodologies for voluntary footprint measurement and the communication of environmental performance of wines. The outcomes from the pilot are intended to become the specific PEF rules to be used by all stakeholders in the European wine sector (or even internationally through voluntarily compliance or spillover effects). The approved guidelines in use during this pilot phase highlight wine packaging as having the most significant climate change impact, prefacing stringent regulations on this stage of the value chain.

Despite these initiatives, to date there has been relatively little mitigation ambition from EU member states in relation to agriculture when compared to action in other sectors. This is based on a variety of factors, including the notion that it is less cost-efficient to deliver mitigation effort in the agriculture

[4] The EU-ETS is a climate change mitigation measure. It is a market-based mechanism centred on the "cap and trade" principle. A cap is set on the total amount of certain GHG gases that can be emitted by installations covered by the system. The cap is reduced over time so that total emissions fall. Within the cap, companies receive or buy emission allowances, which they can trade with one another. They can also buy limited amounts of international credits from emission-saving projects around the world. The limit on the total number of allowances available ensures that they have a value. After each year, a company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another company that is short of allowances. Trading brings flexibility, enabling emissions to be cut where it costs least to do so.

[5] South Africa's geographic distance from its major trading partners in this regard makes the country particularly sensitive to the regulation of carbon emissions relating to transportation (Montmasson-Clair 2015).

[6] CO2 emissions and removals from the land are covered under the Land Use, Land Use Change and Forestry (LULUCF) 2013 decision. To date, the LULUCF sector remains formally outside EU climate policies and EU emission-reduction targets.

[7] The European Commission's Roadmap to a Resource Efficient Europe presents a framework towards the reduction of the overall environmental impact of production. The Roadmap provides guidelines through which future actions can be designed and implemented coherently. It sets out a vision for the structural and technological change needed up to 2050. The Roadmap culminated in the Single Market for Green Products Initiative, which seeks to facilitate better information sharing on the environmental performance of products and organisations (EU Commission, 2017). This initiative was formulated within the context of the difficulties involved in the certification of "environmentally friendly" products in different member states. In some instances, companies must comply with several processes, which often involve the duplication of assessments in order to be deemed "environmentally friendly", and this situation is unsatisfactory as it results in costs for companies and confusion for consumers. The European Commission proposed the Product Environmental Footprint and Organisation Environmental Footprint methods as a common way of measuring environmental performance.

[8] It applies the "comparability over flexibility" approach, reducing the flexibility of methodological choices to increase the comparability of products.

sector as opposed to other sectors, and due to concerns over the impact of mitigation on food production, food security and the implications for rural communities (Hart et al, 2017).

This situation is likely to change in the future as mitigation opportunities in other sectors become more expensive. There is moreover significant potential for relatively cheap GHG reductions in the agricultural sector. Options range from improved cropland management (including nutrient management, tillage/residue management and water management), improved grazing land management (e.g. grazing intensity, nutrient management), the restoration of degraded soils, sink enhancement (carbon sequestration), improvements in efficiency of agricultural productivity, and the minimization of transportation distance.

Box 2: South Africa's carbon tax and the wine industry

The South African Government has committed to reducing the country's GHG emissions by 34% by 2020, and 42% by 2025 compared to a business-as-usual trajectory (DEA, 2011). As part of this commitment, a carbon tax was promulgated on 1 June 2019. The tax is based on a headline rate of R120 per tCO_2eq. However, various exemptions to the tax reduce this to an effective tax rate of R6 to R48 per tCO_2eq, depending on the sector. The tax is in its first phase, until December 2022. A second phase will run from 2023 to 2030.

Agriculture was excluded from the first phase but is expected to be covered from the second phase onwards (National Treasury 2018). Phase 1 targets GHG emissions from electricity use and the burning of fossil fuels. Electricity prices will, however, not be directly impacted by the carbon tax until 2022. The carbon tax has, however, been incorporated into fuel prices and is being passed on to consumers. Overall, indirect price increases on inputs also have a broad impact on economic activities. The impact of carbon pricing on the wine industry will be highly dependent on the tax imposed on electricity and fuel. Although the industry relies heavy on fertilisers, which are a large source of GHG emissions within the agricultural industry, most of the fertilisers used are imported and so the impacts on the domestic industry will be minimal unless a tax is also placed on imported products (see Partridge et al, 2015) for more information on this.

In addition to increasing governmental regulation at the winemaking stage of the value chain, retailers continue to put increasing pressure on their supply chains to reduce their environmental impacts. Retailers largely control the value chain through their buying power and have used it to their advantage to set rules and capture an increasing share of markets and profits. Retailers have used various channels to increase their market power. Over the past decade, the European supermarket industry has become increasingly consolidated. Supermarket chains are now a major distribution channel of many consumer goods, including wine. In Europe, supermarket and discount chains account for close to 70% of off-premise consumption of wine and over 80% of wine sales in the UK are through retail outlets (USDA 2016). Furthermore, many larger retail chains now own their in-house private label wines, which compete directly with branded products (Contini et al, 2015). Within this context, retailers have increasingly leveraged their large market shares and consumer insights to drive their in-house brands as well as novel products, such as carbon-neutral wines.

At the same time, European retailers have also gained from abundant global supply as well as comparably lower marketing and distribution costs to drive prices down to levels that make it difficult for New World suppliers to sell at. New World producers, whose wine often has lesser rapport with consumers in the European markets, have been the most negatively impacted by this rise of retail

sales. South Africa particularly has failed to negotiate more favourable trading agreements on a national level and individual supply contracts, presumably as a result of bearing less geopolitical power (Loose and Pabst, 2018). The South African industry furthermore has a very limited marketing budget to promote local estates and vintages at global fairs, competitions and trade shows. Without large-scale access to the consumer market, private South African wine cellars have failed to compete extensively, and bulk exports have emerged as a more profitable route to market.

On the supply-side, the effect of global oversupply has further pushed prices down. The dramatic expansion of vineyards in the New World, most notably in Chile, the US and Australia, has led to an overall growth in New World exports by close to 45% since 1990 to present. South African production levels have, however, remained largely stagnant, as depicted in Figure 2, while Chile experienced the largest increase in production of the New World countries (Rabobank 2014). Spain, the world's largest wine exporter in value, has also experienced a boom in production over the past two decades. Comparing South Africa's export position in volume (Figure 3) and US dollar (Figure 4) highlights the weak position of the industry. While the sixth largest export in volume (with about a market share of about 4%), the country is only the 12th largest exporter in value (with about 2% of the market).

Figure 3: Global wine exports (in tons)

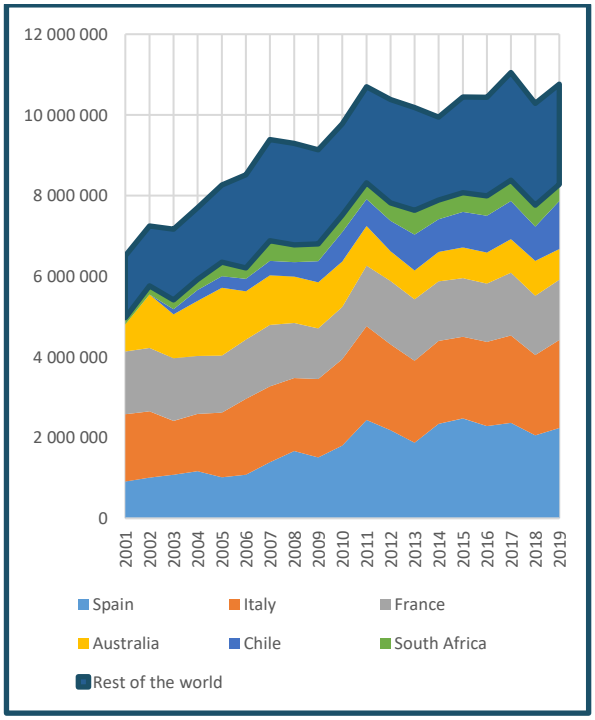
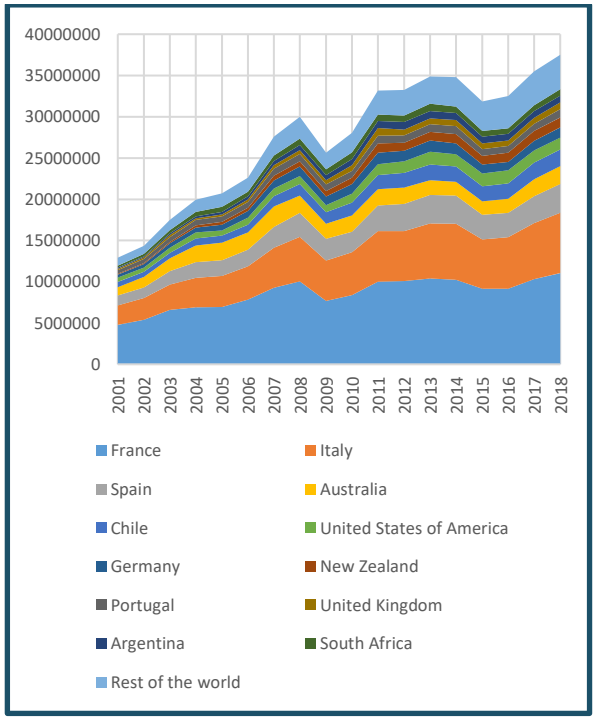


Figure 4: Global wine export (in US$ thousand)



Source: Authors, based on data from Trade Map

Volatile exchange rates in the aftermath of the global economic downturn have also acted to shift the competitiveness of both Old and New World wine producers (Rabobank 2014). While producers in countries such as New Zealand and Australia have benefitted from the appreciation of their currencies in relation to those of their major trading partners, South African producers have been somewhat disadvantaged by the weakening rand, particularly against the British Pound and the Euro. The increase in production input costs (imported corks, barrels, production equipment, yeast and closures) has, according to the industry, outweighed the positive benefit of the devaluation of the Rand, which has made the country's wines more affordable in international markets (Vinpro, 2018). A weak rand has also served to increase the cost of overseas branding and marketing of South African wine.

3. THE IMPACT OF CHANGING REGULATION AND GLOBAL DYNAMICS ON THE SOUTH AFRICAN WINE INDUSTRY

The structure of wine trade has been ostensibly impacted by efforts to reduce GHG emissions. This has manifested through pressures on importers to cut packaging and transport costs, among other measures, and has had dramatic consequences on the structure of wine trade.

Since 2007, a gradual substitution of bottled wine with bulk wine exports has taken place in some of the major New World wine exporting countries, such as Australia, the USA and South Africa. This has resulted in the transfer of bottling operations from wine producer to wine consumer countries (COGEA, 2015). In 2010, 30% of global wine exports were classified as bulk exports (International Organisation of Vine and Wine, 2019). In 2019, bulk exports increased to 47% of global wine exports indicating greater substitution away from bottled wine. New technologies in wine bulk transportation, such as the introduction of the Flexi tank[9] replacing steel containers, have enabled such changes.

Accordingly, importers of South African wine, primarily the UK (the largest single export market) and the EU, have exerted increasing pressure on South Africa (and other exporters of New World wine) to reduce the export quantities of bottled wine. As a result, the nature of South African wine exports has shifted over the past two decades from the export of predominantly bottled wine to bulk units, as shown in Figure 5 and Figure 6.

Figure 5: South Africa's wine exports to the world (in tons)

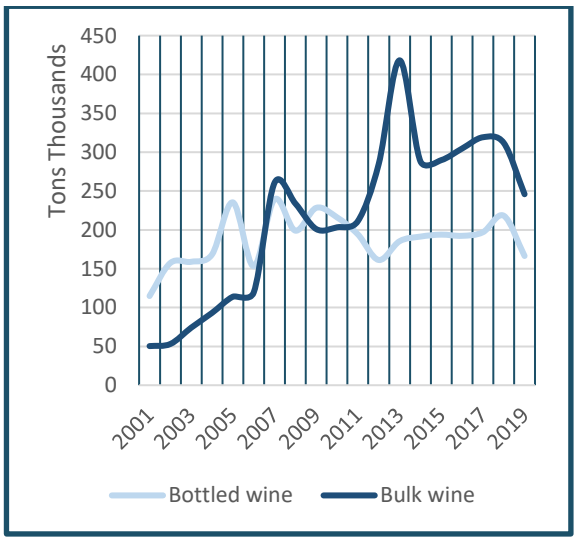
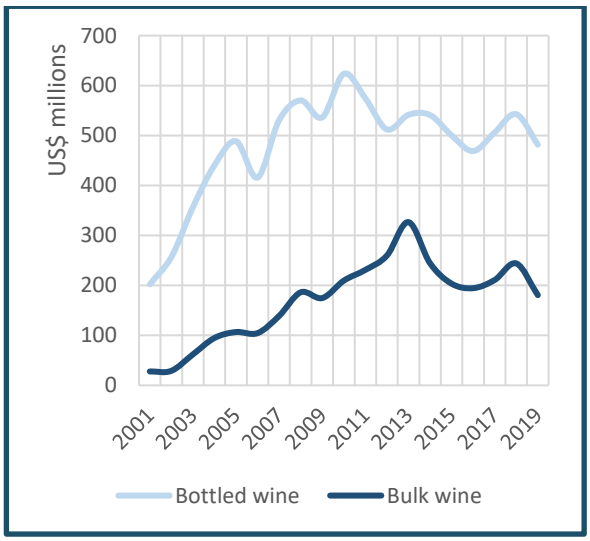


Figure 6: South Africa's wine exports to the world (in USD)



Source: Authors, based on Trade Map data.
HS codes are 220410 and 220421 for bottled wine; and 220422 and 220429 for bulk wine.

From a South African perspective, this shift in the nature of wine exports is problematic for several reasons.

First, bulk units are far less profitable to export than bottled units. As illustrated in Figure 6, the value of bottled wine exports is still much larger than revenues from bulk exports, despite the loss in market share. The shift from bottled to bulk wine exports has played an instrumental role in reassigning how

[9] A flexitank is a sealed, collapsible and flexible bag, which is fitted into a "twenty-foot dry van" or standard container. The overall benefit of a flexitank for wine exporters includes its low contamination and taint risk as well as its greater ability to moderate temperature fluctuations, which together decrease the product risk of bulk wine shipments (Aaltonen, 2015).

value is attributed along the global value chain. With bottling now carried out in import markets, a considerable share of the packaging value and wholesale margin is captured in these markets instead of generating revenue in the exporting market (Franson, 2012). This has been the experience in most New World wine countries, which are all also located at great geographic distances from their export markets. Rabobank (2012) estimated that the shift from bottled to bulk wine exports equated to well over US$1 billion in annual revenue being diverted to the destination markets rather than the source markets, at the benefit of bottlers operating in importing countries.

Not all vineries are equally impacted, however. High-quality winemakers have managed to preserve bottled export. Indeed, bulk shipping is not deemed suitable for luxury product, such as premium bottles and high-quality sparkling wines. Compliance with the laws relating to the use of geographical indications,[10] further requires local bottling for estate wines to be certified as such. Some export-oriented brand owners have, over the past decade, increasingly shipped their own products to the importing market in bulk for packaging and sale under their own labels. In this instance, such a producer retains the wholesale margin and only the packaging stage is locally impacted. In contrast, when bulk wine is sold and exported to an independent third party for packing and sale under an independent brand, the wholesale margin is shared with the independent wholesale retailer. Wine cellars have been concerned about the effect on their individual brands. In particular, South African winemakers fear that their wine could be blended with lower-quality wines, which could present a reputational risk for their products. The South African wine industry has failed to position itself as an overall supplier of high-end products, which has exposed the industry to the blending dilemma as South African wine is commonly portrayed as a cheap product, suitable for blending. This challenge could be overcome by a combination of better branding by export councils as well increasing the visibility of South African products through greater participation in international tasting competitions and exhibitions. These interventions are, however, dependent on support being offered to wine houses wishing to participate in competitions.

Second, the shift in trading patterns has led to loss of employment in the wine packaging industry. Since the shift to bulk exporting, bottling companies in the Western Cape, notably in Stellenbosch and Rostberg, have been operating at below capacity (Sulaiman, 2013). Bottlers[11] have vocalised their concern about the job losses that have resulted since this shift.

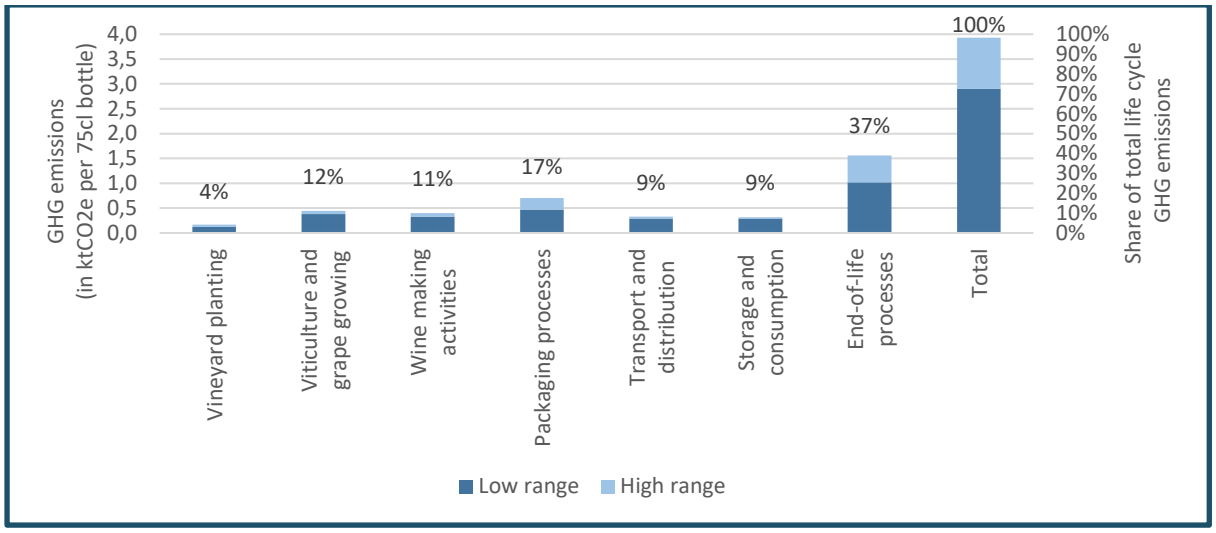
In 2015, SAWIS calculated that, for every 10 million litres of wine shipped in bulk, just over 107 jobs would be lost, depicting the importance of wine packaging to South African employment dynamics. As a remainder, bulk exports have soared from 50 million litres in 2001 to 420 million in 2013, before stabilising at 300 million litres in 2017. Accordingly, Consol Glass, South Africa's largest glass manufacturer, has cut production because of the sharp fall in demand for wine bottles (Consol, 2018). Its wine sector business, which accounts for a quarter of revenues, has for instance declined by more than 20% between 2013 and 2015. First Cape, one of the largest South African wine brands present in the UK, also shut down its own bottling facility in 2011, laying off about 40 people.

[10] A geographical indication is a sign used on products that have a specific geographical origin and possess qualities or a reputation that are due to that origin. To function as a geographical indication, a sign must identify a product as originating in a given place.

[11] While some South African wine is bottled by private cellars at their facilities, a significant amount is packaged at bottling plants.

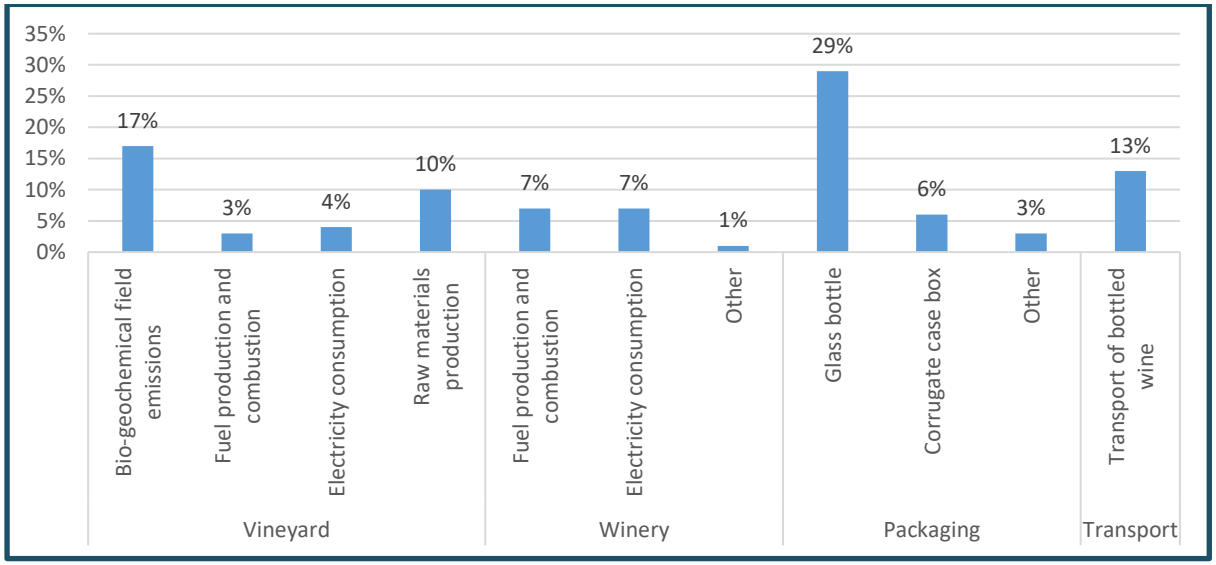
Third, the environmental argument appears, in this instance, to provide an implicit protection to the European packaging industry as well as wine importers, for minimal climate change mitigation benefits (Chidede, 2017; Vickers, 2012b).[12] According to (Rugani et al., 2013), transportation and distribution only account for 9% of the life cycle emissions of a wine bottle, as showed in Figure 7. This is confirmed by a study commissioned by the California Sustainable Wine Growing Alliance (2017), which estimated transportation to account for 13% of the lifecycle emissions of a bottle of wine (see Figure 8).[13]

Figure 7: Average life cycle GHG emissions from a 75cl bottle of wine



Source: Authors, based on data from Rugani et al, 2013

Figure 8: Carbon content of bottled wine



Source: Authors, based on California Sustainable Winegrowing Alliance, 2017

In sum, the vulnerability of the South African wine economy to climate change response measures is of serious concern. In the short to medium term, the ability of the value chain to deeply transform is moreover limited, notably due to asset lock-in, the shortage of skills and resources, and the need to retrain the workforce.

[12] In addition, the carbon footprint of wine influences the purchasing decisions of only a very small group of consumers.

[13] Estimates vary with the mode of transportation. Unrefrigerated container shipping represents the most efficient option but is also the most time consuming. Air cargo, which is the most time effective mode of transportation, has an emission factor of over 43 times that of container shipping.

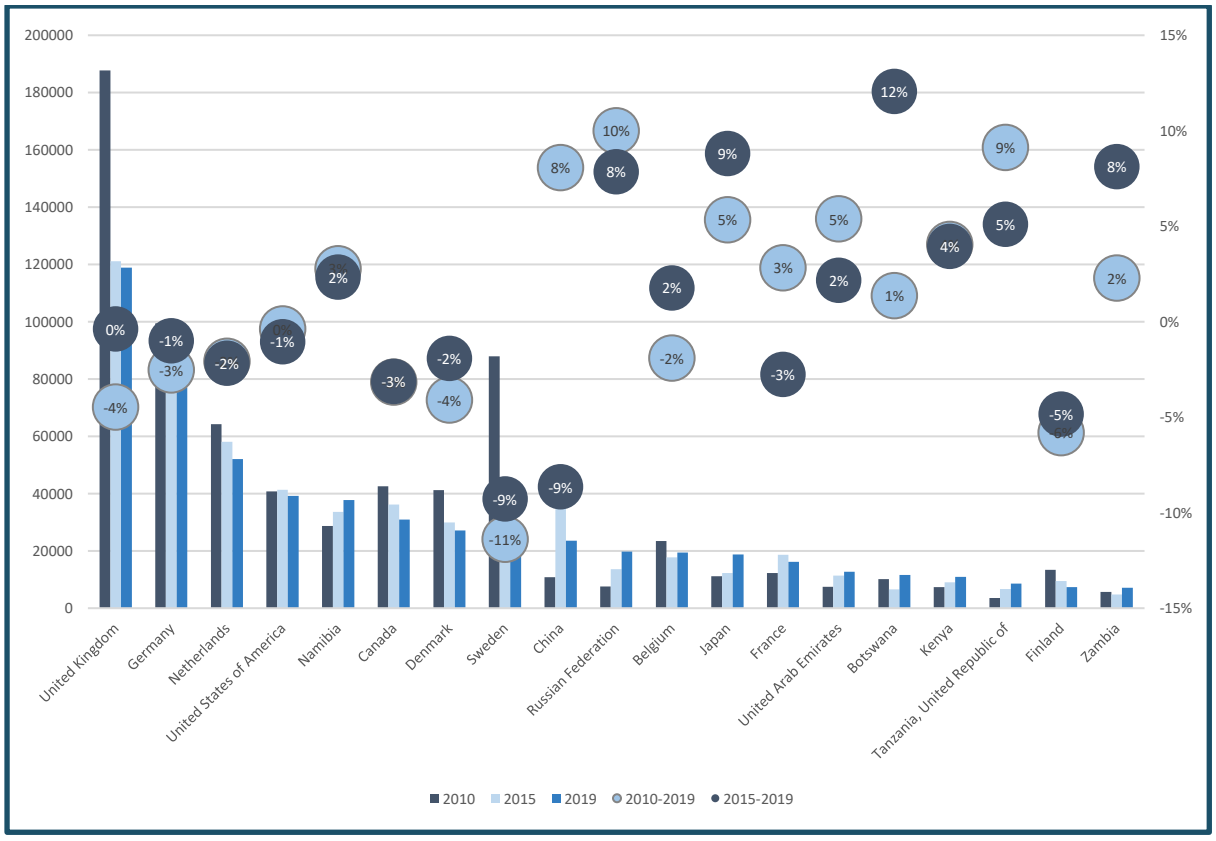
4. POSSIBLE WAYS FORWARD

The wine industry, under the leadership of key industry organisations such as Vinpro, the South African Liquor Brand Owners Association, SAWIS, Wines of South Africa, and Winetech, aims to transform the industry into a robust, profitable and globally competitive sector (Basson, 2020). To this end, the industry seeks to implement a more focused export strategy whilst leveraging the local market, growing wine tourism and championing transformation, all with the underlying goal of ensuring a better profit margin for wine grape producers.

4.1. Exploring new markets

One of the key methods to mitigate the growing risks faced by the industry, including the growth in climate change-related regulations, is for South Africa to shift its exports to new markets. The domestic wine industry at large is making attempts to counter the pressure for bulk export substitution by diversifying its supply channels to countries where demand for premium wine is growing. Destinations for export growth now include the US, China, Japan, Russia and African countries, such as Namibia, Botswana, Kenya, Tanzania and Zambia. While these remain secondary markets for South African wines, they have recorded notable growth in the past few years. As illustrated in Figure 9, Russia, Japan, the United Arab Emirates, Botswana, Kenya, Tanzania and Zambia have recorded strong growth rates over the last decade.

Figure 9: South Africa's wine exports for main markets (in USD thousand and compound annual growth rate – CAGR)



Source: Authors, based on data from TradeMap downloaded from https://www.trademap.org in March 2020.

South African wine performs well in African markets primarily because of the positive brand image the industry has built for its products. The largest challenge in maximising profits from these markets is the lack of infrastructure, particularly around transporting finished products across the continent as well as onerous customs clearance processes. The export industry has found it most rewarding to target countries with a history of wine consumption, usually because of their cultural heritage, such as Angola and Mozambique. Countries, such as Kenya and Tanzania, which have emerged as leading tourist destinations for European tourists are also potential lucrative markets.

A major challenge that the industry has faced in securing market access, in Asia particularly, has been the lack of supporting trade agreements that serve to reduce the cost of exporting. In China, for example, the South African wine industry competes for market access with other New World countries such as Chile, Australia and Georgia, which are all offered preferential market access as a result of established free trade agreements. The higher import tariffs that the industry must pay raises the per unit price of wine to uncompetitive bounds in comparison to other New World competitors.

4.2. Increase EU export in bottle

Interestingly, despite the current trend, there is room to further explore avenues to increase the volume of bottled exports to the EU. The 2016 Economic Partnership Agreement (EPA) between the EU and the Southern African Development Community (SADC) EPA Group, which gives South African wine duty-free access to the EU market and favours bottled over bulk exports. Duty-free quotas for bottled wine (77 million litres in the first year) are twice as high as for bulk wine (33 million litres). Given the existing dynamics in the industry, it remains to be seen whether South African winemakers will be in the position to take advantage of such dispensations.

Under both the SADC-EU EPA and its predecessor, the Trade, Development and Cooperation Agreement (TDCA), South Africa has experienced higher bulk wine exports in comparison to bottled exports. This has resulted in the underutilisation of the bottled wine export allowance offered by the EU.[14] As explained earlier, this is largely the result of pressures to reduce costs. Exporters can reduce packaging and transport costs when exporting bulk over the bottled wine. European wholesale importers, as a result, support and encourage bulk wine imports, as they will be able to reduce pricing from exporters (Mshengu and Kalaba, 2018).

There is a need for increased collaboration between wine industry representatives and Department of Agriculture, Land Reform and Rural Development (DALRDLR), to address the constraints that lead to the underutilisation of allocated export allowances.

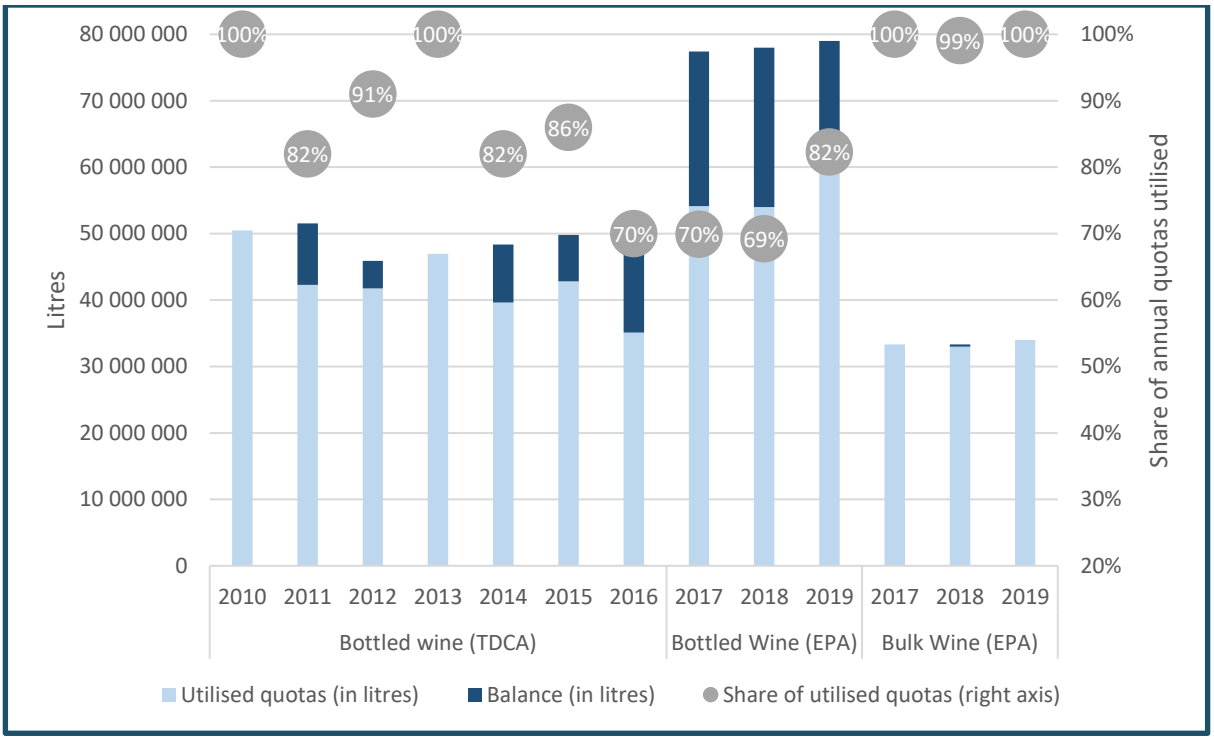
The current monitoring regime may also be enhanced by mandating the declaration of unused allowance prior to the end of a financial year to allow for the reallocation of such allowances.[15]

[14] Under the TDCA, which came into effect on 1 January 2000, South Africa could export certain agricultural products to the EU under a quota system. The quota system provided preferential access to South African exports to the EU market in certain maximum quantities under reduced or free rates of duty. The wine export quota system did not differentiate between bottled and bulk exports. However, as showed in Figure 10, the South African wine industry has historically struggled to fully utilise the offered export quota quantities. In 2010 and 2013, when the quota under the TDCA was completely utilised, the industry recorded its highest yields.

[15] The utilisation of quotas under the EPA is at the discretion of the individual exporters being allocated export allowances by DAFF (Republic of South Africa, 2018). DAFF aims to allocate export allowances in a fair and equitable manner among eligible pre-approved producers.

Furthermore, trade negotiators should explore the possibility of retrospective utilisation of unutilised wine quotas.

Figure 10: Export quota utilisation for South African wine under SADC-EU EPA



Source: Authors, based on data from DAFF.

4.3. Seek alternative packaging

Within the wine industry, business evolution and innovation have been considered slow and bound to tradition. However, drawn by the effects of globalisation and the resultant increasing global competition, the wine industry has evolved to become more dynamic, relatively sophisticated and more knowledge intensive.

Packaging costs constitutes a significant amount of value addition in the finished product. Packaging costs make up roughly 50% of the total cost of producing a bottle of wine, with glass bottle costs in turn comprising about half of packaging costs. As early as 2006 (i.e. before the shift to bulk wine imports), the South African industry began to experience the impact of uncompetitive local packaging costs. High glass, paper and printing costs (relatively to main destination markets) driven by smaller economies of scale, less efficient factory production and less competition, made local glass packaging an unprofitable endeavour (Fin24, 2017).

A first option is to reduce the weight of the glass bottle itself. Traditionally, glass is considered an excellent wine medium that serves the practical, aesthetic and quality protection requirements of the product well and remains the packaging of choice.[16] A study, conducted by the California Association of Winegrape Growers, representative of a New World country, found that by reducing the wine bottle weight from 502g to 300g (the lightest bottle available at the time), the GHG emissions of producing

[16] Glass bottles are traditionally used to sell and store wine. The bottle is what affects the aging process of wine. Glass bottles protect the quality of the wine by reducing oxygen permutation through the container. While other containers might be more economical and lighter in weight, they often do not preserve the quality of wine like glass bottle (Thompson 2010).

and transporting wine could be reduced by up to 15% (California Association of Winegrape Growers, 2017).[17]

In 2010, a South African winery, DGB, in cooperation with the UK's Waste Resource Action Programme pioneered the move to lighter weight bottles in South Africa (Vinpro, 2018). DGB, South Africa's largest independent wine and spirit producer and distributor, moved its entire portfolio to 350g bottles. The change to lighter bottles resulted in a 21% weight reduction over its portfolio. It is estimated that this led to a 30% reduction in GHG emissions with a savings of 120 $kgCO_2e$ for every 1 000 bottles produced (DGB, 2019). Consol, the leading packaging glass manufacturer in South Africa, also made this alteration to their branding line in the same year, depicting the adaptability of South African industry (Consol, n.d.).

Polyethylene terephthalate (PET) has been identified as a viable alternative to traditional glass bottles. PET bottles can weigh as little as 50g, compared to 350g for a standard glass bottle. In addition, the production of PET bottles results in GHG emissions of up to 53g of CO2e, whilst glass production would typically emit 89g per bottle (Mpact, n.d.).[18]

In 2010, the Wine and Spirit Board of South Africa approved the use of PET bottles for South African Wine of Origin certificates. Mpact Plastics, based in the Western Cape, is the leading producer of multilayer wine bottles including PET bottles in South Africa. Mpact claims that the multilayer technology used for plastic production has no bearing on the taste or quality of wine and gives the wine a "tested and proven" shelf life in excess of two years.

Despite Mpact's claims, however, a key consumer concern surrounding the use of PET bottles is the impact on the quality of the wine. PET bottles allow a significantly greater amount of oxygen to enter the wine causing the wine to become severely oxidised and altering the aroma profile of the packaged product (Thompson 2010). This is particularly an issue for premium wine, which can be stored for multiple years.

Complementarily, a variant to reduce the weight and space used by packaging is the development of "flat bottles", as pioneered by British firm Garcon. This innovation is aimed at cutting back transportation costs as well as GHG emissions caused during transportation. The company has designed a case that fits 10 products when only four would fit in a standard casing. The Garcon case holds eight bottles vertically with two slotting horizontally into the space around the bottlenecks. The bottle used by Garcon wineries if furthermore made from 100% recycled PET which makes the bottles up to 87% lighter than glass packaging, coming in at a mere 63g (Garcon Wines, n.d.).

Another avenue is the use of Tetra Pak bottles. Tetra Pak estimates that 70% of the material used in their containers (such as paper) comes from recycled material. Tetra Pak containers also have a significant weight advantage (40g) over traditional glass bottles (Thompson 2010). The use of Tetra Pak containers, rather than glass bottles, could result in the use of 92% less packaging material, 54% less energy over the life cycle of the container, and 60% less solid waste volume (Thompson, 2010).

[17] A reduction from 400g to 302g would reduce GHG emissions by 6.6%.

[18] PET bottles offer other advantages: they are unbreakable, offer a greater flexibility in design, and are lighter than a traditional glass bottle. They also provide a platform for the development of bio-based, biodegradable plastic packaging.

Like the PET bottle, this packaging medium would be most suitable for table wines that do not need to be aged.[19]

Lastly, canned wine has grown in popularity, particularly in the US. At the end of 2018, global canned wine sales were up by 155% from the previous two years. In the US, between June 2017 and June 2018 sales of canned wine grew by 43%. The American canned wine market is now valued at R675 million. The growing acceptance of canned wine in the US market has been attributed to younger wine drinkers who prefer the portable packaging that cans offer as well as the lower cost that results from this form of packaging in comparison to traditional bottles (Mamacosa, 2018).

South African winemakers have been slow to adopt this new trend, particularly due to the implied costs of altering established production lines. The introduction of mobile canning facilities, however, has the possibility of shifting the status quo. A leader in this field has been the Cape Town-based Tinykeg company that begun to offer on-site canning facilities to wine farms. Its facilities can package up to 40 cans a minute. Working at optimum capacity, this can equate to 6 000 litres a day. The biggest advantage cans have over bottles and other more traditional wine packaging materials is their ability to keep out light. Lubanzi, a Cape Town-based wine house, formerly shipped its wine products to the US in bulk where they would be packaged in cans but since the introduction of mobile canning units has begun on-site packaging. In the past year, Tinykeg has canned wines for at least half a dozen South African brands including Ben Wren, Vinette, Uncanny, and Cloof Wine Estate (Thompson, 2020).

4.4. Improve the sustainability of production

The South African Wine industry has formed a voluntary environmental sustainability scheme, the Integrated Production of Wine (IPW), to improve the sustainability of local production. The IPW was established in 1998 with the aim of developing industry-specific guidelines that prescribe best practices in relation to grape production, wine manufacturing and wine packaging, in a sustainable manner (Integrated Production of Wine, n.d.). The scheme falls under the jurisdiction of the Wine and Spirit Board in terms of the Liquor Products Act No. 60 of 1989. The IPW functions as part of a global network of sustainability programmes, including the Global Wine Sector Environmental Sustainability Principles, as published by the International Federation of Wine and Spirits as well as the Guidelines for Sustainable Viticulture: Production, Processing and Packaging of Products, as published by the International Organisation of Vine and Wine.

Assessments under this scheme can be conducted either on each component individually or on the entire process. The standard has wide scope and specific evaluation topics, such as agricultural practices and chemicals use. It covers topics, such as GHG emissions, energy, water, waste management, traceability and wine quality criteria. Approximately 95% of total domestic production is certified by IPW, which represents 75% of winegrowers (wine.co.za, 2019).

An assessment of the IPW application form, however, reveals that the focus of the IPW is on the environmental sustainability of the agricultural process of wine production. The criterions assessed towards certification eligibility are therefore heavily focused on soil and water conservation and there is no mention of the sustainability practices observed by producers in the packaging process.

[19] The California wine industry study also demonstrated that 3-litre bag-in-box packaging decreases the product's overall carbon footprint by 40% from that of the typical glass bottle.

IPW offers distinct certification schemes for farms, cellars and bottling facilities. Wine producers must complete an online self-assessment once a year as a prerequisite to gain permission to export their products. The minimum compliance threshold for certification is currently 65%. Every four to five years, a farm, cellar or bottling facility is audited externally by a third party to gain access to more formal IPW accreditation. In addition, the fees required to satisfy the labelling and certification requirements pose a financial challenge to the already constrained profit margins of smaller South African producers.

The Confronting Climate Change (CCC) Initiative[20] is another project aimed at cultivating industry-specific knowledge on climate-change-related impacts and providing the necessary tools to address issues, such as carbon footprinting, energy efficiency and sustainable resource management. The project was developed to promote improved efficiencies and enhanced sustainability through the South African fruit and wine industry, notably by supporting the sector through identifying and responding to the risks and opportunities associated with carbon emissions. The CCC carbon foot-printing tool has been independently audited by the Carbon Trust,[21] and has been endorsed as a reliable and credible resource for measuring the carbon footprint of South African wine and fruit-related products. Some notable outputs of the CCC have been an online carbon footprinting platform, a series of regular industry engagement workshops, a range of commodity-specific industry benchmark reports and up-to-date and relevant energy and emissions-related news and information.

The World Wide Fund for Nature (WWF) has also been a key sustainability partner to the South African wine industry (WWF, 2020). In 2004, the organisation piloted a Biodiversity and Wine Initiative (BWI) which culminated in a collaboration with over 250 landowners and cellars, through which assistance was given to producers towards their attainment of IPW certification. The assistance offered was mainly around the setting up of environmental management plans. As of 2015, over 90% of the South African Wine Industry had been certified as being environmentally friendly through the cumulative efforts of the BWI and IPW partnership. Since 2015, the BWI programme was restructured into the Conservation Champions Programme, which focuses exclusively on industry leaders. The programme offers voluntary membership to producers willing to commit to biodiversity-friendly farming practices, the conservation of their natural areas as well as to continually improve their water and energy efficiencies. The WWF supports these farms in their environmental efforts by co-developing detailed environmental management plans, setting tangible targets and helping them to prioritise actions to address their most pressing environmental risks. In exchange, the Conservation Champions can use the distinctive Sugarbird and Protea logo on their wine bottles so consumers can make an informed choice to support environmental wine leaders (WWF, 2020).

Looking outside of South Africa, the Spanish experience provides an illustration of the potential to improve the sustainability of the wine industry. Spain is the third largest producer in hectolitres, the largest exporter, and the largest percentage of hectares under production, is in Spain. The Spanish wine industry has emerged as a leader within the EU in climate change mitigation. Box 3 looks at the country's initiatives.

[20] A steering committee provides strategic guidance to the project, and includes representatives from the fruit and wine industry, the Western Cape Department of Agriculture, and the World Wide Fund for Nature (WWF-SA), in addition to a number of independent climate and energy experts.

[21] The Carbon Trust is a world-leading and trusted expert in low-carbon technology development and deployment, low-carbon issues and strategies, and carbon footprinting.

Box 3: The Spanish Wine Federation's climate change initiative

The Spanish Wine Federation (Federación Española del Vino) has developed the Wineries for Climate Protection certification system, which establishes the criteria that sustainable wineries must meet. The certification is voluntary and focuses on improving the sustainability of wineries in the areas of GHG emissions, water management, waste reduction, and energy management (renewable energy and energy efficiency).

The Spanish Wine Federation is also spearheading an international initiative through the International Wineries for Climate Action organisation that aims to reduce GHG emissions in the global industry by 80% by 2045. Membership requirements include that the winery:

1) Be at least 20% powered by onsite renewable energy (excluding the purchase of Renewable Energy Credits or other offsets).

2) Has completed a minimum baseline third-party verified GHG inventory for a standardised set of emissions categories across Scopes 1-3 (using World Resources Institute GHG protocol and ISO 14064 process), including 90% of the organisation's volume within the region where its main winery is.

3) Demonstrates at least a 25% reduction of CO2 emissions per unit of wine produced from a baseline emissions inventory year, as proof of proactive ongoing commitment.

4) Has a mid- and long-term objective to reduce total emissions 50% by 2030 and 80% by 2045.

Bodegas Torres Wineries has been a leader in creating a carbon-neutral wine industry in Spain. The company, through its Torres & Earth campaign reduced its GHG emissions per bottle by 27.6% between 2008 and 2018 and has committed to reducing its emissions by 30% by 2020. The winery has installed a biomass boiler to turn organic residue into electricity, it has a solar photovoltaic system to provide energy for the vineyard, and it uses geothermal installations to maintain the temperature at its facilities. The winery has also taken up some offset projects, such as planting 850 hectares of forest trees. It is also looking at carbon capture and storage and has a "climate change vineyard" where it experiments with different elements.

5. CONCLUSION

In conclusion, the vulnerability of the South African wine value chain to climate change-related regulation, particularly coming the European market, cannot be overlooked. The relative weak position of the local industry on the global market further makes such climate change-related pressures more difficult to absorb. The shifting of packaging to export markets in an effort to reduce transportation-related GHG emissions has had a debilitating effect on the industry's revenues and employment.

The launch of the EU's PEF pilot phase in 2018 signals the EU's intention to ramp up action on this front. Although the guidelines established for this are initially designed as voluntary measures, the South African wine industry must remain abreast of any developments within its leading export market.

While the interplay between international trade law, through the World Trade Organization, and climate change regulations remains a source of debate, the global power status of the countries attempting to impose green protectionist measures on the wine industry (or any other industry) will

play a major role in their global acceptance. As a result, border carbon adjustments may soon be another impediment to the market access of South African wine in Europe.

The existence of a legislated certification scheme in South Africa offers an opportunity for the local industry to adapt to being a less carbon-intensive industry. This is particularly the case for packaging, as a framework for such developments already exists. The South African wine industry should dedicate more research into alternative bottling options (such as PET and Tetra Pak). This could help the industry take advantage of the remaining quotas for bottled wine to the EU.

Within this growing trend of carbon content sensitivity, the regulatory and advocacy institutions already operating within the wine industry, such as the IPW and Confronting Climate Change Initiative, should also place greater emphasis on mapping the carbon emitting production processes involved in the manufacturing of wine and not only the carbon foot printing of the agricultural processes.

The state of the South African wine industry highlights that it is imperative for the industry to adapt to this new trading environment. A revision of the terms of trade in favour of South Africa indeed appears unlikely. Adopting more carbon-neutral production and transport methods to ensure access into the European market as well as seeking out new export opportunities emerge as the two key avenues to maintain market access in the long run.

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