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# Identifying the willingness to pay for eco-certified wine by South African consumers: A comparison of biodynamic, fair trade and sustainably produced wines

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**ABSTRACT:** As eco-certified wines are being produced in increasing quantities and varieties, so are the definitions and the labels that accompany them. This has resulted in confusion with regard to what type of eco-certified wines customers prefer and what prices they are prepared to pay for such wines. The purpose of the research is to provide clarity regarding consumer knowledge about eco-certified wines and their preferences for each category as expressed by their willingness to pay (WTP). Specifically, the goal of the research was to identify the willingness to pay for South African eco-certified wine with a focus on three labels: biodynamic, fair trade and sustainable. The methodology used by the study was to identify the willingness to pay for the wines by using contingency valuation modelling. A survey was administered using the Qualtrics platform. It consisted of three sections: the first set of questions included questions about purchasing behaviour and important considerations when buying wine. The second set of questions collected perspectives and opinions about the multiple wine certifications discussed in this article and the third set of questions collected demographic data. The research focused on South African consumers and consisted of 267 respondents. Three WTP models were run separately for biodynamic, fair trade and sustainable wines. The study found that younger individuals with higher incomes, higher levels of education, previous eco-labelled product purchases and better knowledge of eco-certified wines have a positive impact on the WTP. The only exception seems to be in the case of biodynamic wines where previous knowledge of eco-certification has a negative effect on the WTP. The research outcomes provide guidelines to producers, retailers and restaurateurs about their output, marketing and sales efforts towards the ever-growing consumer demand for such wines.

**KEYWORDS:** contingency valuation, eco-certification, market, preferences, sustainable, wine growing

## Introduction

Environmental sustainability is quickly becoming one of the key factors for the future development of the wine industry (Moscovici et al., 2020). As a result, various eco-certified labels have been introduced, each associated with a different production process requirement. An important factor to take into account is that as eco-certified wine production increases, the number of wine consumers interested in ecological farming is growing, further generating additional income for the wine producers that follow such practices through the development of tourism (Pomarici & Vecchio, 2014).

The level of competition in the global wine market has steadily increased over the last two decades as many new producers

entered the market. This is also the case for wines that have eco-friendly attributes, where different producers try to gain a competitive advantage to consolidate a share of the market (Getz & Brown, 2006; Orsolini & Boksberger, 2009; Holohan & Remaud, 2014).

As the growth in interest in eco-sustainable wine has been increasing, so has the certification that defines the production of wines that are associated with this concept. The result is that there are many different types of eco-certified wines and that it is difficult for the consumer to correctly define and understand what they are purchasing. This is also one of the reasons that the market share of eco-certified wines is underdeveloped (Willer, 2000). The research objective in this paper was to identify whether there is a willingness by South African consumers to

purchase South African eco-certified wine. This specific analysis focused on the biodynamic, fair trade and sustainable labels as they were among the most recognisable eco-labels by the South African consumers.

### An overview of environmental certification

Eco-certifications, or labels, are widely used to inform consumers about the environmental attributes of food and beverage products (Delmas & Gergaud, 2021). The goal of these eco-labels is to provide the consumer with trustworthy and transparent information on the reduced environmental impact of the product. This can be used to inform consumers and encourage an increase in their demand for such products (Heyes et al., 2020).

One major problem associated with the production of eco-friendly wines is the need for credibility with the consumers. This is a result of the inability of the consumers to assess the sustainability-friendliness of production. One way of reducing this information asymmetry from the part of the consumers is the use of clear labels and other sources of information that should provide credible information related to the sustainable credentials of the wine (Leire & Thidell, 2005). The most important labels are organic wines, biodynamic wines, natural wines, fair-trade wines and sustainable wines (Moscovici et al., 2020).

Organic wine production and consumption has been steadily increasing in recent years. The International Federation of Organic Agriculture Movement (IFOAM, 2014) defines organic agriculture, including viticulture and wine-making, as a process that relies on ecological processes, biodiversity and cycles. This implies the elimination of products such as pesticides, genetically modified organisms (GMOs), and fertilisers. There is a wide range of legislation governing the production of organic wine in different countries. The French definition does not allow for additives, such as sulphites or yeast, or genetically modified organisms. In South Africa, organic means wine that has been made with organically produced grapes. It focuses on what happens in the vineyard, the growing of the grapes, rather than in the winery, the production of the actual wine. This allows for preservatives such as sulphur dioxide to still be used (Ponte & Ewert, 2007)

Biodynamic wine production is governed by the same rules that regulate organic wine production (Castellini et al., 2017). In general, biodynamic production follows stricter guidelines than organic certification rules. The concept of biodynamic winemaking incorporates homeopathic treatments as well as astrological considerations. The wine growers aim is to find the most suitable timing for each wine producing process according to natural cycles (ibid.). Despite its less scientific production process, the market for biodynamic wine in Europe is growing with an increasing number of wineries including this concept in their wine-making operations (Bigolin, 2017).

Natural wines are made according to the standard of original farming techniques and producers follow the concept of minimal chemical and technological intervention. This involves using native vines and indigenous yeasts, instead of added yeasts, which leads to spontaneous fermentation. Another characteristics of natural wines is the lack of additives such as sulphites (Maykish et al., 2021).

Even though there are standards for the production of natural wine, there is no legal definition of natural wine. This introduces a substantial level of vagueness to the term (CBI Market Intelligence, 2016). This has the potential to distort the choices of consumers and lead to non-optimal production and consumption patterns. One example of lessening this effect is the idea introduced by the French government in 2020 through the inclusion of "Vin méthode nature" as a wine category (Gray, 2020). In South Africa, natural wine has been produced since 1935; however, it has been largely marginalised due to the favouring of more traditional mass-market procedures (Garrett, 1995).

Fair trade wines involve wines that have been certified by Fairtrade International which relate to fair prices and improving social conditions for wine producers and communities (CBI Market Intelligence, 2016). Fair trade wine standards need to include factors of an economic and social nature. These factors include ownership for the workers, minimum wages and trade equity. Few wineries receive a fair trade certification because the costs of complying with all the requirements are often regarded as prohibitive (Moseley, 2008). The concept of fair trade has been strongly promoted in South Africa, where a number of organisations have been established: Wine & Agricultural Industry Ethical Trade Association (WIETA), Fairtrade Label South Africa and the Cape Winemakers Guild (CWG) (Metivier, 2020).

The concept of sustainable wines encompasses more definitions and is a combination of the implementation of so-called sustainable methods throughout the whole production chain and the whole ecosystem. For a wine to be sustainable, it needs to achieve a combination of social, environmental and economic goals (Moscovici et al., 2020). In the production of wine, water use, chemical use and soil erosion are important environmental sustainability concerns. From an economic perspective, the benefits and costs of implementing sustainable wine-making practices need to be considered to take into account levels of investment needed as well as changes in the welfare of both producers and consumers. Finally, social sustainability issues will intensify as changes occur in the vineyards (Gbejewoh et al., 2021)

### Willingness to pay and consumer preferences for eco-labelled wines

As shown earlier, there are five main definitions of environmental and sustainable certification, each associated with different methods that need to be followed by producers to qualify. One major problem associated with the production of these types of wines is the need for credibility on the part of the consumers. This is a result of their inability to assess whether the wine production follows the rules required to obtain a certain label. One way of reducing this information asymmetry from the part of the consumers is the use of clear labels and other sources of information that should provide credible information related to the sustainable credentials of the wine (Leire & Thidell, 2005).

Research conducted in this field reveals different outcomes regarding willingness to pay (WTP) for organic wines. Bazoché et al. (2008) found in their study of French wine consumers that wines produced in environmentally sustainable way were valued similarly to any other type of wine. There is also evidence found by Loureiro and Hine (2002) of American consumers that were not willing to pay more for the environmentally friendly wines due to the perceived difference in quality. A different outcome

is derived from research results on willingness to pay for sustainable Italian wines, which indicate that consumers value sustainability attributes of wine positively (Pomarici & Vecchio, 2014). It also showed that WTP for sustainable wines was significantly higher than the WTP for conventionally produced wine. This is supported by research done by Hoekstra et al. (2015) who found that a high level of wine knowledge positively influenced organic wine appreciation. Previous research done by Mihailescu (2015) regarding preferences for organic wine in South Africa indicates a positive relation between income and WTPs for both white and red organic wine.

Research shows that the characteristics of the consumers are also of great importance in influencing their preferences and WTP for ecologically produced wines. For example, age seems to be an important factor, where older generations seem to be more willing to pay for sustainable wines (Pomarici & Vecchio, 2014). There are some indications that the younger generation (millennials and generation Z) tend to prefer the eco-labelled wines (Moscovici et al., 2020). Additionally, the WTP for eco-certified wine and the extra purchase amount differs from country to country and needs to be carefully interpreted to properly inform the producers of the potential revenue increases if they were to adopt such measures and certifications.

Another major problem associated with sustainable/organic wines is their higher production costs that can amount to 25–30% above the costs of more conventionally produced wines (Sellers-Rubio & Nicolau-Gonzalbez, 2016). These production costs can be mitigated by the willingness of the consumer to pay a premium for the organic wines. Such a premium can be justified by the potential benefits that sustainable production can bring to the consumer, such as wines that contains fewer health-damaging ingredients and an increased sustainability of production. A positive willingness to pay for eco-labelled wine could act as a signal to producers in their quest to attract more consumers.

### Purpose of the study

As just indicated, a positive willingness to pay would act as a signal to the wine producers for resource allocation towards an increase in biodynamic, fair trade or sustainable production. This research focuses on measuring and comparing the potential willingness to pay (WTP) for biodynamic, fair trade and sustainable wine revealed by wine consumers through the use of a contingency valuation method. In this context, five hypotheses were formulated:

1. An increase in age of the respondents has a negative effect on the WTP for the three chosen wine labels.
2. An increase in income levels will positively influence the WTP of the consumer that purchases any of the three labels.
3. A higher level of income leads to a higher WTP by consumers for the three chosen wine labels.
4. Knowledge of eco-certified labelled wine by consumers leads to a higher WTP for eco-certified wines.
5. Consumers that have previously purchased eco-certified products will have a higher WTP for eco-certified wine.

### Methodology

We used the contingent valuation method (CVM). To reveal the willingness to pay for a product or service, CVM creates a

hypothetical market situation for a given good or service, in this case the eco-labelled wine. The method results in a quantification of the value consumers confer on products by associating that value with the sum of money they are willing to pay (Kawagoe & Fukunaga, 2001; Sellers-Rubio & Nicolau-Gonzalbez, 2016).

A tobit model was fitted to the data collected for each eco-label to generate predictive models of willingness-to-pay (WTP), rather than using an ordinary least squares method (OLS). The tobit model is commonly used in CVM studies to describe the relationship between WTP (i.e. the dependent variable) which is non-negative, and a vector of explanatory variables (age, income, wine knowledge and previous purchase of eco-labelled products). The use of the ordinary least squares method (OLS) regression would, in this case, produce negative predicted WTP values, which is incorrect from a theoretical perspective (Mitchell & Carson, 1989).

The data from the respondents were collected by posting an online web survey using the Qualtrics survey platform. The survey was run concomitantly in a number of countries, including the USA, the Netherlands, Chile, South Africa, Australia, France and Italy. The data were analysed separately for each country using a different methodology. The focus of this article is the analysis of the South African consumer preferences. Future research will also compare the data among the countries.

The survey consisted of three sections. The first section asked respondents about their background and habits with wine consumption and purchasing behaviour. The second set of questions collected perspectives and opinions about the multiple wine certifications discussed in this article. These questions asked consumers if they bought certified food and how often, their knowledge of the wine certifications, their purchasing behaviour with respect to the certifications and how much more they would be willing to pay for the certified bottles. Finally, the demographics of the respondents was collected based on age, gender, education levels and income. The sample size consisted of 267 respondents. The model was run separately for biodynamic, fair trade and sustainable wines.

### Characteristics of the respondents

Table 1 shows that more than half of the respondents (around 57%) were female, and over 64% having either a bachelor's or a master's degree. The age range of the sample is composed mainly of generation Z respondents (36.70%) and of millennials (23.57%), which is indicative of the young composition of South African wine consumers. A high 31% of the respondents reported an annual income of less than R200 000 (€12 000), with another 43.29% reporting an annual income between R200 000 (€12 000) and R649 999 (€39 000).

### Willingness-to-pay functions

Of the respondents questioned, 29.96% in the case of biodynamic labels, 21.72% for fair trade and 24.71% for sustainable wines submitted zero willingness-to-pay values. These were considered to be protest bids; in other words, these were consumers who did not want to answer as they did not agree about paying a premium. The protest bids were retained for analysis purposes as it is statistically incorrect to exclude them. The reason for this is the sample selection bias that occurs as a result of the non-inclusion of zero bids. The results could be that the empirical analysis of the valuation function may produce

inconsistent parameter estimates, and the calculated benefit measures may also be biased (Sale et al., 2009). The results of the WTP valuation for each of the eco-labels are illustrated in Tables 2, 3 and 4.

TABLE 1: Profile of respondents (N = 267)

Characteristic	%
Gender	
Female	57
Male	43
Age	
18–24 years old	36.70
25–34 years old	23.57
35–44 years old	8.61
45–54 years old	15.40
55–64 years old	13.10
65–74 years old	2.62
Education	
High school	16.10
Some tertiary education, no degree	7.86
National Diploma	10.86
Bachelor's degree (e.g. BA, BS)	40.84
Master's degree (e.g. MA, MS, MBA, Med)	23.22
Doctorate (e.g. PhD, EdD)	1.12
Annual income (Rands)	
Less than 200 000	31.08
200 000 to 349 999	16.47
350 000 to 499 999	13.52
500 000 to 649 999	13.30
650 000 to 799 999	8.90
800 000 to 949 999	7.73
950 000 to 1 099 999	0
1 100 000 to 1 249 999	4.50
1 250 000 to 1 399 999	0
1 400 000 to 1 649 999	1.8
1 650 000 or more	0.7

The sign of the coefficients regarding education, income, age and previous purchases are supportive of the predictions made in the hypotheses. It can be seen that for every year's increase in educational level attained, the willingness to pay increases by about R5.00. Income and previous purchases are also positively correlated – for example, the model shows that for each extra rand previously spent by respondents on eco-labelled products, the willingness to pay for biodynamic wines increased by 21 cents. In the case of knowledge, the model shows a negative WTP, which rejects the hypothesis in the case of biodynamic wines.

The WTP formula for biodynamic wines is as follows:

$$\begin{aligned} \text{WTP (biodynamic)} = & -95.939 + 4.696 \text{ Education} + 0.447 \text{ Income} \\ & - 0.358 \text{ Age} + 0.021 \text{ Previous purchase} \\ & - 3.950 \text{ Knowledge} \end{aligned}$$

Table 3 shows that coefficients regarding education, income, age, knowledge and previous purchases are according to the predictions made. In the case of fair trade labelled wines, the willingness to pay associated with education levels increases to R5.62 for every year attained in education level. Income, previous knowledge and previous purchases are also positively correlated – for example, the model shows that for each extra rand previously spent by respondents on eco-labelled products the willingness to pay for fair trade wines increased by 71 cents. As in the case of biodynamic wines, age is negatively correlated to the WTP for fair trade.

The WTP formula for fair trade wines is as follows:

$$\begin{aligned} \text{WTP (fair trade)} = & -104.419 + 5.622 \text{ Education} + 0.706 \text{ Income} \\ & - 0.323 \text{ Age} + 0.071 \text{ Previous purchase} \\ & + 1.066 \text{ Knowledge} \end{aligned}$$

Similar to fair trade, sustainably labelled wine coefficients regarding education, income, age, knowledge and previous purchases are according to the predictions made, as illustrated

TABLE 2: The fit of the WTP function for the biodynamic wine using a tobit model where WTP is the dependent variable

Variable	Coefficient	Std. error	z-statistic	p-value
Constant	-95.939	58.151	-1.555	0.038
Education	4.696	2.180	1.058	0.040
Income	0.447	0.195	2.288	0.022
Age	-0.358	1.482	-1.100	0.027
Previous purchase	0.021	0.000	2.735	0.006
Knowledge	-3.950	1.156	-1.800	0.050
R <sup>2</sup>	0.291			
Adjusted R <sup>2</sup>	0.217			

TABLE 3: The fit of the WTP function for fair trade wine using a tobit model where WTP is the dependent variable

Variable	Coefficient	Std. error	z-statistic	p-value
Constant	-104.419	56.686	-2.444	0.008
Education	5.622	4.873	1.403	0.261
Income	0.706	0.331	5.513	0.005
Age	-0.323	0.170	-1.777	0.050
Previous purchase	0.071	0.000	3.791	0.000
Knowledge	1.066	3.923	1.972	0.049
R <sup>2</sup>	0.658			
Adjusted R <sup>2</sup>	0.589			

in Table 4. In this case, the willingness to pay associated with education levels is lower, with an increase of R2.78 for every year attained in education level. Income, previous knowledge and previous purchases are again positively correlated and supportive of the predictions. In this case, previous knowledge of sustainable labels increases the willingness to pay the most.

The WTP formula for sustainable wines is as follows:

$$\text{WTP (sustainable)} = -188.323 + 2.788 \text{ Education} + 0.699 \text{ Income} - 0.102 \text{ Age} + 0.411 \text{ Previous purchase} + 2.332 \text{ Knowledge}$$

### Conclusion

The premise of the research was that consumers are willing to pay some sort of premium for eco-labelled wines. The WTP models run in the case of the biodynamic, fair trade and sustainable labelled wines show that consumer profiles are important determinants in the size of the amount they are willing to spend. In the case of biodynamic wines, previous knowledge of eco-labels seems to have quite a negative impact on the WTP model and rejects the hypothesis that knowledge is positively related to willingness to pay. A possible explanation of this might be the misconception associated with the definition of this type of wine.

The WTP results for the other two eco-labelled wines do not show the same impact and are fully supportive of the predictions. In all cases, an increase in age of respondents has a negative effect on the total willingness to pay for eco-labelled wines. The sustainable labelled wines seem to have the lowest age-negative effect from all three types of wine. In general, all three WTP models show an overall increase in the willingness to pay a premium for purchasing the wines associated with each label.

### Research implications and limitations

The results of the research send a signal for the wine producers in their quest to produce and sell more eco-labelled wine products. In the marketing and distribution of these types of wines, the producers and retailers need to pay particular attention to the customers' profiles and the type of wine they wish to produce. As shown, not all the factors have the same directional and size impact on the willingness to pay.

A more comprehensive analysis should also consider the other two labels identified, namely natural and organic wines. The results need to be compared with the marginal costs incurred in making eco-labelled wines to provide producers with clear information as they make decisions in the allocation of resources necessary for output.

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TABLE 4: The fit of the WTP function for the sustainable wine using a tobit model where WTP is the dependent variable

Variable	Coefficient	Std. error	z-statistic	p-value
Constant	-188.323	79.375	-2.146	0.045
Education	2.788	1.210	1.058	0.040
Income	0.699	0.596	1.332	0.038
Age	-0.102	0.000	-1.211	0.108
Previous purchase	0.411	0.107	2.843	0.030
Knowledge	2.332	1.005	2.230	0.025
R <sup>2</sup>	0.380			
Adjusted R <sup>2</sup>	0.291			

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