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Buying decision with French wine: how important is the type of stopper? A comparison between French and French-speaking Swiss consumers

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Abstract:

When a consumer buys a bottle of wine (bottom-of-the-range), we may wonder if their perception of the type of stopper: natural cork, synthetic cork or metallic screw-top influences their buying behaviour. The underlying idea of this research is to measure the importance a consumer gives, during their buying decision, to the stopper attribute (composed of 3 levels: natural, synthetic and metallic) of a bottle of wine vis-à-vis the other attributes of the bottle. Additionally, a comparison is made between French-speaking Swiss and French consumers in order to observe if the second hypothesis is valid or not: "French-speaking Swiss consumers are more willing to consume wines with metallic (or synthetic) corks than French consumers (vis-à-vis the bottom-of-the-range wines)". Conjoint analysis is used to estimate the relative importance of the bottle's attributes and the part-worth utilities of the attributes' levels (hypothesis 1). Two studies were undertaken: study 1 took place in 2006 with a sample of 104 consumers and pinpointed the relative importance of the cork attribute was 29% (out of 8 attributes). Study 2 was undertaken in 2007 with a sample of 296 consumers and 9 attributes (one more attribute than study 1: price) and underlined the relative importance of the cork attribute was only 11% whereas price was the most important attribute with 17%.

Introduction

In June 2004, a survey carried out by SOFRES among 958 consumers pinpointed that bottles of wine with natural cork were perceived with a higher quality. Despite this finding, bottles of wine (with natural cork) may become corked. Even if the purpose of a natural cork (unlike synthetic and metallic corks) is to make the matured wine still drinkable or fantastic, the main disadvantage a natural cork may have is to make the wine corked. Since the beginning of the eighties, it has been underlined that the corked taste is due to a molecule called “2,4,6-trichloroanisole”, or TCA (NOMACORC, 2006).

There are no accurate statistics regarding the percentage of corked bottles, even if it can be estimated between 3 and 10% according to the professional literature:

- Between 3 and 6 according to ingoodtastestore.com ;
- Between 3 and 10 according to Aluminium Association ;
- Between 5 and 8 according to NOMACORC ;
- 8% according to Aspen Daily News.

Next to this problem, we can notice it is very difficult to produce high quality natural corks since only two countries, Spain and Portugal, produce 80% of the whole production of natural cork. Therefore, they must also maintain a high level of quality when the demand for natural corks is increasing, which is not that easy given the 16.2 billion bottles (and thus, of corks) produced each year (excluding sparkling wines) according to the company NOMACORC.

The two factors of: corked taste and increasing demand are thus serious issues and there is an opportunity for the industry to substitute natural cork with metallic or synthetic ones, at least for the bottom-of-the-range of wines. As a result, the objective of this research is to understand how these alternative corks are perceived by consumers. The research problem will be developed further in the first part of this paper. Secondly, the implementation of the conjoint analysis technique will be described (methodology and conceptual framework). Finally, the results of both studies will be presented and some managerial implications and limitations will be derived.

1. Research problem

If a consumer accepts the idea that a bottom-of-the-range wine can be closed by a metallic or a synthetic cork, some important savings can be realised for the wine industry for the following reasons:

- Firstly, synthetic or metallic cork (around 0.045 eurocents) is cheaper than natural cork whose price is between 0.015 and 45 eurocents according to L'Union (N°18391, 2004). Another reference (TSR, 2004) mentions synthetic corks cost approximately 10.58 eurocents and the natural corks cost around 37.33 eurocents;
- Secondly, from a financial point of view, the percentage of corked bottles would decrease and lots of bottles should not be exchanged by the industry (or indirectly by the cellarman), which represents between 3 and 10% of the 12.96 billions of bottles with a natural cork (NOMACORC, 2006);
- Thirdly, the quality of natural cork would be better for the top of the range wines (and therefore, there should be less corked bottles of high quality wines)

- Finally, the relationship between the cellarman and the consumer would be improved, especially in terms of after-sales services because there would be less corked bottles and a better satisfaction (no risk or very reduced risk during the consumption) or even loyalty.

As mentioned above, this research only focuses on the bottom-of-the-range wines because the life of a synthetic or metallic cork never exceeds more than 36 months (according NOMACORC, 2006). Therefore, we must define what we mean by a bottle of wine described as the bottom-of-the-range: it is a bottle of wine with a satisfactory level of quality and fairly low price, as it is the case, for a “vin de pays” or a “vin de coteaux” whose price is between 6 and 10 EUR. This study is only limited to the bottom of range wines because the top-of-the-range wines must wear a natural cork in terms of packaging and maturation: L’Union (2004), based on a SOFRES survey, underlined that 80% of French consumers consider natural cork as a guarantee of high quality and only 29% of these consumers consider natural cork as essential. Another study carried out by the Portuguese Cork Producers in 2002 (see the report on “Bottle closures in the wine industry”) highlights 75% of the sampled drinkers expressed a preference for natural cork and 69% consider it as a quality indication. This leads to our first hypothesis:

H1: the cork is an important attribute in the buying decision of a bottom-of-the-range wine (in comparison with other attributes of the bottle) for French and French-speaking Swiss consumers.

Given these 29% of French consumers consider natural cork as essential and many Swiss bottles of bottom-of-the-range wine are closed with alternative corks (according to TSR, 2004, 80% of the bottles of chasselas grape are closed with screw-top in French-speaking Switzerland), it indicates that Swiss are more open-minded to these options. So, we hypothesize there should be a difference in terms of behaviour between French and French-speaking Swiss consumers. The second hypothesis is:

H2: French-speaking Swiss consumers are more willing to consume wines with metallic (or synthetic) corks than French consumers (vis-à-vis the bottom-of-the-range wines).

In order to test these two hypotheses, two studies were realised: the first study led in 2006, with a sample of 104 consumers took into account a bottle of wine composed of 8 attributes; the second study led in 2007, with a sample of 296 consumers used a bottle composed of 9 attributes (the 8 attributes of the first study plus price). In both studies, the method used to collect and analyse the data on the relative importance of wine bottle’s attributes (H1) is conjoint analysis. The implementation of this method will be described in the next point.

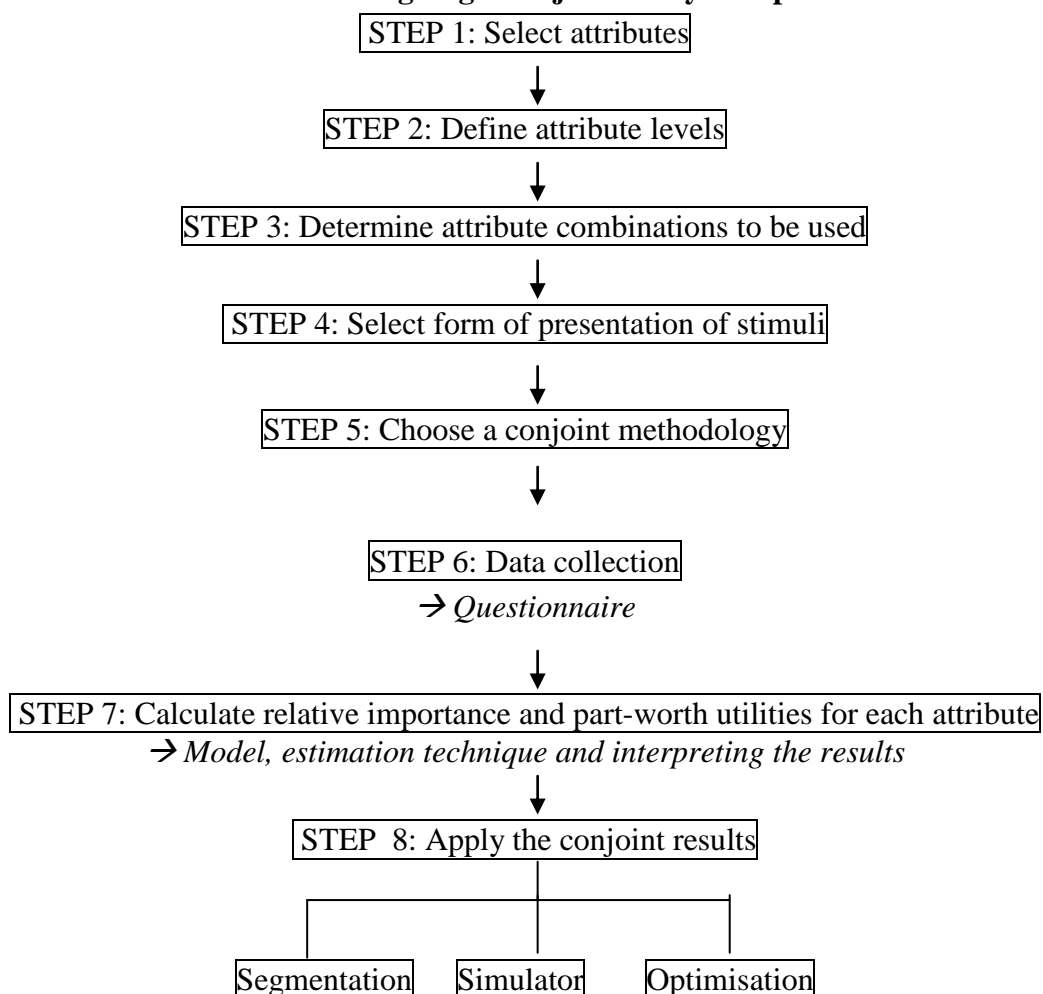
Both studies were carried out under the same conditions. The consumers were interviewed at the University of Geneva and in consumers’ homes because conjoint analysis supposes that they rank cards or scenarios describing a bottle of wine. A filter question allowed the determination of quota based on the main country where the consumers bought wines (France or Switzerland) and allowed us to answer H2. The idea is to count enough Swiss and French consumers based on the main country where they shop (and not on their nationalities given the specific international context of Geneva).

2. Conjoint analysis

According to WITTINK (2002), “Conjoint analysis is any decompositional method used to quantify consumer tradeoffs between product attributes, for an assumed structure based on consumer evaluations of products specified on two or more attributes using experimental design principle”. In other words, the method allows studying the preference structure of each consumer in order to determine how important the attributes of a bottle of wine are for them. The relative importance of the different attributes and the part-worth utilities of attributes’ levels derived from the ranking of different scenarios of wine bottle give the global preference or the global utility for each consumer. According to HAIR et al. (1998), conjoint analysis is best suited for understanding consumers’ reactions to and evaluations of predetermined attribute combinations that represent potential products or services.

The compensatory linear model (used to estimate part-worth utilities) allows evaluating the preference each consumer has for a bottle. It takes into account two parameters: the part-worth utilities of each attribute’s level and the relative importance of each attribute (assuming every attributes are independent from each other in order to avoid interaction effects, and therefore, too many parameters to be estimated and a negative number of degrees of freedom). Eight steps (see illustration 1) have to be followed in order to implement a study using conjoint analysis.

Illustration 1. Designing a conjoint analysis experiment.



Reference: Adapted from HAIR et al., (1998: 401-402) & CHURCHILL, (1999: 433).

2.1. STEP 1: Select attributes

Attributes may be physical, tangible, functional or symbolic but they must be independent¹ from each other and perfectly describe the product (bottle of wine).

Regarding the different alternatives of bottles of wine to be ranked by consumers, different references are used to identify the attributes of the bottle and their levels: in-depth interviews led by students, brainstorming or specialised literature (ROUZET & SEGUIN, 2003). There are 5 kinds of attributes:

- First, there are the intrinsic characteristics of the wine such as: fermentation, grapes, wine production methods, maturation, degree of alcohol, or specific flavours. These attributes represent the technical and organoleptic characteristics;
- Secondly, there are attributes linked to the physical aspects of the bottle such as: the shape (Bordeaux, Burgundy, Muscadet, etc.), the bottom, the weight, the colour of the glass (green or white), the quality of the glass, the size (75 cl, 1l, bag-in-box of 5 litres, small bottles, etc.);
- Thirdly, there is the label that also constitutes a tool of communication where we can distinguish some legal mentions like: name of AOC (region), degree of alcohol, name and address of the bottler, the capacity of the bottle, the serial number, the origin-country, and also, other items like the year, the brand, the logo, the name of the estate, the wine production method, the place of the bottling and the rewards. On the counter-label, we can mainly find information on grapes, maps, presentation of the place, dominant flavours, maturation and way of consumption;
- Fourthly, there is the capsule and the cork that might be natural, metallic or synthetic;
- Finally, there are specific attributes such as: over-packaging (pack of 6, gift), the brand, price, history or services (tourism and delivery).

Among all these attributes, 8 were selected for study 1 and 9 attributes for study 2. We will argue why we choose these attributes in the next section.

2.1.1. Study 1

Among all these potential attributes described in the previous point, eight have been selected for study 1 (see table 1):

- The “appellation contrôlée” (with a guarantee of origin), that is to say an appellation that can produce red wines and white wines as well (in order to avoid unrealistic scenarios). Furthermore, the wine must be bottom-of-the-range in a region known by the Swiss and the French consumers. Here are French appellations that fulfil those conditions: Gaillac, Lirac, Coteaux du Languedoc, Côtes de Bergerac, Côtes du Rhône-village, Côtes du Luberon, Côtes du Roussillon, Vin de Pays d’Oc, Vin de Pays du Sud-Ouest, Vin de Pays du Roussillon, Vin de Pays de Provence, Vin de Pays du Languedoc;
- The colour of the wine: rosé, red or white;
- The shape of the bottle that is perceived as modern, dynamic, original and smart if it tends to be elongated (ROUZET & SEGUIN, 2003). The shapes can have the following styles: Burgundy, Bordeaux, Champagne or Muscadet among the most famous ones;

¹ Indeed, if there are no interactions between attributes, the additive model can be used. On the contrary, if the attributes are dependent, a configural model must be used.

- The bottom of the bottle will be considered by the consumers as top-of-the-range if it is more and more domed;
- The name of the wine (Château or Domaine);
- The colour of the label, called logo in our study;
- The awards obtained during regional or international fairs (also called medals);
- And finally, the cork that can be natural, metallic or synthetic.

A study led by GIL & SANCHEZ (1997) also identified some of the 8 attributes: prestige, quality homogeneity among brands from a region, image, regional label, grape vintage, purchase frequency, price and taste. However, they only used 3 attributes in their implementation of conjoint analysis (price with 3 levels, current year wine and old wine for grape vintage year and regional label of each area (Navarra and Aragon).

The following attributes are fixed because they are present on the bottle (often due to legal reasons) and, in this study, they only have one level: the colour of the bottle (green), the size (75cl), the origin-country (France) and the year (2003).

The next attributes were not selected because either they are too difficult to be perceived (technical and organoleptic attributes), or they are too sophisticated for the target (grapes). Here is the list of those non-selected attributes: grapes, fermentation, wine production methods, maturation, flavours, weight, quality of glass, serial number, name and address of the bottler (even if it is legal, it has not been selected not to make the study too tense), brand, price, place of bottling, counter-label, over-packaging and services.

2.1.2. Study 2

The selected and fixed attributes are the same as those of study 1 (Appellation contrôlée, colour of the wine, bottom, shape, name, logo, reward, cork) plus the price.

Between both studies, there are some differences: on the one hand, there are 9 attributes in study 2 instead of 8 attributes in study 1: the price has been taken into account because according to ROUZET & SEGUIN (2003), price is a sensitive topic within the viticultural industry. On the other hand, the number of levels for the attribute cork has been reduced from 3 to 2: in study 1, there are 3 levels (natural, metallic and synthetic) whereas in study 2, the 2 levels are “natural” and “metallic”. This reduction is justified by the fact that a consumer cannot see a synthetic cork when he is buying a bottle but only during its consumption.

2.2. STEP 2: Define attribute levels

Once the attributes have been identified, we must choose their levels and the number of these levels. The number of levels must be quite homogeneous between attributes since it has been observed that the increase of attribute's levels tends to increase the weight of this attribute, *coetus paribus* (EVRARD, PRAS, ROUX, 2000).

In the first study, 8 attributes were selected (based on a brainstorming, in-depth interviews and the literature) and the number of levels varied between 2 and 3 (see table 1). For each attribute, the choice of the levels will be discussed:

- Regional appellation (AOC): Côteau du Languedoc and Vin de Pays du Languedoc because these 2 levels are appellations that produce white and red wines;

- The colour of the wine: white and red because rosé and sparkling wines are more niche-wines and so, it has been decided not to take them into account;
- The shape of the bottle: Bordeaux and Burgundy because these kinds of bottles are mainly used in Languedoc;
- The bottom of the bottle: flat or domed. The purpose is to notice if a domed bottom, which is supposed to be perceived as a high quality wine, is preferred to a flat bottom;
- The name of the wine is declined in two levels: Domaine or Château;
- The colour of the label, called logo, is declined in 2 levels: present (colour) and absent (white);
- The award obtained in local or international fairs: medal and no medal;
- The kind of stopper: natural, metallic, synthetic.

Given the fact that this study is mainly focused on the cork, we will define briefly each level of this attribute:

- Firstly, natural stopper is the most common cork on the market (14 billions according to TSR, 2004; sparkling wines included) and it costs between 10 and 65 eurocents;
- Secondly, synthetic stoppers are mainly produced by the market's leader that is the American company NOMACORC. 4 ranges of synthetic stoppers exist depending on the desired protection in terms of maturation: there are corks for the wines that have to be consumed within 12 months, then within 24 months, then within 36 months and finally, in more than 60 months. According to NOMACORC, the market of synthetic corks represents more than 20% of the world market (16.2 billions bottles a year);
- Thirdly, the screw-top or metallic cork that is well accepted by consumer (according to EAFA Infoil, 2004) would be better or at least as good as bottles of wine using other kinds of corks. According to Wine International Spectator (2003) that realised a comparative wine tasting with different kinds of corks (synthetic, natural or metallic), wines with metallic cork were preferred by more than 50% of wine tasters. This gustatory superiority is also underlined by the vintner, Michel Laroche: "I never found any bottles closed with natural corks superior than those closed by metallic cork (screw-top); on the contrary, bottles with natural cork were often less neat but above all irregular" (La Revue du Vin de France, 2006).

Table 1. Attributes and levels (study 1)

Attributes	Level 1	Level 2	Level 3
Region	Côteau	Vin de pays (VDP)	
Color	White	Red	
Bottom	Flat	Domed	
Shape	Bordeaux	Burgundy	
Name	Château	Domaine	
Logo	Present	Absent	
Reward	Medal	No medal	
Cork/Stopper	Natural	Synthetic	Metallic

In the second study, 9 attributes were selected (see table 2): cork attribute has only 2 levels (natural and metallic) and price (with 3 levels) has been added (10CHF/6EUR, 13 CHF/8 EUR, 16 CHF/10 EUR).

Table 2. Attributes and levels (study 2)

Attributes	Level 1	Level 2	Level 3
Region	Côteau	Vin de pays (VDP)	
Color	White	Red	
Bottom	Flat	Domed	
Shape	Bordeaux	Burgundy	
Name	Château	Domaine	
Logo	Present	Absent	
Reward	Medal	No medal	
Cork/stopper	Natural	Metallic	
Price	10 CHF/6 EUR	13 CHF/8 EUR	16 CHF/10 EUR

2.3. STEP 3: Determine attribute combinations to be used

Once the attributes and their levels have been identified, the number of potential combinations of attributes' levels must be determined. Each of these profiles/combinations represents a bottle that will be evaluated or ranked by consumers depending on their preference. The number of combinations must be reduced to an acceptable size because consumers cannot rank easily a huge number of profiles. WITTINK *et al.* (1989) underlined that industry standard was on average 16 profiles. The reduction of the number of combinations can be done through a method called factorial fractional plan.

2.3.1. Study 1

The number of potential combinations (factorial plan) is 384 profiles or bottles ($2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$) that should be ranked by each consumer, which is of course too much!

From a statistic point of view, the plan of 384 profiles can be reduced optimally thanks to the factorial fractional plan. In order to get a number of degrees of freedom superior to 0, the minimum number of profiles or bottles to be ranked is 10. Furthermore, we need a minimum number of degrees of freedom and for orthogonal reasons, the number must be a multiple of 2 and 3. Therefore, the number of profiles to be ranked by consumers is 24. SAS through PROC OPTEX procedure gives the following factorial fractional plan (see table 3), which constitutes the 24 bottles to be ranked.

Table 3. Fractional factorial design (study 1).

Card	Region	Color	Bottom	Shape	Name	Logo	Reward	Cork
1	VDP	White	domed	bordeaux	chateau	present	medal	natural
2	VDP	White	domed	bordeaux	domaine	absent	no medal	Metallic
3	VDP	White	domed	burgundy	chateau	absent	medal	Synthetic
4	VDP	White	domed	burgundy	chateau	present	medal	natural
5	VDP	White	flat	bordeaux	chateau	present	no medal	Synthetic
6	VDP	White	flat	burgundy	chateau	absent	no medal	metallic
7	VDP	Red	domed	burgundy	domaine	present	medal	metallic
8	VDP	Red	domed	burgundy	domaine	present	no medal	synthetic
9	VDP	Red	flat	bordeaux	chateau	absent	medal	metallic
10	VDP	Red	flat	bordeaux	domaine	present	medal	natural
11	VDP	Red	flat	bordeaux	domaine	present	no medal	natural
12	VDP	Red	flat	burgundy	domaine	absent	no medal	synthetic
13	coteau	White	domed	bordeaux	domaine	absent	medal	synthetic
14	coteau	White	domed	bordeaux	domaine	present	no medal	metallic
15	coteau	White	flat	bordeaux	chateau	present	no medal	synthetic
16	coteau	White	flat	burgundy	domaine	absent	medal	natural
17	coteau	White	flat	burgundy	domaine	absent	no medal	natural
18	coteau	White	flat	burgundy	domaine	present	medal	metallic
19	coteau	Red	domed	bordeaux	chateau	absent	no medal	natural
20	coteau	Red	domed	bordeaux	domaine	absent	medal	synthetic
21	coteau	Red	domed	burgundy	chateau	absent	no medal	natural
22	coteau	Red	domed	burgundy	chateau	present	no medal	metallic
23	coteau	Red	flat	bordeaux	chateau	absent	medal	metallic
24	coteau	Red	flat	burgundy	chateau	present	medal	synthetic

2.3.2. Study 2

Regarding the second study, the factorial plan is composed of 768 profiles ($2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$). The minimum number of profiles in order to get a positive number of degrees of freedom is 11 and to be consistent, we also choose a factorial fractional plan of 24 combinations. These profiles are presented in table 4.

Table 4. Fractional factorial design (study 2).

Card	Region	Color	Bottom	Shape	Name	Logo	Reward	Cork	Price
1	VDP	white	domed	bordeaux	chateau	present	medal	natural	13 CHF/8 €
2	VDP	white	domed	burgundy	chateau	present	no medal	metallic	10 CHF/6 €
3	VDP	white	domed	burgundy	domaine	present	no medal	natural	16 CHF/10€
4	VDP	white	flat	bordeaux	chateau	absent	no medal	natural	16 CHF/10€
5	VDP	white	flat	burgundy	chateau	present	medal	metallic	13 CHF/8 €
6	VDP	white	flat	burgundy	domaine	absent	no medal	metallic	10 CHF/6 €
7	VDP	red	domed	bordeaux	chateau	absent	medal	metallic	16 CHF/10€
8	VDP	red	domed	bordeaux	domaine	absent	medal	metallic	10 CHF/6 €
9	VDP	red	domed	burgundy	domaine	absent	no medal	natural	13 CHF/8 €
10	VDP	red	flat	bordeaux	chateau	present	medal	natural	10 CHF/6 €
11	VDP	red	flat	bordeaux	domaine	absent	no medal	natural	13 CHF/8 €
12	VDP	red	flat	burgundy	domaine	present	medal	metallic	16 CHF/10€
13	coteau	white	domed	bordeaux	chateau	absent	no medal	metallic	16 CHF/10€
14	coteau	white	domed	bordeaux	domaine	absent	medal	metallic	13 CHF/8 €
15	coteau	white	domed	burgundy	chateau	absent	medal	natural	10 CHF/6 €
16	coteau	white	flat	bordeaux	domaine	present	medal	natural	16 CHF/10€
17	coteau	white	flat	bordeaux	domaine	present	no medal	natural	10 CHF/6 €
18	coteau	white	flat	burgundy	domaine	absent	medal	metallic	13 CHF/8 €
19	coteau	red	domed	bordeaux	domaine	present	no medal	metallic	10 CHF/6 €
20	coteau	red	domed	burgundy	chateau	present	no medal	natural	13 CHF/8 €
21	coteau	red	domed	burgundy	domaine	present	medal	natural	16 CHF/10€
22	coteau	red	flat	bordeaux	chateau	present	no medal	metallic	13 CHF/8 €
23	coteau	Red	flat	burgundy	chateau	absent	medal	natural	10 CHF/6 €
24	coteau	Red	flat	burgundy	chateau	absent	no medal	metallic	16 CHF/10€

2.4. STEP 4: Select form of presentation stimuli

There are 3 methods of presentation stimuli:

- The first one is called the trade-off approach and consists of comparing the attributes two by two via a matrix crossing the two sets of levels (EVRARD *et al.*, 2000);
- The second method called pair-wise comparison consists of presenting a pair of stimuli (or profiles or combinations) to a consumer to be evaluated. Then, the consumer chooses which one of those two profiles he does prefer;
- The third one is the full profile method and it proposes to the consumers a full description of stimuli with all attributes (HAIR *et al.*, 1998). In these two studies, this method has been chosen because it is simple to implement and it is very often used.

The profiles can have different presentations: a written description, an oral description, an image or a prototype. In both studies, each profile represents a bottle (image) with a written description for each attribute's level.

2.5. STEP 5: Choose a conjoint methodology

Before collecting the data and thus, interviewing the consumers, we must first select which conjoint methods to be implemented:

- Either a decompositional approach is used (traditional conjoint analysis);
- Or a compositional approach is used (self-explicated approach);
- Or a mix of both methods is used (adaptative or hybrid conjoint analysis).

Then, a choice between preference evaluation, purchase intention, like/dislike, buy/don't buy must be done. And on the other hand, a scale must be chosen [ranking, rating (from 1 to 10), pair-wise comparison, (0,1)].

In this research, the conjoint measurement method used is: traditional conjoint analysis with an ordinal scale to rank consumers' preference.

2.6. STEP 6: Data collection

During this step, a questionnaire was built based on the 5 previous steps. Then, data were collected and coded via a pre-established grid.

2.7. STEP 7: Calculate relative importance for each attribute and part-worth utilities for each attribute's level

2.7.1. Model²

The model also called linear model or vectorial model (that supposes proportionality between utility and the number of attributes) can be mathematically formulated for each consumer as followed:

$$U(s_i) = \sum_{a=1}^A \sum_{m \in \{M_a\}} u_{(m,a)} \cdot x_{(m,a)/i}$$

$$\text{Under constraint } \sum_{m \in \{M_a\}} x_{(m,a)/i} = 1$$

Where,

$U(s_i)$ = global utility for stimulus (bottle of wine) i ;

$a \in \{1, 2, \dots, A\}$ = attributes of a bottle of wine;

$m \in \{1, 2, \dots, M_a\}$ = levels of an attribute a ;

$u_{(m,a)}$ = part-worth utilities for a level m of an attribute a ; these coefficients are the estimated parameters of the monotonic regression;

$x_{(m,a)/i}$ = binary variable indicating which level m of attribute a characterized the stimulus i ;

$x_{(m,a)/i} = 1$, if level m of attribute a is present in stimulus i ;

$x_{(m,a)/i} = 0$, otherwise.

Mathematical model of conjoint analysis

In other words, each profile is a linear combination of binary variables (0 or 1) that specify the levels of each attribute for the different profiles (or bottles of wine)

² The model must fulfil some hypotheses: (1) the global utility of a product (bottle of wine) is function of the utilities of its attributes; (2) this function is an additive one; (3) the attributes and their levels are selected a priori; (4) there are no interaction effects.

2.7.2. Conceptual model

The collected data are analysed via traditional conjoint analysis whose conceptual model [based on GREEN & SRINIVASAN (1990)] is composed of the 6 following steps:

- (1) Choice of a preference model: linear compensatory model;
- (2) Data collection: full profile. GREEN & SRINIVASAN (1990) suggest using full profile method when the number of attributes is small;
- (3) Determination of attributes combinations through factorial fractional plan which allows to reduce the set of 738 profiles (for study 2) or the set of 384 profiles (for study 1) to 24 profiles to be ranked;
- (4) Profile presentation: image and written text;
- (5) Scale to measure consumers' preference: ranking. GREEN & SRINIVASAN (1978) underline rankings tend to provide more reliable results;
- (6) Estimation procedure of the model: MONotonic ANalysis Of the VAriance (MONANOVA).

2.7.3. Estimation and interpretation

There are different estimation methods (linear model, ideal point or part-worth) and different kinds of scales. The use of one specific model or scale, instead of another one, requires using a specific estimation method. In this study where each consumer is asked to rank some profiles, we can use MONANOVA or mathematic programming (such as LINMAP). On the other hand, if a consumer is comparing some pairs, probabilistic choice models should be used (LOGIT or PROBIT).

The interpretation is first analysed at the disaggregated level (individual) and then, possibly at the aggregated if we want to segment consumers' behaviour. Segmentation allows proposing accurate recommendations to the industry in defining the accurate profile of each group of consumers.

2.8. STEP 8: apply the conjoint results

Based on the preference each consumer has expressed for each profile (bottle), the relative importance of each attribute and their levels can be estimated via MONANOVA. Thanks to this information, an optimal product (bottle) can also be designed and we can realise analyses at the individual and group levels.

3. Results

The following section describes first the results of study 1 followed by those of study 2.

3.1. Study 1

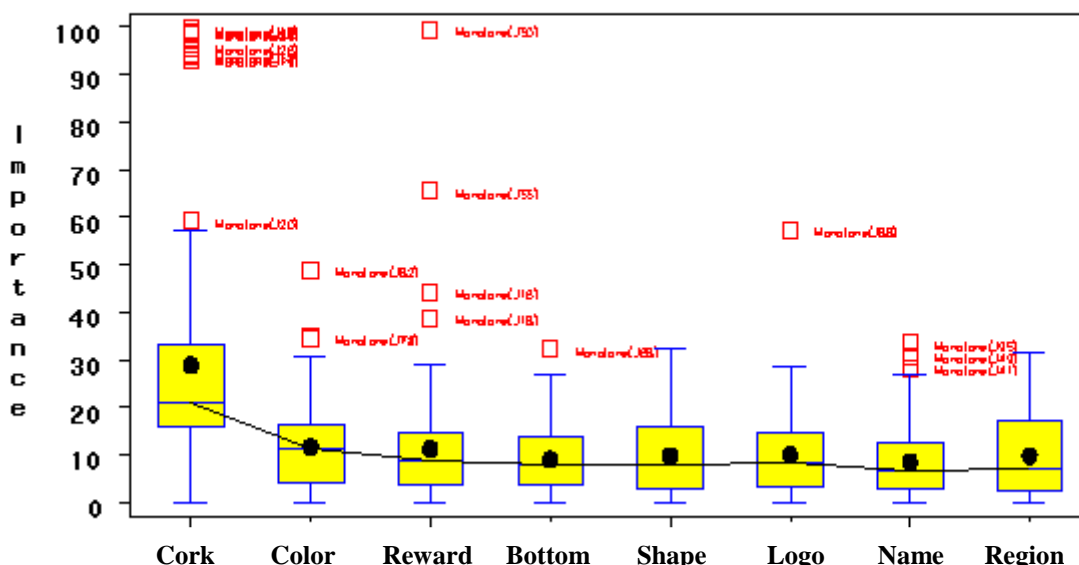
Based on a sample of 104 consumers, the cork is, on average, the most important attribute for the consumers with a relative importance of 29% (see table 5).

Table 5. Relative importance of the attributes composing a wine bottle (study 1).

Attributes	Region	Color	Bottom	Shape	Name	Logo	Reward	Cork
Relative importance (in %)	10	12	9	10	9	10	11	29

The following box-plot illustrates the dispersion and shows how important is the cork (in terms of relative importance) in comparison with other attributes of a wine bottle.

Illustration 2. Average relative importance of the attributes of a wine bottle (Study 1)



The relative importance of the cork attribute pinpoints we can easily validate H1: “*the cork is an important attribute in the buying decision of a bottom-of-the-range wine (in comparison with other attributes of the bottle) for French and French-speaking Swiss consumers*”.

Regarding H2: “*French-speaking Swiss consumers are more willing to consume wines with metallic (or synthetic) corks than French consumers (vis-à-vis the bottom-of-the-range wines)*”, the first analyses (see table 6) show that H2 should be partly accepted even if 31 of 104 consumers who do their shopping in France consider the cork as very important (relative

importance of 27%) whereas the 70 consumers who do their shopping in Swiss give to the cork a relative importance of 30%. Furthermore, if we do the same analysis based on the nationality, we observe that 20 French express a relative importance for the cork of 25% whereas 49 Swiss express their preference with a relative importance of 34%. If we analyse the main level for the cork attribute (except, for the synthetic cork to a lesser extent), we obtain the same results:

- 45% of the consumers who do their shopping in Switzerland prefer natural cork (against 42% in France). But if we take into account the nationality³, they both consider natural cork as important (48%). It also shows H1 is accepted;
- 27.5% of the consumers who do their purchase in Switzerland prefer synthetic cork (against 19% in France). But if we take the nationality, 23% of Swiss do prefer synthetic cork (against 26% of French). For synthetic cork, H2 is accepted⁴;
- 27.5% of the consumers who do their purchase in Switzerland prefer metallic cork (against 39% in France). But based on the nationality, Swiss do prefer metallic cork (with 29%) against 26% of French. For metallic cork, H2 is rejected;

Table 6. Analysis of the levels of the attribute cork by nationality and buying by country (study 1).

Levels of cork attribute	Dominant (n)	%	Purchase in France	%	French Nationality	%	Purchase in Switzerland	%	Swiss Nationality	%
Natural	47	45	13	42	9	48	33	45	25	48
Synthetic	25	24	6	19	5	26	20	27.5	12	23
Metallic	32	31	12	39	5	26	20	27.5	15	29
	104		31		19		73		52	

3.2. Study 2

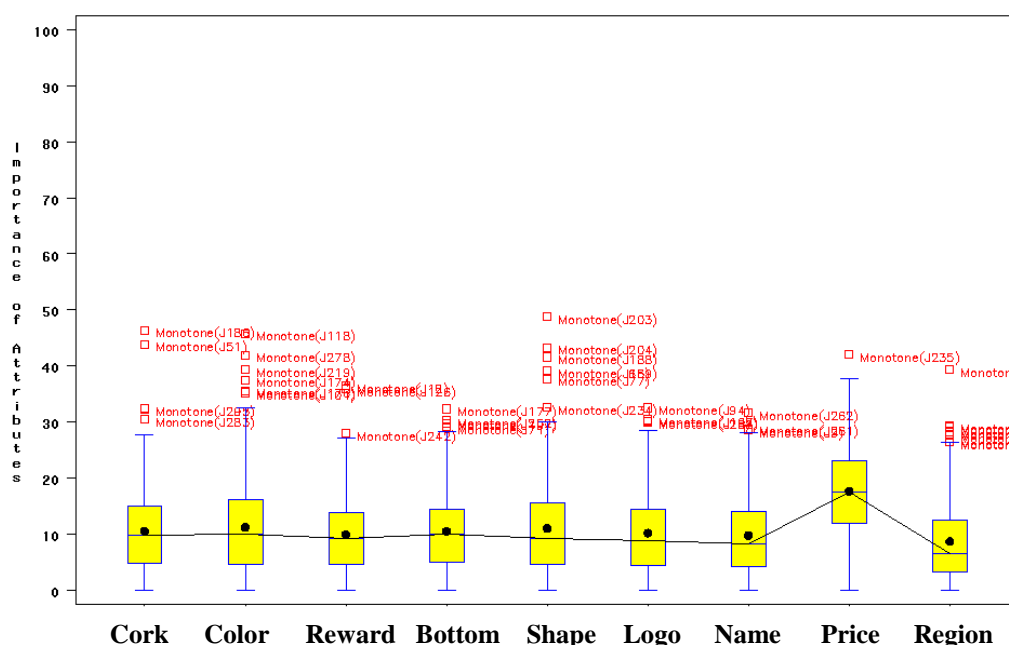
Based on illustration 3 and table 7, we can observe the cork attribute (11%) is less important if the price attribute (18%) is taken into account. Price is indeed considered as an important attribute according to ROUZET & SEGUIN (2003). H1 is thus rejected.

Tableau 7. Relative importance of the attributes of a wine bottle (study 2).

Attributes	Region	Color	Bottom	Shape	Name	Logo	Reward	Cork	Price
Relative importance (in %)	9	11	11	11	10	10	10	11	18

³ The consumers with several nationalities are not taken into account in order to avoid bias.

⁴ The location where consumers do their shopping is used to validate the hypotheses (and not the nationality).

Illustration 3. Average relative importance of the attributes of a wine bottle, study 2.

Regarding H2, we can observe in table 8 that:

- 56% of the consumers who do their shopping in Switzerland prefer natural cork (against 56% in France). But if we take into account the nationality, Swiss do prefer natural cork (58% against 51%). It also shows H1 is rejected;
- 44% of the consumers who do their purchase in Switzerland prefer metallic cork (against 44% in France). But based on the nationality, Swiss do prefer metallic cork (with 42%) against 49% of French. H2 is rejected.

Table 8. Analysis of the levels of the attribute cork by nationality and buying by country (study 2).

Levels of cork attribute	Dominant (n)	%	Purchase in France	%	French Nationality	%	Purchase in Switzerland	%	Swiss Nationality	%
Natural	167	56	87	56	50	51	79	56	73	58
Metallic	129	44	68	44	48	49	61	44	53	42
	296		155		98		140		126	

4. Managerial implications and limits

Study 1 allows validating H1 and partly H2 for the synthetic cork. It rejects H2 for the metallic cork. It is quite encouraging since it shows French consumers are open-minded to screw-top. The French-speaking Swiss consumers are open-minded to synthetic cork but not to screw-top. It is a bit amazing since they have on their own market bottles of wine with metallic cork. It may be due to the origin of the wine (Languedoc) or in other words, they may be open to alternative corks for the Swiss wines but not necessary for the French wines. We can also observe consumers do prefer natural cork (more than 40%), which limits to a lesser extent our results. Advanced segmentation (behavioural and socio-demographic) will help us to investigate further the consumers' attitude vis-à-vis alternative corks.

Study 2 underlines that once the price attribute is taken into account, the relative importance of the cork attribute decreases very much (from 29 to 11) and the price attribute becomes the

most important attribute with 18%. H1 is thus rejected. The same amount of consumers do prefer alternative cork (metallic) and thus, H2 is also rejected. Through advanced segmentation, we will obtain more accurate analysis in terms of consumers' behaviour. It will also be interesting to analyse deeply the price attribute because we could find differences in terms of behaviour if we cross price with the cork attribute. We could segment the market easily since we have a large sample.

Both studies present some limits. In study 1, the sample size is small 104 and the number of French shoppers is also very small. Furthermore, the ranking of some consumers may not be homogeneous and thus, those consumers should be rejected (the R-square of the monotonic regression is an indicator of the consistency of each consumer's judgement). Regarding the second study, we must admit the addition of another attribute (price) which tends to reduce the relative importance of the other attributes (GREEN *et al.*, 1990). For both studies, we formulate these 3 limits: firstly, the available secondary data are very poor (Internet websites or unofficial references) and therefore, we need to look for more accurate data to quantify the managerial implications. Secondly, the selection of only a French wine (Languedoc) may be a bias since the French-speaking Swiss consumers may consider that all French wines should be bottled with a natural cork (which is obviously not the case for lots Swiss wines bottled with a metallic cork). Finally, the sample is a convenient one (even if social and occupational categories are well balanced) and so, the results of both studies must be analysed carefully.

**B. Lecat, 20th February 2008 (1st Version).
9th May 2008 (2nd Version)**

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Appendix 1: Illustration of card 1, Study 1



Appendix 2: Illustration of card 1, Study 2

N° 1

