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submitted article

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Abstract

It is stated, according to the paradigm of knowledge-based economy, that information asymmetry between consumers and producers is reduced thanks to information availability and dissemination through the Internet or other media channels. Conversely to this statement, several articles have pointed out that knowledge-based economy reinforces the information asymmetry between experts and novices among the consumers. Accordingly, we consider the heterogeneity of consumers by means of k-means clustering applied to a knowledge-oriented questionnaire. We then try to identify and qualify the differences between several groups of French respondents regarding their attitudes and behaviour towards wine.

JEL: L66, D12

Keywords: Wine, Knowledge-based economy, Consumer Clustering

Introduction

It is often stated, according to the paradigm of knowledge-based economy, that information asymmetry between consumers and producers is reduced thanks to information availability and dissemination through the Internet or other media channels. Conversely, several articles have pointed out that knowledge-based economy reinforces the information asymmetry between experts and novices among the consumers (Hogg et al. 2007; Gregan-Paxton and Roedder-John 1997; Alba and Hutchinson 1987). Accordingly, we consider the heterogeneity of consumers by means of K-means clustering applied to a knowledge-oriented questionnaire. Cluster analysis was used in order to obtain a reliable and significant distinction between respondents with respect to level of wine knowledge. Furthermore, we used different types of wine knowledge to capture both information availability and information asymmetry related to identified clusters of respondents. We then identified and qualified the differences between these groups of French respondents regarding their attitudes and behaviour towards wine and socio-demographic characteristics. The article presents previous results related to consumer knowledge and information processing (I), then it depicts survey methodology and data analysis (II) and it deciphers measurements and results obtained (III) before a synthesis discussion in the conclusive section.

1. Consumer knowledge with respect to wine

When choosing wine, consumers have to process several information regarding for example price, brand, vintage, or grape variety. Once at home those who wish to be reassured on the bottle they bought, can often find an overflow of information available on the Internet though plenty of websites belonging not only to companies but also to consumer associations or simply end-users clubs. However, most of the information available requires some skill in order to be intelligible. The main question may be: Are consumers able to interpret this overflow of information? In other words:

Are professional worlds still open for consumers? It was pointed out that the product class knowledge of respondents lowers the total search effort in view of a purchasing purpose (Beatty and Smith 1987). We consider that consumer search for information is not always provoked by immediate purchasing purpose, and may participate to a broader objective of building up knowledge-based expertise (Bloch et al. 1986). In the wine sector, it is generally considered that consumers' knowledge is supply-chain driven as tasting is only possible after purchasing, and, when selling wine, most stakeholders are telling a story through labelling and wine guides.

From a sensory perspective, it was proven that the information provided on the label of a bottle allows consumers to discriminate Champagnes, while blind tests do not (Lange et al. 2002). It was pointed out that, for white wine, the context has a huge influence on the perception of wine, even for oenologists (Brochet and Morrot 1999). More generally, wine appreciation is mainly based on semantic information (Chrea et al. 2005; Fischer et al. 1999). For instance, it was recently demonstrated that women may express a positive willingness to pay for men-recommended wines (Brouard and Sutan 2010). It was also found that consumer knowledge of wine regions operates during the choice-making process for wine (Barber 2010).

It was recently proven that providing information does not lead to increased knowledge, as consumers are overwhelmed by warnings from consumer protection organizations, the media, government, and various scientific studies (Conley and Wade 2007). They have often received conflicting information. The authors have showed that consumers are reasonably intelligent in their evaluation of information: they responded differently to information perceived as biased versus information perceived as objectively reported.

The phenomenon of cognitive overload due to limited information processing capabilities is well documented in the psychology literature (Alba and Hutchinson 1987) and might be illustrated in the case of consumer attitude with respect to food. It was shown that the overload and complexity of information on food products results in misunderstanding and misinterpretation. Even when information is made sufficiently available and accessible to consumers, only a limited amount of this information is actually brought to consumers' attention and raises interest for being processed in an environment characterised by information overload. Furthermore, there is a real potential danger of information overload. Interestingly, it was shown that consumers can decide to remain rationally ignorant due to the opportunity costs of information processing, related to time and allocation of cognitive capacity, exceed the expected marginal benefit of being fully informed (McCluskey and Swinnen 2004).

2. Survey and data collection

The paper presents the results of a consumer survey carried-out in France in 2006, focusing on knowledge on wine. French consumers are generally considered to frequently experience such

beverage. The studied item was white wine, of which the consumption is less popular and more selective in France than red wine. We assume that there is information asymmetry among consumers, which means that close to the area of production, they may have become more familiar with a given wine, rather than those living far from this area. Hence, the survey was carried out in two different regions, namely Burgundy and Auvergne. The first is famous for its wines, while the second is not known for its wine production. The sampling was thus divided between a local region and a far-off region regarding the area of wine production. 300 consumers were recruited, half in Auvergne, half in Burgundy, on the basis of one criterion: to answer spontaneously white burgundy wine when asked about their wine consumption. The final size of dataset was: 109 respondents in Auvergne and 113 in Burgundy at the end stage of the consumer survey.

The first step of the survey involved a household self-report of purchasing behaviour of white wine, indicating the items bought during the three months preceding the survey. This self-report indicated the quantity and the diversity of purchases, and the frequency of buying directly from the wine makers, which is a marker of high personal involvement in the choice making process, the use of other distribution channels was also documented. The respondents were then invited in the research institutes' premises to answer a written questionnaire including twenty-two questions on key dimensions of product-oriented knowledge: processing, semantic and geography, all related to the relevant category of food product, in order to assess respondents' awareness on the given wine. One additional section of the questionnaire was devoted to the usual socio-demographic descriptors of the respondents.

The main part of the questionnaire focused on time or spatial dimensions of the knowledge on processing, harvesting, wine-making, labelling… For instance, one of the processing-oriented questions was "Blending white and red wines is allowed for rosé wine-making, which one? [Champagne rosé, rosé d'Anjou, rosé de Provence, don't know]" (correct response is underlined). Semantic knowledge relating to general culture on wine, including wording and naming, was assessed with questions such as "What is a vintage wine? A wine [older than 10 years, made from a single harvest, coming from a famous vineyard, don't know]". To evaluate the geographical knowledge, one of the questions was "What is the main grape variety used for making Côte Rotie wine? [Cabernet-Sauvignon, Syrah, Merlot, don't know]". The complete list of questions is in appendix. Thus, each respondent obtained three scores on the basis of the level of knowledge shown through his/her responses among the three dimensions: processing, semantic and geography. For these dimensions an individual global score was given to each respondent.

3. Measurement and results

The distribution of ratings issued from the above-mentioned coding of knowledge level according to wine indicates that geography about wine is the dimension of knowledge most shared among the

respondents, whereas the processing-related dimension for the studied products is more discriminating. General culture of products (semantic knowledge) is in medium position. As the respondents were wine consumers, being aware that the survey will focus on white wine, those interested in white wine consumption, are slightly more represented within the sampling, compared to the usual or casual consumers. This may imply that the proportion of respondents showing a high level of processing-related knowledge may be higher than expected. However, the targeted category Chardonnay, was never quoted by interviewers during the recruitment process, nor during the questionnaire stage, in order not to introduce bias in responses.

It is well-known that consumers feel charged with a mission and modify their responses when they know precisely the item for which they are being observed. According to the literature, we may call *experts* those respondents with a high level of knowledge and *novices* those showing a low level of knowledge. As the level of knowledge is divided into three dimensions, namely processing-related, semantic or geographical, the classification of respondents into *experts* versus *novices* will not be fully reliable *per se* and needs to be refined by means of clustering analysis.

K-means clustering was then used in order to better explain the diversity of knowledge displayed by the respondents according to the selected products. This method segments respondents into clusters according to their level in various types of knowledge. K-means clustering is a non-hierarchical clustering procedure: objects are assigned into a user-specified number of clusters. Four significant segments of respondents were identified by means of this method of classification. Each cluster is described by its relative positioning according to the level of knowledge in each dimension (see figure 1).

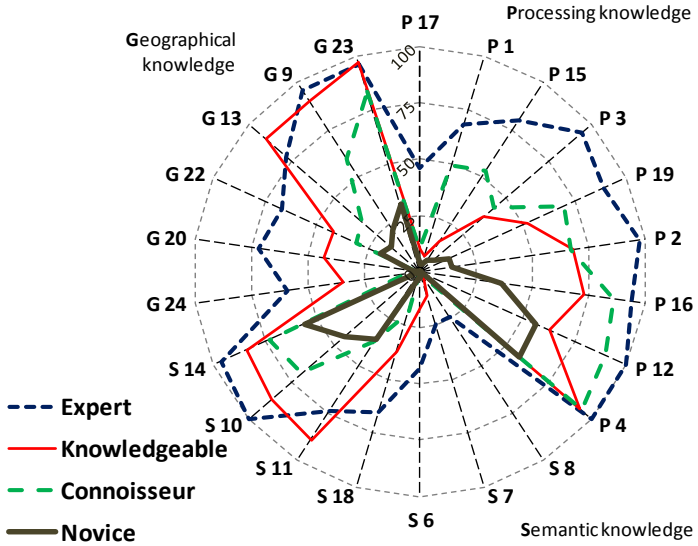


Figure 1. Percentage of right answers per cluster, see appendix for caption

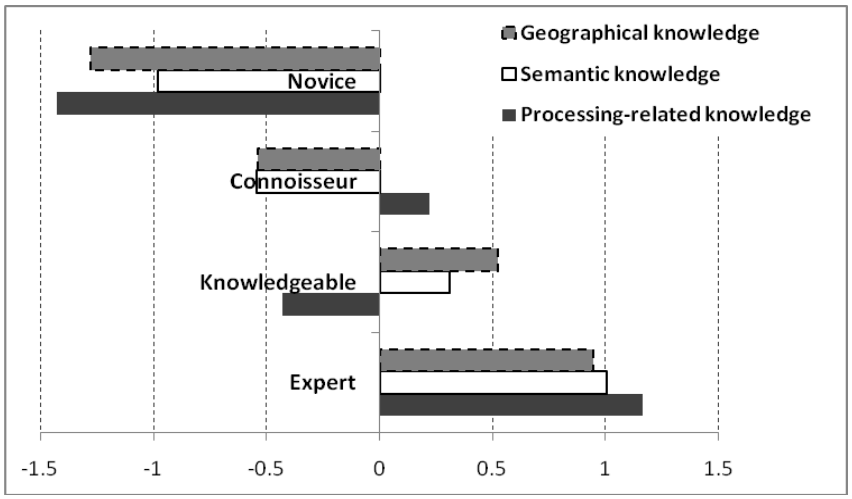
The clusters are identified according to the level of knowledge and described according to purchase

behaviour and socio-demographic characteristics of respondents. As expected, the distance between cluster *Expert* and cluster *Novice* is maximal as they are at the extreme positioning within the clustering (see figure 2). The two in-between clusters were named *Knowledgeable* and *Connoisseur*. Processing-related knowledge and Geographical knowledge discriminate the clusters well, but Semantic knowledge acts to a lower extent (see table 1).

Table 1. ANOVA variable-cluster according to wine knowledge of respondents

Zscore	F	Significance
Processing-related knowledge	197.882	.000
Semantic knowledge	80.566	.000
Geographical knowledge	137.913	.000

Table 1 shows that the more complex the kind of knowledge, the higher is its discriminating power between respondents, and vice-versa, the more general the knowledge, the lower is the difference between respondents. In our case, processing-related knowledge is highly discriminating, whereas semantic one is less.



Number of respondents per cluster:
Novice: 62
Connoisseur: 54
Knowledgeable: 70
Expert: 36

Figure 2. k-means clustering, final centres of clusters according to wine knowledge, N= 222

An asymmetry effect is shown in figure 2, as the type of knowledge does not take away *Expert* and *Novice* clusters' responses with the same intensity. More complex is the knowledge of wine (processing-related and geographical knowledge), lower is the score of *Novice* cluster. While semantic knowledge, more available for everybody, is acting with symmetry between clusters' scores.

The clusters were cross-tabulated with the other data collected and some significant relationships were identified. For the cluster 1, so-called *Expert*, the main explaining factors are: self-statement of respondent as well aware about wine, using direct sale as a purchasing channel, region of residence (experts are more often from Burgundy), readings on oenology, level of stocks of wine from Burgundy, diversity of regions in the own wine cellar, number of bottles of white wine in the own

wine cellar which are higher for experts.

The description of the clusters shows that the members of cluster *Expert* are older, are more often male and have higher income rather than the average of respondents. The intermediate clusters are well discriminated by means of the living region of the respondents: cluster 2, so-called *Knowledgeable*, counts respondents mainly from Auvergne, while those from cluster 3, so-called *Connoisseur*, are more frequent in Burgundy. The cluster 4, so-called *Novice* is at the opposite situation of class 1 *Expert*: younger, more female and low level of income.

4. Conclusion

The conclusion of this survey confirms the initial assumption: providing information increases information asymmetry between consumers. Providing more information fits well with information processing of those who are highly involved in wine consumption, here cluster *Expert*. On the other hand, it may lead to some cognitive overload for those who are not highly interested by wine consumption, here cluster *Novice*. The first cluster may be more cognitive-driven with respect to wine consumption, as wine is a complex and amazing story, while the last cluster may be more affect-oriented, as wine is simply pleasant, or not, to drink.

Efficient advertising and communication plans devoted to wine should take into account these refinements when targeting consumers. While knowledge-based economy states that information asymmetry between consumers and producers may be reduced by providing information available, it was shown in the present study that there are various types of consumers with different needs in quantity and type of information depending on their prior knowledge. Processing-related knowledge does not address the demand of information from usual or casual consumers, while it is worth to highlight for connoisseurs or experts. On the other hand semantic or geographical information, such as wording, naming, labelling or branding, would be better affordable for less involved and less aware consumers and will better address their expectations, which are not so focused but still worth considering. The worse would be to provide information without any clear target or focus, apart from providing information *per se*! This practice will lead for sure to fuelling the cognitive overload of consumers by means of an undifferentiated flow of information. This tendency would probably increase the information asymmetry between the consumers.

Interestingly, the results of the present study indicate that, among the respondents, the clusters *Expert* and *Novice* are operating and fruitful categories when explaining consumers' knowledge related to wine. However these extreme categories do not fully document the wide spectrum of replies collected. The intermediate clusters *Knowledgeable* and *Connoisseur* have to be considered as promising medium categories in order to avoid a binary analysis with loss of variety. In the case of France, where the culture of wine is still vivid, the multidimensional aspects of wine knowledge should not be forgotten.

However, the present findings focus only on one country and one broad category of wine; they should be cross-compared with other countries and/or more precise wine categories in order to be enhanced. Self-estimation of wine knowledge could help to discriminate experts from novices but would not be reliable enough for solid clustering, although it fits well with the knowledge of the extreme classes of respondents. When the objective is to reach sufficient reliability of measurement for cluster analysis, self-reported purchases are useful as a validation dataset. Self-estimation of wine knowledge and self-reporting of wine purchases might be considered as an interesting trade-off for measurement of consumer knowledge with respect to wine, as the cost of this data collection is low.

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Appendix

List of questions (P: process-related knowledge, S: semantic, G: geographical)
P 17: Which of these wines is made via carbonic maceration?
P 1: From which grape variety is Bourgogne Passetoutgrain made?
P 15: During wine-making, what is the first fermentation?
P 3: What is special about“vin de paille”?
P 19: Which of these rosé wines is a blend of white and red wines?
P 2: How do you call the process of adding sugar to must during alcoholic fermentation?
P 16: Is it possible to make white wine from black grapes?
P 12: What is a varietal wine ?
P 4: What are late harvest wines?
S 8: What does VQPRD mean?
S 7: What does PGI mean?
S 6: What does PDO mean?
S 18: Which of the following statements about varietal wine is correct?
S 11: What is the shape of a Bordeaux wine bottle?
S 10: What is a vintage wine?
S 14: Which day is Beaujolais Nouveau released on the market?
G 24: What is the particularity of appellation Château-Grillet?
G 20: What is the main grape variety used for making Côte Rotie wine?
G 22: Does a Bordeaux Supérieur wine label indicate a regional appellation?
G 13: Does a Burgundy wine label indicate a regional appellation?
G 9: What is the main grape variety used for making Burgundy white wines?
G 23: From which vineyard does Châteauneuf-du-Pape come from?