Heterogeneity in Consumer Sensory Evaluation as a Base for Identifying Drivers of Product Choice

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In this paper we propose a multiattribute choice modeling approach to explore the heterogeneity in the saliency of product attributes in the process of a product choice that is based on sensory evaluations. We demonstrate this idea by using data about consumers' red wine evaluation. Such an approach enables managers to add knowledge about consumers' needs and wants beyond traditional art and the experience of wine makers into the process of designing a product. We utilized a choice model that enables us to identify such attributes and, simultaneously, to estimate the choice probabilities for each different wine. Our results, based on four different red wines, indicate that based on their sensory evaluation, consumers tend to utilize several wine attributes in their choice process. The saliency of these attributes varies in different consumer segments such as gender and frequency of wine drinking.

Choosing among products characterized by many different types of attributes is difficult for consumers, as it requires a considerable cognitive effort. This is particularly true when the product category offers many different alternatives with various tastes. In such cases, consumers can rely on extrinsic (i.e., signals of quality such as brand name or package) or intrinsic (i.e., taste of the product) product characteristics to choose among alternative products. The latter might be more reliable than the former, as consumers can develop their own direct evaluation criteria (their own taste) and test that product. Wines, for example, provide consumers with a wide variety of products with different tastes, qualities, prices, and other related attributes. Choosing a specific wine, therefore, is a complex task for consumers. Furthermore,

verifying the qualities of such products is usually possible only after actually using the product. Moreover, due to the wide selection of possible alternative products, consumers cannot be sure they made the right decision even after consuming the product. This makes wine a typical credence product – products that are difficult to evaluate before as well as after consumption (Darby & Karni, 1973), as opposed to search products (that can be evaluated prior to consumption) and experience products (that can be evaluated after consumption) (Nelson, 1974). It is logical to expect that consumers cannot solely rely on their own taste test for wine choice, since, in many purchasing situations, this option is not easily available. As a result, other methods of reducing uncertainty can be used by consumers. For example, Lynch and Ariely (2000) found that electronic shopping can reduce search costs and price sensitivity, while maximizing the transparency of quality information specifically for a differentiated product such as wine. Nevertheless, a taste test is still the more reliable selection criteria for choosing such products when possible.

Consumers can use their own sensory evaluation to verify product qualities, when possible. Shepherd and Towler (1992), for example, argue that experience (and valuation) of consumers with food products is shaped by sensory attributes and particularly, by taste. Koivisto and Sjóden (1996) argue that taste is a good explanatory variable for food choices. As in many aspects of consumer products, there is heterogeneity among consumers when it comes to the exact combination of marketing mix variables that fit their needs. Heterogeneity stemming from personal differences (e.g., gender) geographical, behavioral (e.g., experience with the product) and other sources can have an effect on the desired product characteristics and preferences for it. For example, Scarpa, Philippidis and Spalatro (2005) found a variation in choice that is associated with socioeconomic variables in several food products. Hu et al. (2004) found gender differences in a latent class model analysis of choice of genetically modified ingredients of food products. The same type of difference was also found in wine (Goodman, Lockshin & Cohen, 2008).

The current study explores how the effect of consumer sensory evaluations on the choice among different products can provide diagnostic information about product modification, or new product development. In order to demonstrate this approach, we analyze red wines, where sensory evaluation plays a significant role, as this product is characterized by a variety of attributes that are evaluated by different sensors (e.g., taste, smell). To expand our understanding about the potential difference among consumer segments with respect to such product modifications, we explore two different sources of potential heterogeneity in consumers' evaluation: gender differences (personal source) and frequency of drinking wine (behavioral source).

To address the objective of this paper, a probabilistic choice model formulation is used to identify the salient product attributes in choice formation. The results of the analysis reveal that such attributes can be identified and consumers' heterogeneity in sensory evaluation that is reflected in the saliency of the wine attributes exist across different consumer segments. That is, a segment-to-segment difference is revealed. Better understanding of such a pattern of results can provide a better understanding of sensory-based evaluation methods and scenarios and, at the same time, provide insight into the type of product (wine) managers should develop to better cater to their target markets.

The rest of the paper is organized as follows. In Section 2, we present the background for this study and present the conceptualization of the research at hand. In Section 3, the methodology used in this study is presented. This is followed by Section 4, where the results of the analysis are laid out. Section 5 provides the discussion, conclusion, and summarizes the study.

Problem Conceptualization

Traditionally, winemakers make wines that preserve the qualities of the different wine varieties and at the same time, attempt to create a wine that will appeal to the palettes of wine consumers. In a sense, it is an art of blending two aspects of product creation into the resulting outcome: wine taste. Research aimed at improving grape quality in the agricultural area is grounded in extensive accumulated knowledge that can provide wine growers with better agro-technical methods to improve the cultivation of their vineyards (Weaver, 1976; Seguin, 1986) or improve the technology of wine making (Pretorius & Bauer, 2002) and bottling (Prescott et al., 2002).

Substantial research has also been conducted on the other domain of importance to winemakers; consumer preferences. Such research is mainly concerned with taste tests and the development of information cues that try to assist consumers in identifying and selecting wines (Johnson et al., 2001). The latter includes the effect of countries and regions within a country on the evaluation of wine (Orth, Wolf & Dodd, 2005; Skuras, 2002) and branding (Thode & Maskulka, 1998; Walker, 2003). Another type of research has focused on consumer heterogeneity with respect to wine preference. This has taken the form of appropriate methodology for heterogeneity detection (Mueller, Francis & Lockshin, 2009; Cordelle, Lange & Schlich, 2004) or consumer demographic effects (Scarpa et al., 2005; Hu et al., 2004), among others. As noted earlier, tasting the wine is probably the best method consumers can use in selecting a wine, as it is probably more reliable in examining wine qualities. Indeed, winemakers frequently use taste tests to persuade consumers to test different wine blends for qualities such as aroma, bouquet, after taste, and other characteristics.

Sensory Evaluation and Preference

Since wine can be considered as a credence quality type of good, consumers use a variety of direct and indirect product attributes to evaluate the product since consumers cannot be sure they made the right decision. To address these difficulties, wine producers, for example, try to influence potential consumers by reducing some of the uncertainty concerning their wines. To this end, producers create several wine brands for the same varieties based on the quality of the grape juice, which could be a signal or self-declaration of quality. Other indicators are vintage, winery and reputation, geographical location, and other external characteristics that may classify the wine. All these indicators serve as a proxy to the product quality. Since wine quality is marked by relatively high heterogeneity, even when dealing with the same variety and the same production year, the best tool for consumers to evaluate the quality of the wine is still their own tasting experiment. It is very difficult for consumers to taste all wines they might like to buy before an actual purchasing has

taken place. Wine marketers usually provide sampling procedures to foster such testing. This procedure provides marketers with primarily two types of information from consumers: 1) the opportunity to gain insight into the overall preference for a certain wine, and 2) evaluation of the different wine qualities based on consumers' sensory evaluation (Lesschaeve, 2007). Relating the information from the second source to the first (attributes to preference) can reveal more insight about the formation of consumer preferences. This is particularly important to winemakers, as it will allow them to lower the number of blends they create to better target the desired preferred wine. In other words, identifying attributes that drive consumer preferences can indicate to winemakers what aspects of the wine need to be changed to increase its preference among consumers. Wine testing and a short follow-up questionnaire completed by consumers after tasting the wine regarding product attributes that are evaluated by their taste and smell sensors can indicate what kind of product attributes create a preferred product.

We frame the consumer decision of whether to buy a certain wine in this study to the sensory evaluation case. The decision about such a purchase, therefore, depends on consumer perceptions of these sensory-based product attributes. On regular purchasing occasions, consumers are faced with more than a single alternative of wine from which they can choose. The purchasing decision in such real-world scenarios becomes even more complex to analyze as there are common attributes across products and one choice decision that, in a sense, captures a competitive scenario between alternative products. Since this case is probably more important to winemakers than the single (i.e., monopoly type) case where only one wine is considered, rather limited work aimed at modeling this purchasing decision process in wines has been done. More specifically, no complete understanding exists of the competitive intensity between various wines available to the consumer that is based on sensory-type attribute evaluations. Furthermore, the effect of the wine attributes on the purchase decision has not been adequately addressed in the literature. To fill this void, we propose a probabilistic modeling approach that will address these issues. In particular, we employ a multinomial Logit choice model to examine the choice probabilities of different red wines as a function of the wine sensory-based attributes.

Researchers have tried to define wine quality according to objective characteristics based on chemical and instrumental analyses of wine attributes. Such characteristics include acidity, color, volatile components, and other aroma-related and measurable attributes. Wine's compositional and sensory profiles are widely documented, and several models have been proposed to identify and classify wine quality and origin, based on these profiles (Cliff & Dever, 1996; Vanier, Brun & Feinberg, 1999). These measures, however, are not fully appreciated by consumers, who generally rely on their own perception of product qualities.

Some characteristics are not easily measurable either. For example, the aroma and sensory attributes of wine are complex and difficult to measure and describe. Hence, a sensory evaluation of wine is generally performed by wine experts, who evaluate the wine and describe its attributes to potential consumers. However, consumers will frequently rely on their own judgments about these qualities. Since consumers make the purchasing decision, it would be prudent for winemakers to use a consumer

sample to evaluate such wine qualities and preferences to better identify the preferred wine taste.

Consumer Heterogeneity

As noted above, wine tasting is a common method for selecting a wine in wineries or wine stores, as it reduces uncertainty about the product qualities. What are the attributes that most affect consumers in such a choice process? Do these attributes differ across different consumer segments? In other words, does heterogeneity among consumers have an effect on the saliency of the wine attributes in a choice context? From the marketers' perspective, the answer to these questions might indicate a potential for constructing a marketing strategy based on those important attributes. Such a strategy might be more effective and efficient than others, because it would focus on the potential drivers of consumer preferences and choice. That said, a lack of understanding continues to exist with respect to the salient attributes of red wines which differ from white wines in their complex characteristics and the variation in different consumer segments.

The aforementioned discussion about winemaking that is primarily based on the winemakers' experience and consumer evaluations primarily based on their sensory evaluation, yields some inconsistencies regarding the issue of how to develop a wine with the highest consumer preference. The art of winemaking, as exhibited by the knowledge of the winemakers, was eventually tested by consumer sensors. Such wine taste tests evaluate the overall quality of the product and give winemakers an indication as to whether they are on the right track. This type of test has one shortcoming since it involves a sequential evaluation of each wine, one at a time, with an evaluation of that wine on its own. That is, there is no provision for the relative effect of the one wine characteristic on the relative preference of this wine compared to other wines in the choice set. This issue becomes even more complex as pooling consumers evaluation might lean to an "average" wine taste that will not necessarily fit the desired preference of a certain segment. It is therefore essential to identify heterogeneity among consumers in terms of preference formation to reveal the drivers of this preference formation.

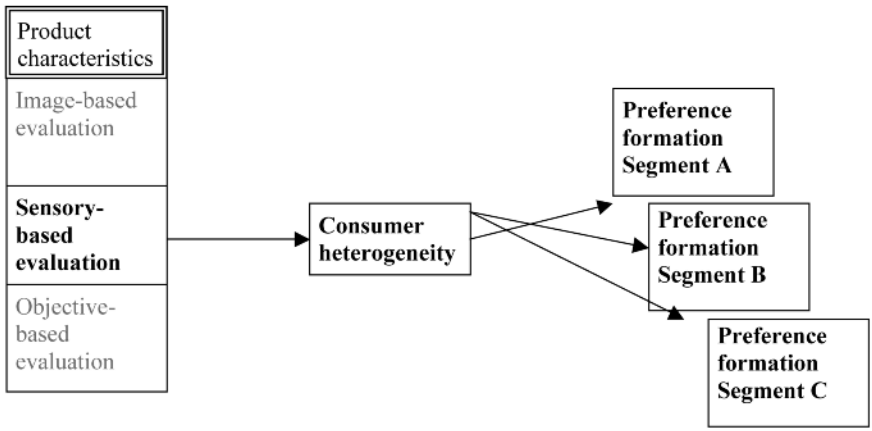
Heterogeneity in consumer sensory evaluation is well documented in the literature (Tomlins et al., 2007). In a study conducted by Weaver (2001), heterogeneity in food preference based on sensory evaluation was observed, to a certain degree, between men and women. In addition, preference and frequency of consumption were also correlated. Differences between consumers based on gender behavior of alcohol consumption have been widely documented (Ricciardelli et al., 2001). Since heavy alcohol drinkers may be more experienced in wine styles, segmenting the market based on the frequency of drinking wine might be valuable in gaining more insight into different consumer needs.

Figure 1 summarizes the proposed framework of analysis of this study.

In short, this study is aimed at filling the void in the literature on gaining additional insight into sensory-based attributes and their effect on consumer choice in a heterogeneous consumer group. Winemaking is considered by many as a combination of art and science, so we worked to increase knowledge of the exact

wine attributes that drive consumer choice and, therefore, provide managers with more "knowledge to improve art," while capturing the competitive intensity that prevails in such product category.

Figure 1: *Sensory-based Evaluation Analysis*



Methodology

In terms of methodology, we used a descriptive research approach that was based on two stages. In the first, we identified the relevant red wine attributes that consumers consider when purchasing red wines. In the second stage, we conducted a blind taste test experimental design to capture the effect of the wine qualities only (i.e., not the brand effect or other external cues). We used the following list of characteristics as representative of the wine attributes: color intensity, aroma, bouquet, taste, tannic, harmony, and after-taste sensation. This set of wine attributes conforms to the generally accepted rules of wine tasting (Kolpan, Smith & Weiss, 1996).

Procedure and Data collection

The subjects used for this study were students, visitors and staff members at a large university. The taste tests were conducted during a time period of two days that lasted from late morning to late afternoon. One hundred and thirty-five respondents participated in the study. The tasting experiment was performed in the lobby of a large building complex to attract potential participants. The researchers suggested wine tasting to the visitors who walked through the building. They presented four bottles of wine wrapped in brown paper. All of the wines tested were presented to the subjects simultaneously, without any information about the wine. Furthermore, random mixing of the alternatives across participants was carried out to avoid potential primary or recency effects. Overall, four red generic wines of different brands were tested (i.e., an unknown producer with a private label, a well-known brand, a wine from a boutique winery, and a very well-known brand).

Overall, 135 participants took part in the wine tasting procedure and answered the questions pertaining to this test. The sample was formed by 88 males and 47 females. The participants were mostly young adults, 41 of which were between the ages of 18 and 24 (since the legal drinking age is 18 in the area where the study was performed), 89 between 25 and 40, and 5 over 40. It is acknowledged that this sample might be skewed toward younger male customers. Further exploration of other demographic variables can be carried out in future research. With respect to income level, 81 of the participants earned less than the average salary, 46 at about the average, and 14 above the average income. The level of employment ranged from full-time, 64, to part-time, 8, and full-time students (unemployed), 62. Subjects were asked to taste the wine and to rate each of the following wine attributes described earlier: color intensity, aroma, bouquet, taste, tannic, harmony, and aftertaste. Respondents were asked to rate their responses on an interval scale of 1 (very low level) to 10 (very high level). For instance, a respondent would be asked: "On a scale of 1 to 10, where 1 is very light and 10 is very dark, how would you rate the color intensity of this brand?" Descriptions for the scales used for the other attributes are also given in Table 1.

Table 1: *Attributes Involved in Product Evaluation*

Attributes
1. Color – whether this wine is dark colored (very light vs. most dark)
2. Aroma – how strong is the aroma of this wine (very light vs. very strong)
3. Bouquet – how strong is the bouquet of this wine (very light vs. very strong)
4. Taste – how tasty is this wine (not tasty vs. most tasty)
5. Tannic – what is the tannic level of this wine (very low vs. very high)
6. Harmony – what level of harmony this wine has (very low vs. very high)
7. Aftertaste – how strong is the aftertaste feeling of this wine (very light vs. very strong)

Respondents were informed about the characteristics of the different product attributes. For example, *aromas* are the smell stemming from the grape, *bouquet* is the smell coming from the production process (e.g., aging in oak barrels) of the wine and not the grape itself. *Harmony* is the balance between the wine components, while *tannic* is the dry feeling in the mouth after drinking the wine, and so on. Similar measures were used in other studies (Nerlove, 1995; Hughson & Boakes, 2001).

In addition, respondents were asked to rate their overall evaluation of each wine and to rate their overall preference for each of the four wines they tasted (Cohen & Lowengart, 2003).

Choice Model

The main objectives of this study, as noted above, are twofold: 1) estimating the probability that a consumer would choose a specific wine from a set of alternative wines, and 2) identifying the red wine attributes that most affect customers in their purchasing decision. The latter will assist managers and winemakers in deciding which wine attribute they need to modify to improve the choice probability of their wine.

We employed a probabilistic multinomial Logit choice model (McFadden, 1974) to

analyze the data. The MNL model is a simultaneous compensatory attribute choice model that incorporates the concepts of thresholds, diminishing returns to scale and saturation levels (McFadden, 1974). Furthermore, the MNL is based on the assumption that the overall preference of a consumer for a choice alternative (i.e., the preferred wine) is a function of the perceived relative utility that the alternative (wine) holds for the consumer.

Let U_{ij} be the utility of alternative product j for customer i, and m the number of alternative products. The utility function can be separated into a deterministic component V_{ij} (measured in terms of perceived value associated with the characteristics of the products), and an unobserved random component, ε_{ij}, which is assumed to be drawn from independent and identically distributed such that:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \qquad (1)$$

The distribution of ε_{ij} is assumed to be exponential (Gumbel type II extreme value) and thus the probability that alternative product j will be chosen by customer i is represented by:

$$P_{ij} = \frac{\exp^{(V_{ij})}}{\sum_{j=1}^{j=m} \exp(V_{ij})} \qquad (2)$$

Utility Specification

The deterministic component of the utility function is a product of the weighted sum of the product attributes identified earlier and has the following form:

$$V_{ij} = \alpha_1 COLOR_{ij} + \alpha_2 AROMA_{ij} + \alpha_3 BOUQUET_{ij} + \alpha_4 TASTE_{ij} + \alpha_5 TANNIC_{ij} + \alpha_6 HARMONY_{ij} + \alpha_7 AFTERTASTE_{ij} \qquad (3)$$

where,
$COLOR_{ij}$ – consumer i' perceptions of the color intensity of wine alternative j
$AROMA_{ij}$ – consumer i' perceptions of the aroma of wine alternative j
$BOUQUET_{ij}$ – consumer i' perceptions of the bouquet of wine alternative j
$TASTE_{ij}$ – consumer i' perceptions of the bouquet of wine alternative j
$TANNIC_{ij}$ – consumer i' perceptions of the tannic of wine alternative j
$HARMONY_{ij}$ – consumer i' perceptions of the harmony of wine alternative j
$AFTERTASTE_{ij}$ – consumer i' perceptions of the aftertaste of wine alternative j
for $j=1,2,3,4$.
$\alpha_1\alpha_2\alpha_3\alpha_4\alpha_5\alpha_6\alpha_7$ – parameters to estimate.

Results and Discussion

The estimated parameters $\alpha_1,\ldots,\alpha_7$ for all subjects tasting red wine are presented in Table 2. The data indicate that four wine attributes are salient in the choice process – namely, taste and harmony and to a lesser degree, bouquet and aftertaste. Thus, wine

producers and marketers should focus on these wine attributes, while targeting wine consumers similar to those in our study.

Table 2: *Multinomial Logit Coefficients – Aggregate Level*

Wine Attribute	Coefficient	Significant Level
Color intensity	- 0.449	0.750
Aroma	- 0.082	0.553
Bouquet	0.261	0.091
Taste	0.684	0.000
Tannic	0.067	0.446
Harmony	0.616	0.000
Aftertaste	0.146	0.075
McFadden R^2	0.451	

Understanding consumer preferences and what drives their choice is essential is developing marketing strategies. Based on the results in Table 1, it can be concluded that changing the wine taste and harmony will have a significant effect on the choice probability of red wines, and a marginal effect when improving the bouquet and aftertaste of the wine at the aggregate level. The exact attribute level can be determined in a different study when several categories, or values, of each variable are considered to find the optimal level of the specific attribute. The choice-based model was able to identify those attributes that drive wine choice among four alternative red wines.

As a next step in identifying drivers of wine choice in a heterogeneous consumer market, we employed the same multinomial logit analysis for different segments based on gender, frequency of wine drinking (less than once a week and twice a week or more, for low and high frequency wine drinking), and wine involvement.

With respect to male/female segmentation scheme, our results, presented in Table 3, show that taste is a salient attribute for both males and females. These two segments, however, are different with respect to other wine attributes. Harmony plays an important role in the male segment (harmony is recognized as the balance among all wine attributes) and, to a lesser degree, aftertaste. Bouquet is also significant in the female segment. A possible justification for this finding might be that bouquet is considered as the feeling in the mouth while drinking the wine, and not the actual meaning of bouquet, which is the combination of aromas and odors developed in the wine during fermentation and aging.

In sum, the gender segmentation variables revealed interesting dissimilarities between segments such that the male segment was concerned with intrinsic product characteristics that are taste sense-based evaluated. The preference for red wine in the female consumer segment, in contrast, was also driven by external product characteristics that are other sensor-based evaluated (smell). Based on these results, it can be seen that personal differences in consumers, such as gender, have an effect of the formation of preferences and choice.

Table 3: *Multinomial Logit Coefficients - Male and Female Segments*

	Male		Female	
Wine Attribute	Coefficient	Significance Level	Coefficient	Significance Level
Color Intensity	-0.075	0.711	-0.217	0.391
Aroma	-0.867	0.584	-0.068	0.799
Bouquet	0.010	0.955	0.710	0.029
Taste	0.674	0.000	0.859	0.000
Tannic	0.011	0.931	0.132	0.361
Harmony	0.776	0.000	0.360	0.143
Aftertaste	0.219	0.076	0.218	0.155
McFadden R^2	0.454		0.512	

The next step of the analysis is exploring heterogeneity in consumers' frequency of drinking alcohol beverages that is a proxy to their experience with the product. Analyzing the results of this analysis (Table 4), it can be seen that bouquet is a salient attribute in the low frequency wine drinkers' segment (Table 4). Both segments appreciate taste and harmony. The high frequency segment is also affected, to a certain degree, by the aftertaste and color of the wine. It comes as no surprise that less experienced and knowledgeable consumers tend to evaluate products with a smaller set of attributes (Sujan, 1985).

Table 4: *Multinomial Logit Coefficients - Low and High Drinking Frequency Segment*

	Low Frequency		High Frequency	
Wine Attribute	Coefficient	Significance Level	Coefficient	Significance Level
Color intensity	0.036	0.840	-0.533	0.108
Aroma	-0.149	0.378	0.045	0.857
Bouquet	0.421	0.036	-0.030	0.909
Taste	0.687	0.000	0.740	0.009
Tannic	0.114	0.305	-0.097	0.547
Harmony	0.387	0.027	0.999	0.000
Aftertaste	0.150	0.130	0.325	0.109
McFadden R^2	0.447		0.508	

To verify whether our segmentation schemes are meaningful (i.e., whether separating the sample into two segments should result in better data fitting than in an aggregate sample), we conducted log-likelihood tests, $-2 \log \lambda$, where $\lambda = (LL_{segments} - LL_{aggregate})$, (Gensch, 1985) on the different segmentation schemes. The results of this analysis are presented in Table 5.

Table 5: *Segmentation Scheme Log Likelihood Tests*

Segment	Log Likelihood	
Aggregate model	-105.15	-105.15
Male	-65.88	
Female	-30.43	
Low frequency		-65.16
High frequency		-31.39
2λ	17.68	17.20

All of these tests are significant at least at the 0.05 level, thus indicating that our segmentation schemes are meaningful and such consumer groups do behave differently in their choice decisions.

Discussion and Conclusions

The purpose of this study was aimed at exploring the effect of sensory-based product attributes on consumer choice, and in a heterogeneous consumer market in particular. It therefore, presented a general approach for obtaining diagnostic information about the saliency of product attributes in a choice context. In order to demonstrate this framework, the paper focused on seven sensory based wine attributes that were identified as part of consumer considerations. We employed a probabilistic choice model to address this issue and were able to identify those wine attributes. In addition, we estimated the effect of a change in these attributes on the probability of choosing a wine. This methodological approach enabled us to gain insight into consumer preferences that are driven by attributes that can be managed scientifically, as well as practically, by winemakers. That is, the proposed method added science into art in the sense that part of the winemaking decision can be based on consumer research preferences and perceptions, and not just on expert opinion or trend guessing. However, this is not to say that the other methods supporting product design decisions are not important in consumers decision of wine purchase. This is also not to say that other product attributes (i.e., price, image, etc.) are of less importance. For example, mapping techniques that combine consumer perceptions and preferences can provide insight into the desired (ideal) product and the proximity of alternative products in the category to this ideal point (Ghose & Lowengart, 2001). There are other quantitative methods that utilize consumers' sensory evaluation to examine product preference that can be found in the literature (Saguy & Moskowitz, 1999; Lesschaeve, 2007). The approach proposed in this study provides a different tool to get better accuracy in understanding consumer needs and wants through choice process formation and relevant diagnostic information.

When constructing a marketing strategy for a red wine and utilizing the results of this study, marketers can increase the choice probability of their wines by improving the taste and emphasizing the wine's harmony. This can be done either by technological improvements or by blends with other varieties of grapes. Naturally, it is

not easy to delineate what is the exact taste and harmony for a preferred wine; rather, this study can indicate which sensory wine attributes are those that influence the choice process. Wine marketers, therefore, need to construct further sensory evaluations tests to identify the most preferred tastes and flavors for their wines. Namely, we can indicate "what" should be improved and the question "how much" can be answered in another study.

Our results also indicated variation in the saliency of the wine attributes across different consumer segments that can be incorporated into a better understanding of customer preferences. This market-to-market variation in the male segment, for example, can be translated into offering a wine that is a bit more complex in that it will include indications of its harmony and aftertaste. A different approach, one that offers a wine that indicates the bouquet of the wine, can be targeted for the female segment. Such diagnostic information can aid wine marketers in constructing more effective marketing strategies to increase their market share. This can be done by introducing two different wines with different marketing communication strategies that will fit each segment. Such marketing responses will be more effective than marketing the same wine to both male and female segments. Similarly, the consumer segment that purchases wines at low frequency can be educated about the bouquet of the wine with appropriate communication schemes to increase the choice probability of purchasing specific red wine.

It should be noted that the proposed framework provides diagnostic information about which attribute is salient in the choice process that allows managers to design marketing strategies for product modifications, or new product development. It does not, however, provide insight about the exact level of such (salient) an attribute and the exact tactic to obtain it. This can be obtained in different research that can examine the different levels of this attribute.

Overall, this study presented a choice model-based approach for gaining knowledge about current product modifications, as well as developing new products in categories that are characterized by the high importance of consumer sensory evaluation in forming preferences toward brands. This is particularly valid in categories where product design decisions are based on experience and art. Identifying the salient product attributes for the aggregate and disaggregate markets provide managers and winemakers with information about the exact product attributes that need to be modified. Improving the relevant product attributes will increase consumer choice probabilities for the specific product (wine) alternative.

The current study introduced a framework for future studies that can focus on the effect of other consumer characteristics, demographics and others, on wine selection, as well as the manufacturer's (i.e., winery) effect on the choice of such a product. That is, exploring whether consumer heterogeneity in responsiveness to various wine attributes might aid marketers in tailoring marketing strategies that are more targeted and therefore more efficient.

Many different factors can affect the choice decision of a product in a product category. These include tangible (e.g., price, quality, packaging, taste, etc.) and nontangible aspects (e.g., reputation, image). For complex products, those that have many different types of product characteristics, or that have experience or credence in nature, the choice task of consumers is even more difficult.

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