

Development of an objective knowledge scale: Preliminary results

Natalia Kolyesnikova, James B. Wilcox, Tim H. Dodd, Debra A. Laverie and Dale F. Duhan

Contact: n.kolyesnikova@ttu.edu

Consumer knowledge about a product category is an important construct in marketing theory and practice. Traditionally, consumer knowledge has been defined and operationalized as three distinct constructs: subjective knowledge, objective knowledge, and prior experience with the product category. While there is extensive previous research on the importance of product knowledge in consumer decision making processes, there is still a general lack of consistency in defining 'knowledge' and by extension, in the measures employed. The current paper focuses on objective wine knowledge and describes the development of a wine objective knowledge scale.

Key Words: objective knowledge, scale development.

Introduction

The role of product knowledge has long been a subject of interest to marketing researchers. Brucks (1985) described three categories of consumer knowledge: (a) subjective knowledge - consumers' self-perceived level of knowledge about the product category; (b) objective knowledge - the factual knowledge about the product that is held in consumer's memory and can be measured by a test; and (c) previous experience with the product. The three-element classification has been followed by many consumer behavior researchers (e.g., Alba and Hutchinson, 1987; Flynn and Goldsmith, 1999; Park, Mothersbaugh, and Feick, 1994). While there is extensive previous research on the importance of product knowledge in consumer decision making processes, a need for consistent operationalization of the knowledge constructs still exists. Some initial work has been done in the development of scales to measure wine knowledge - both objective and subjective (see Philippe and Ngobo, 1999; Veale, 2008). The purpose of this paper is to re-examine the knowledge assessment issue. Particularly, this study describes the process of the development of a test with varying levels of questions difficulty to measure consumer objective knowledge about wine.

Literature Review

To briefly outline the most generally acknowledged findings on the consumer product knowledge subject, objective and subjective knowledge are commonly considered the two components of knowledge, and experience a determinant of both (Park *et al.*, 1994; Raju, Lonial, and Mangold, 1995). Previous consumer research focused on knowledge measurement (Brucks, 1985; Flynn and Goldsmith, 1999), product judgments (Maheswaran, Sternthal, and Gürhan, 1996), choice (Mitchell and Dacin, 1996), and information processing (Brucks, 1985; Dodd, Laverie, Wilcox, and Duhan, 2005; Raju *et al.*, 1995). Past research has also demonstrated that as the amount of prior knowledge about a product category increases, comprehension and recall of information about the product also increases. Alba (1983) noted that in the situations in which choice is determined by the quantity of retrieved information, high-knowledge consumers will be at a distinct advantage.

The wine market presents consumers with a vast variety of heterogeneous products. There are approximately 10,000 brands of wine available in the US market alone (O'Connell, 2006). In addition to a wide assortment of wine brands, consumers process information about different grape varieties, origins, vintages, wine quality ratings, etc. With the wine market being so multifaceted, the level of product knowledge is a significant factor dictating the processes undergone by consumers.

The specific focus of this study is the knowledge measurement issue. Although literature on consumer product knowledge is abundant, there is still a lack of consistency in the measures employed (Veale, 2008). Brucks (1985) noted that while many marketing studies supposedly measured 'knowledge', the measures used differ considerably between studies, posing a problem for research in this area. Brucks identified two major problems with the lack of a generally accepted measure of knowledge. First, individual researchers have to develop their own measures. And secondly, it is difficult for researchers to build upon previous work when developing theories since this is no certainty that all the measures used in previous research actually measured the same construct.

While a clear need for the development of a valid and reliable measure of consumer knowledge has been identified early on, previous research efforts in this area lack uniformity. More attention seems to be given to measures of subjective knowledge than to measures of objective knowledge. Using wine as one of the product categories tested, Flynn and Goldsmith (1999) developed and validated a short self-reported measure of subjective knowledge that is applicable to a variety of products. The scale is widely used in the wine marketing literature. Various subjective knowledge scales were also developed by Mason *et al.* (2001), Mukherjee and Hoyer (2001), Roehm & Sternthal (2001), Cole & Balasubramanian (1993), just to cite a few studies.

Measuring objective knowledge, however, is a more challenging task. In fact, Brucks (1985) argued that it is easier to measure subjective knowledge than objective knowledge. Although objective knowledge can be measured by testing consumer's factual knowledge of a product category, developing the actual test may be difficult for a variety of reasons. Because subjective knowledge indicates levels of self-confidence, measures can be adapted to various subject areas. On the contrary, the development of an objective knowledge test must be done with specific application to each product category under investigation.

Determining the domain of objective knowledge is critical and unique for each product category. A typology of consumer objective knowledge developed by Brucks (1985) included terminology, product attributes, criteria for evaluating attributes, attribute covariance, and usage situations. Because Brucks' objective knowledge test was created for the sewing machines product class, most of her measures were focused on indicators of the product's functionality (e.g., *list sewing machine features; check attributes importance for the product performance; describe the difference between a \$700 sewing machine and \$300 sewing machine; etc.*) These measures, however, may not be applicable for products that are not functional, wine being one of them. As mentioned earlier, a specific product domain needs to be created for each individual product.

Different measures have been used to operationalize wine objective knowledge. In fact, almost every study on consumer wine knowledge has used its own scale. To cite a few examples, Dodd and his co-authors (Dodd *et al.*, 2005) used a 10-item multiple choice test to measure consumer factual knowledge about wine, including questions on wine alcohol content, grape varieties, pairing and serving. van Dijk and van Knippenberg (2005) used a different 10-item test, and in addition to grape varieties, their questions tested knowledge of different vintages and various facts about the French wine industry. Frost and Noble (2002) used their own wine trivia quiz which consisted of 11 questions from an undergraduate class exam. Their questions were of varying levels of difficulty and accordingly, varying points were given to each correct answer. More recently, Veala (2008) implemented a 24-item test with specific emphasis on knowledge of Chardonnay to fit the purpose of her study. The item pool for this test was derived from information that may typically be found on wine labels and from the advice of industry experts. Mueller, Francis, and Lockshin (2008) used an unaided elicitation of grape varieties and Australian wine regions to measure respondents' objective wine knowledge.

This brief overview of the selected studies measuring objective wine knowledge clearly demonstrates a lack of uniformity in addressing the domain of wine knowledge. The development of a uniform objective wine knowledge scale may be challenging due to the fact that wine knowledge could be country-specific. Consumers from a certain wine region are likely to know more about wine from their region than other countries. This can be the reason for previous non-uniformity of objective knowledge measurement. One of the challenges for the development of an objective knowledge scale is to create a "geographically neutral" test.

In addition, consumers naturally have different levels of knowledge about wine. Previous research has found that experts and novices differ in the amount, content, and organization of their knowledge, and as a result, exhibit large variances when they perform product-related tasks (Philippe and Ngobo, 1999). While many researchers examined differences between high knowledgeable and low knowledgeable wine consumers, with a very few exceptions (e.g., Frost and Noble, 2002) the issue of differentiating consumer levels of wine knowledge almost never gets addressed while developing knowledge scales.

This paper addresses an issue of objective knowledge operationalization with the specific focus on varying levels of items difficulty. The ultimate goal of this study is to develop a scale to measure wine

objective knowledge, which (a) would address the domain of wine knowledge, and (b) can differentiate consumers at all levels of knowledge. The current paper describes an initial step in the process of the development of such a scale.

The Process

Defining the domain

The boundaries for the wine objective knowledge domain were determined by examining (a) typologies of previous studies measuring wine objective knowledge; (b) wine trivia quizzes found online and in popular literature on wine; (c) the content of the undergraduate-level beverage management class; (d) information commonly provided on wine labels; and (e) advice from the wine industry professionals and wine educators. Based on information obtained from the above mentioned sources, the following was considered to constitute the domain of wine knowledge: grape varieties, the wine making process, wine regions of the world and appellations, wine serving and pairing, wine characteristics; and major historic facts about wine.

Generating list of items

Based on the sources outlined above, a list of 50 items was originally developed. To maximize the face validity of the scale, the initial pool of items has been emailed for review to 18 wine experts. Expert judging has been suggested as an effective way for items retention in the scale development process by numerous researchers (DeVellis, 2003; Hardesty and Bearden, 2004; Zaichkowsky, 1985).

The expert panel consisted of the wine industry professionals and wine educators who are knowledgeable in the content area. The experts were asked to rate each item with respect to its clarity and to select items most relevant to consumer wine knowledge. Based on the experts' ratings and insightful comments on individual items, the initial pool was scrutinized and limited to 25 items. According to the recommendation of DeVellis (2003), the 2:1 ratio between the initial pool and the final scale is considered appropriate. Consistent with previous objective knowledge measures, a multiple choice layout was selected as a response format for this test.

Initial Examination of Items Performance

For the initial examination of items performance, another panel of expert judges was used. The test was administered at the annual conference of the local wine and grape growers association. Industry professionals ($N = 60$) of approximately comparable expertise participated in the study. They were asked to accomplish two tasks: (a) complete the wine knowledge test, and (b) rate each of the 25 items on the test in terms of its difficulty. The assessment of difficulty was necessary to ensure items of varying levels of difficulty are included in the test. Such a multi-level scale will provide an opportunity for researchers to select questions of varying difficulty for various samples and to differentiate consumers at all levels of wine knowledge.

The next step in examination of items performance was to implement the test with two additional consumer samples. The first sample consisted of 63 undergraduate students enrolled in an upper-level beverage management class at a large public southwestern U. S. university. The second sample consisted of general wine consumers at a local organization ($N = 40$). Both samples were simply asked to complete the test of their wine knowledge (without assessing questions' difficulty levels). The results were coded with one (1) point given for each correct answer.

Results

Table 1 summarizes the results of the three studies mentioned above. The second column in the table reflects the difficulty of each item as judged by wine professionals. Columns three through five contain the percent of individuals in each group, professionals, students and members of a local organization, respectively, that got the item correct. Finally, the point biserial correlation (the relationship between getting a question correct and the overall score on the test) is reported. The

correlation between the percent of professionals getting an item correct and their rated difficulty of the item was $-.75$, a good indication of validity. It is also noteworthy that scores decline across the expertise of the groups from professionals to students studying wine management to a group of occasional wine drinkers.

The intent was to develop a set of items that collectively was capable of distinguishing between people of different levels of wine knowledge. The results reported in Table 1 suggest that the items satisfy this objective.

Future Directions

Clearly, additional work is necessary. The items will be used in subsequent studies to facilitate examination of convergent, discriminant and nomologic validity. Over time, as experience and sample sizes grow, it may be possible to apply Item Response Theory techniques to help in the selection of items for a particular study or group, allowing considerably less than the 25 items to be used to accurately estimate the true wine knowledge of respondents.

Table 1. Item difficulty and percent correct by study group

Quest. #	Difficulty ¹	Professionals	Students	Organization	Pt. Bi-serial
1	1.8	1	0.94	0.18	-
2	2.9	0.92	0.52	0.08	0.59
3	2.7	0.98	0.75	0.18	0.09
4	2.9	0.92	0.51	0	0.13
5	2.5	0.95	0.65	0.18	0.16
6	3.5	0.41	0.25	0	0.48
7	3.2	0.52	0.37	0.15	0.38
8	3.1	0.9	0.79	0	0.4
9	3.2	0.6	0.52	0.03	0.39
10	3	0.79	0.63	0.05	0.23
11	3.8	0.4	0.3	0.1	0.28
12	2.9	0.98	0.67	0.05	0.22
13	3.5	0.98	0.9	0.08	-0.08
14	1.5	0.79	0.27	0.1	0.56
15	3.1	0.89	0.44	0.2	0.18
16	3.3	0.75	0.19	0.43	0.55
17	3.7	0.59	0.24	0.28	0.54
18	3.9	0.73	0.51	0.15	0.49
19	3.9	0.54	0.22	0.15	0.32
20	2.4	0.98	0.86	0.15	-0.13
21	3.2	0.87	0.56	0.2	0.43
22	2.2	0.98	0.49	0.18	0.39
23	3.4	0.71	0.51	0.08	0.33
24	2.8	0.94	0.41	0.55	0.25
25	2.8	0.92	0.62	0.25	0.39

¹ Item difficulty was measured on a 4-point scale

References

- Alba, J. W. (1983), "The effects of product knowledge on the comprehension, retention, and evaluation of product information", *Advances in Consumer Research*, Vol.10 No., pp. 577-580.
- Alba, J. W. and Hutchinson, J. W. (1987), "Dimensions of consumer expertise", *Journal of Consumer Research*, Vol.13 No., pp. 411-454.
- Brucks, M. (1985), "The effects of product class knowledge on information search behavior", *Journal of Consumer Research*, Vol.12 No. 1, pp. 1-16.
- DeVellis, R. F. (2003), *Scale development: Theory and applications*, (2nd ed. Vol. 26). Sage Publications, Thousand Oaks, CA.
- Dodd, T. H., Laverie, D. A., Wilcox, J. F. and Duhan, D. F. (2005), "Differential effects of experience, subjective knowledge and objective knowledge on sources of information used in consumer wine purchasing", *Journal of Hospitality and Tourism Research*, Vol.29 No. 1, pp. 3-19.
- Flynn, L. R. and Goldsmith, R. E. (1999), "A short, reliable measure of subjective knowledge", *Journal of Business Research*, Vol.46 No. 1, pp. 57-66.
- Frost, M. B. and Noble, A. C. (2002), "Preliminary study of the effect of knowledge and sensory expertise on liking for red wines", *American Journal of Enology and Viticulture*, Vol.53 No. 4, pp. 275-284.
- Hardesty, D. M. and Bearden, W. O. (2004), "The use of expert judges in scale development Implications for improving face validity of measures of unobservable constructs", *Journal of Business Research*, Vol.57 No. 2, pp. 98-107.
- Maheswaran, D., Sternthal, B. and Gürhan, Z. (1996), "Acquisition and impact of consumer expertise", *Journal of Consumer Psychology*, Vol.5 No. 2, pp. 115-133.
- Mitchell, A. A. and Dacin, P. A. (1996), "The assessment of alternative measures of consumer expertise", *Journal of Consumer Research*, Vol.23 No., pp. 219-239.
- Mueller, S., Francis, L. and Lockshin, L. (2008). *The relationship between wine liking, subjective and objective knowledge: Does it matter who is in your 'consumer' sample?* Paper presented at the 4th International Conference of the Academy of Wine Business Research.
- O'Connell, V. (2006, February 8), "How Gallo got front-row seats at fashion show", *The Wall Street Journal*, p. B1
- Park, C. W., Mothersbaugh, D. L. and Feick, L. (1994), "Consumer knowledge assessment", *Journal of Consumer Research*, Vol.21 No. 1, pp. 71-82.
- Philippe, A. and Ngobo, P.-V. (1999), "Assessment of consumer knowledge and its consequences: A multi-component approach", *Advances in Consumer Research*, Vol.26 No., pp. 569 - 575.
- Raju, P. S., Lonial, S. C. and Mangold, W. G. (1995), "Differential effects of subjective knowledge, objective knowledge, and usage experience on decision making", *Journal of Consumer Psychology*, Vol.4 No. 2, pp. 153-180.
- van Dijk, E. and van Knippenberg, D. (2005), "Wanna trade? Product knowledge and the perceived differences between the gains and losses of trade", *European Journal of Social Psychology*, Vol.35 No. 1, pp. 23-34.
- Veale, R. (2008). *Sensing or knowing? Investigating the influence of knowledge and self-confidence on consumer beliefs regarding the effect of extrinsic cues on wine quality*. Paper presented at the 4th International Conference of the Academy of Wine Business Research.
- Zaichkowsky, J. L. (1985), "Measuring the involvement construct", *Journal of Consumer Research*, Vol.12 No. 3, pp. 341-352.