**Developing an Application to Score Unreviewed Wines**

(Technical Paper)

**How the Delicacy of Taste Enables Expert Wine Reviews to Function as a Placebo with Respect to the Consumer Purchasing and Tasting Wine Experience**

(STS Paper)

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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The current global wine market in 2020 has a value of $323 million dollars and by 2022 it is forecasted to reach $411 million dollars (Datamonitor, n.d., p.8). This significant growth in the wine industry can be attributed to the increase in consumer interest in purchasing wine. Of the global wine market, supermarkets and hypermarkets, which are supermarkets combined with a department store, hold a 41.1% share of the total markets volume (Datamonitor, n.d., p. 13). With the super and hypermarkets holding such a large stake of the market it is important that they are able to sell the wines they purchase to the end consumers. Therefore, it is important that the consumers feel confident about their purchases in order to want to continue buying wines from the stores, which will continue to spur the growth of the market.

When purchasing wine consumers often have a limited amount of information given on the bottle label to base their purchases off of. Further, consumers generally only spend on average less than one minute in front of a shelf (EBI, 2007). The limited amount of time and information can make it difficult for a novice wine consumer to determine the quality of a given bottle of wine. Sometimes the wines in the store will have a critic rating accompanying them to give the buyer a general idea of what a wine expert thought of the bottle. High agreement among good critic ratings can increase a buyer's likelihood of purchasing a particular bottle by 9.8%, making it a significant factor in a consumer's purchasing decision. (Mueller, Lockshin & Louviereb, 2009, p. 6). With the large purchasing emphasis placed on a critic’s review of a bottle of wine, the technical portion of this project aims to create an application where users can input wine label information and receive a generated wine score for the bottle. The STS portion of this project will look into the role that expert opinions, such as wine scores, have on consumer risk perception when buying wine.

**Technical Topic: Developing an Application to Score Unreviewed Wines**

The wine industry's growth in recent years has led to expansion in more areas than just the wine producers. Notably one niche that has developed is wine reviews, where there are now hundreds of thousands of reviews online for a large number of distinct wines. Wine reviewers taste wines and give them a score out of 100 based on a number of features to serve as an indication of the wine's quality. The scores are available online and are sometimes displayed in stores where they can be used by consumers as a metric to decide whether or not to buy a particular bottle of wine. In a study done by Hilger, Rafert and Villas-Boas (2011, p. 2) it was found that when high scoring wines were displayed with their scores the sales increased by up to 25% while at the same time the high scoring wines that did not have their scores displayed did not show any significant increase in sales.

With the rapid growth of the wine industry there comes a side effect that it is not possible for wine critics to rate every wine that is produced. Supermarkets usually provide hundreds of different wines and even Costco, a wholesaler, carries a selection of 100 different wines at a time (Oana, 2018, p. 4). With the large number of wines available in the consumer market, it is not reasonably possible for stores to display a critic score for every wine that they sell. This leaves the consumers with the limited information on the wine bottles label when deciding what wine to purchase.

A benefit to the growth of the wine industry is that there are a large number of reviews for a large number of different wines available to consumers online. This technical project will work off of the research done by Hilger, Rafert, and Villas-Boas (2011, p. 5**)** who found that "… a wine's displayed score has a significant positive impact on demand for treated wines". Additionally, in the study it was noted that "low-scoring wines experienced a decrease in demand" and "high-scoring wines experienced an increase" indicating the impact that an expert review can have on a consumers wine purchases (2011, p. 1**)**. As consumers are risk averse, an outstanding critic score gives them confidence that the given wine will be of higher quality than a wine with a lower score. Therefore, the goal of this technical project will be to take the large, available dataset of wine reviews to train a machine learning algorithm to predict a wine score

for an unreviewed bottle of wine. The algorithm will train on a number of different features that are available on the wine bottles label including vintage, region produced, winery, and type of wine. The algorithm will also take into account the price of the bottle of wine as higher price is generally correlated to higher wine quality (Miller, Genc & Driscoll, 2007). The reason to believe this method will work is based on research that wine experts generally agree on the overall quality of the wines they evaluate (Grohmann, Peña, & Joy, 2018, p. 8). The research concluded that the wine experts tested in the study, "generally agreed on the overall quality of the wines they evaluated, whereas their perception of subjective sensory attributes differed". This indicates that, if a wine is higher quality, then it will generally receive higher ratings by critics. This means that the dataset used by the algorithm will likely not have contrasting ratings for the same wines and thus will be able to perform accurately. One of the main challenges that will be faced in this project is the input of label information in the user application. As shown in Figure 1 below, there is a standard set of information that is included on wine labels as required by the government.


***Figure 1***. *Wine Label Information. (Napa Valley Vintners, n.d.).*

The difficulty will be in ensuring that the algorithm is able to understand all the information on the label as it may encounter unique data that it was not trained on. If any new data, such as a winery is inputted that the algorithm has never seen it could result in an inaccurate score being generated. At the end of this technical project the anticipated deliverable will be a working user application that a wine buyer can input a bottle's information into and receive a wine score for that bottle. Users can then use that generated score to help aid their purchasing decisions at the store.

**STS Topic: Role of Expert Opinion in Consumer Risk Perception When Purchasing Wine**

When it comes to purchasing wine consumers can have multiple reasons for being risk averse such as the taste of the wine, which was found by Mitchell and Greatorex (1988) to be the risk that concerned consumers the most when buying wine. The same study found that another risk customers perceive is potentially being embarrassed in a social setting when bringing a poorly received wine. Because of these risks associated with purchasing wine, consumers adopt multiple risk reduction strategies in order to be confident about their purchases. Since consumers are most of the time not able to sample the wine they are considering purchasing in order to reduce their risk they must use extrinsic information to aid their decisions. One important piece of extrinsic information noted in a study by Hopfer and Heymann (2014) that is used by consumers is wine critic scores, which influence the consumers expectation and thus final tasting experience.

While wine critic scores can give consumers an idea of the quality of the wine in order to aid their purchasing decisions, there is still information that is not conveyed by the score. Robert Parker, a notable wine critic and the person who pioneered the 100-point wine scoring system, says on his website on the page about scores that, “scores do not reveal the important facts about a wine. The written commentary (tasting note) that accompanies the ratings is a better source of

information ... than any score could ever indicate" (Parker, n.d., n.p.). Further, as with most products, the level of perceived quality of wine has large levels of variability not only among consumers, but also among wine experts (Hodgson, 2008). This lack of information and variability in expert perceived quality can lead to the problem where consumers may rely on an expert's wine score when purchasing a bottle, but then find that it doesn't match what they expected. The consequence of this is that it can dissuade consumers from relying on expert opinion as a strategy for risk reduction in the future when buying wine. This could then potentially result in expert critics no longer being necessary in the larger wine industry as consumers won't trust the scores and thus producers won't bother to get their wines rated in the first place.

The research question that this STS project aims to study is whether following expert wine recommendations will lead consumers to purchasing wine that they will enjoy more. This project will build upon the research done by Denton Marks on whether fine wine can be known by consumers vicariously through expert opinions. Marks noted about ratings that, "they may be the best proxy we have for consumer knowledge of wine; but, as knowledge, they suffer from a variety of flaws" (Marks, 2015, n.p.). One of mentioned flaws is the share of the expert's tasting experience transferred to the consumer. This means that the circumstances that the expert tasted the wine in, for example the time the wine was allowed to breath for, may be different for the end consumer. The STS concept of actor-network theory will be used to aid the investigation of the interaction between expert opinions and consumer risk perception. As expert opinions can be pervasive in more ways than just ratings, such as affecting the prices of wines, actor-network theory will help create a map to potentially realize more ways that experts influence the end consumers. At the end of this research project, I anticipate having a better understanding of how

expert opinions can influence consumer buying behavior in the wine market and consumer enjoyment of wine. I also expect to have a better understanding of the wine market as a whole and how expert opinions not only affect consumers, but also producers and the other actors present in the wine industry.

**Intended Outcomes of the Project**

As the consumer wine market grows, more and more people are going to need help in picking out suitable wines. The technical portion of this project will culminate in an application where users can input label information for a bottle of wine and then receive a wine score from the backend machine learning algorithm. This will help the consumers differentiate between higher and lower quality wines. The STS portion of this project will culminate in a better understanding of whether the expertise of a wine critic is necessary in order to accurately critique the quality of wine. This will shed light onto the role of a critic as a vicarious knowledge source for consumers when making purchasing decisions. For the technical portion this understanding will be important in analyzing the validity of the results as the output scores are all based on the reviews given by wine critics.

**References**


Aqueveque, C. (2015, September 1). The influence of experts' positive word-of-mouth on a wine's perceived quality and value: The moderator role of consumers' expertise. *Journal of Wine Research*, *26*(3), 181 - 191. https://doi.org/10.1080/09571264.2015.1051217

Charters, S., & Pettigrew, S. (2007, January 1). The dimensions of wine quality. *Food Quality and Preference*, *18*(7), 997 - 1007. https://doi.org/10.1016/j.foodqual.2007.04.003

Datamonitor (Firm). Global Wine. Datamonitor: New York, NY.

EBI Ehrenberg-Bass Institute for Marketing Science (2007), *Understanding wine shoppers' purchase decision process and behaviour in store*, unpublished research report. Retrieved from https://core.ac.uk/download/pdf/35468713.pdf

Hopfer, H., & Heymann, H. (2014, March 1). Judging wine quality: Do we need experts, consumers or trained panelists?. *Food Quality and Preference*, *32*(Part C), 221 - 233. https://doi.org/ 10.1016/j.foodqual.2013.10.004

Grohmann, B., Peña, C., & Joy, A. (2018, December 1). Wine quality and sensory assessments: Do distinct local groups of wine experts differ?. *Journal of Wine Research*, *29*(4), 278 - 289. https://doi.org/10.1080/09571264.2018.1532882

James Hilger, Greg Rafert, & Sofia Villas-Boas (2011, November 1). Expert opinion and the demand for experience goods: An experimental approach in the retail wine market. *The Review of Economics and Statistics*, *93*(4), 1289 - 1288. https://doi.org/ 10.1162/REST_a_00117

Marks, D. (2015, December 1). Seeking the veritas about the vino: Wine ratings as wine knowledge. Journal of Wine Research, *26*(4), 319 - 335. https://doi.org/10.1080/09571264.2015.1083953

Mueller, S., Lockshin, L., Louviere, J., Francis, I., & Williamson, P. (2009). How does shelf information influence consumers' wine choice? *Australian and New Zealand Wine Industry Journal, 24*. Retrieved from https://www.researchgate.net/publication/238080167_How_ does_shelf_information_influence_consumers'_wine_choice

Miller, JonR., Genc, I., & Driscoll, A. (2007, April 1). Wine price and quality: In search of a signaling equilibrium in 2001 california cabernet sauvignon. *Journal of Wine Research*, *18*(1), 35 - 46. https://doi.org/ 10.1080/09571260701526899

Mitchell, V.W., & Greatorex, M., (1988), Consumer risk perception in the UK wine market, *European Journal of Marketing*, *22*(9), pp. 5-15. https://doi.org/10.1108/EUM0000000005296