Engineering Wine

Submitted to Dr. Miguel Bagajewicz
May 6, 2006

Susan L. Kerr
Michael T. Frow

Executive Summary

A new methodology for the development of new products is applied to winemaking. A consumer preference function is developed that allows data generated by market analysis to be related to wine properties. These wine properties are easily measured throughout the winemaking process and can be manipulated by the producer at negligible cost. The manipulation of these variables affects the consumer's satisfaction obtained from the enjoyment of wine. The most influential factor is identified to be that of toasting.

Through incorporation of this consumer function, a demand model is formed that allows for the manipulation in selling price. Based on the consumer and the pricing models, a profit maximization model is formed. This function shows the characteristics of wine to target the selling price and capacity of the manufacturing plant simultaneously.

Wine is evaluated by the consumer with the following characteristics:

- Clarity
- Color
- Bouquet
- Acidity
- Sweetness
- Bitterness
- Body/Texture
- Finish/Aftertaste

Each of these characteristics is evaluated individually by the consumer's level of satisfaction attained. Once the utility of the consumer is identified, these characteristics are evaluated by their relation to physical attributes that can be manipulated throughout the process at a minimal cost. Multiplied by weights pre-determined by the consumer's ranking of priority, the summation of the products of each attribute and their corresponding weights form the consumer's overall utility function. The value of satisfaction of the consumer is then compared to that of the competition, forming the superiority function that governs the pricing model. The optimum happiness found for the engineered pinot noir proposed is 77%.

The inferiority function, alpha, is employed to allow the evaluation of the consumer's overall knowledge and familiarity with the product. It is a function of time and can be manipulated with advertisement. However, this adds operating cost and is optimized for three scenarios of alpha values: high ($2 million), medium ($1 million), and low ($0.2 million). The optimum scenario for alpha upon its incorporation into the pricing model is $2 million.

Based upon the pinot noir winery design proposed and after risk analysis, the optimum production capacity is found to be 1.15 million bottles per year with a selling price of $30. These values, when incorporated into the demand and pricing models, yield a return on investment of 102%, a net present worth of $44 million, and a pay out time of four years. These values are all found with the assumption of 20% variance in the alpha and beta values as well as a variance of $10 in the competitor's selling price of $30.