

522c Use of Pricing and Customer Satisfaction Measures in Consumer Product Design

Miguel J. Bagajewicz, Heyde Lopez, Monica Sanders, and Erin Sposato

Several papers have been written in recent times regarding the problems associated with product design. Recently, Hill (2004) pointed out the difficulties that the design of products presents when such products require a structure, that is, they are not the commodities that the process systems engineering community concentrated its attention on. Earlier a string of papers by Wibowo and Ng made some connections between basic properties and structure for creams, pastes and other complex products. The book by Cussler makes some connections between basic properties and some of the “properties” that are defined by the customer. For example, in the case of lotions, Cussler shows how “creaminess” and “smoothness”, lotion (attributes that are actually considered by end consumers to evaluate a product) can be connected to physical properties such as viscosity and surface tension, which can at the end be linked to concentration of diverse ingredients, aside from the active ones.

There is, however, an issue associated to consumer products that has not been linked to these design procedure, which is the price. Pricing models require certain parameters that are associated to how much satisfaction the consumer gets from the products. For example, if one uses the traditional Cobbs-Douglas utility function, one obtains the following relationship: $p_1 \cdot d_1 = c \cdot p_2 \cdot d_2$, where p_1 and p_2 are the prices and demands of the product of interest (p_1 and d_1) and the competition (p_2 and d_2), respectively. The constant c , is related to how much consumers “like” one product more than the other (regardless of its price). Thus, one wants to increase c as much as possible, and that can only be done by manipulating the new product properties, which in turn has a cost. The task then is to build a model that can link all these while maximizing profit.

In this paper, we illustrate how such a model can be constructed. We use a set of three skin lotions that can be sold as a set for treatment of skin disorders (ichthiosis). We will show how different can be proposed, what the effect of these ingredient is on the different properties desired (effectiveness to cure, smoothness, creaminess, fragrance, etc). We will show how the concentration of these ingredients, which can be used to define viscosity, surface tension, etc., help build a “happiness” function that can be used to build a customer “happiness” function. Then we will show how this function is used to obtain the value of the constant c . Next, we will also show how knowledge about the product makes also the value of c time dependant. Finally, we will show how manufacturing costs are used together with this pricing model as constraints of a profit maximization problem. Such problem renders the lotion ingredients and their concentration, the selling price and the capacity of the manufacturing plant simultaneously.