

Engineering Skin Lotions

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Executive Summary

In this work we apply a recently proposed methodology for product design to the case of engineering skin lotions, a project inherited from previous years. A consumer satisfaction model is constructed and used to engineer the lotion that maximizes consumer satisfaction. Such a formulation turns out not to be the most profitable formulation. Thus, a pricing model is used to find a formulation that maximizes profit.

From the preference model that was created, it was found that a perfect product is economically feasible, however is not the most profitable product that can be produced. A demand model was then created to find a more profitable solution. The demand model maximizes NPW while changing the demand as well as the ingredients and their concentrations. From the demand model the preference was found to be 61% with an ROI of 7700%. This is still higher than the competitor's preference of 51%. From the risk analysis, it is seen that the demand has the greatest effect on the ROI. As long as the demand is high, the process is more profitable.

There are a few ingredients that are in the competitor's lotion, but not in the preference model. In order to have a better comparison between our product and the competitors, the model needs to have all of the competitor's ingredients to choose from. The satisfaction functions should be better approximated by conducting more extensive consumer surveys with lotions of well defined and known component concentrations and laboratory measured properties.

Nash equilibrium is a very viable method in determining the competitor's response; however other equally credible methods could be employed to give a new response. A demand like the one used in this study, could be used to give some perspective on the competitor. Microsoft Excel's Solver was also found to not have the capabilities to completely handle all of the constraints. Some of the calculations had to be manipulated manually instead of Solver going through all of the options. Another software program should be looked into that can better handle then number of constraints and the non-linear equations.