

INDR 371 HOMEWORK-2

1. (15 Points) Assume that you are planning to produce and sell pasteurized watermelon juice.
 - (a) Develop a gap map for the product. Choose appropriate attributes (dietary/health value, taste, image etc.) and some benchmark products (coke, orange juice, other fruit juices, dietary beverages, chocolate milk, ice tea etc.)
 - (b) Assume that your primary market is Koc University campus. State how you can estimate the potential weekly sales (consider the number of potential consumers, profile of students etc.)
2. (15 Points) Consider the watermelon juice operation (production, packaging, sales). Sketch some ideas on the choice of packaging (glass, plastic, or others) from the following perspectives.
 - Design for manufacturing
 - Design for logistics
 - Design for life cycle management
3. (70 Points) Consider the MILP model we discussed in class for the make-or-buy decisions and answer the following questions.
 - (a) (25 Points) Assume that in addition to the one-time fixed setup cost (c_3) there is a also fixed operating cost, c_4 (per time period), for the in-house production facility for maintenance and personal costs. Assume that once we open the production facility for in-house production at some time period t , then it needs to stay open until the end of the planning horizon. Note that in that case, we need to pay the cost c_4 for all the consecutive time periods starting with t . Present a new mathematical model that would include this new cost structure.
 - (b) (10 Points) Now assume that in every period $t \in T$ the maximum amount you can buy from the third-party supplier is limited by Y_t and the procurement cost depends on the time the product is purchased (given as $c_2^t, t \in T$). The production costs are also time dependent (given as $c_1^t, t \in T$) explain how you would modify the model in part a to include this limitation.
 - (c) (35 Points) Consider the extensions suggested in parts a and b and use the data provided in the HW2.xlsx file and find the optimal production plan that minimizes the total cost. Upload your code and the final screenshot that shows the result.