Red Brand Canners Revisited

Red Brand Canners is a medium-size company specialising in canning and distributing a variety of fruit and vegetable products under private brand names in the western states of the US. On Monday, September 13th, Mitchell Gordon, Vice-President of Operations, asked the Controller, the Sales Manager, and the Production Manager of Red Brand Canners to meet with him to discuss the amount of tomato products to pack that season. The tomato crop, which had been purchased at planting, was beginning to arrive at the cannery. Packing operations would have to start by the following Monday because, after this time, the fruit would begin to deteriorate. In effect this ruled out the possibility of reselling any part of the crop which, if it remained unpacked, would be worthless.

William Cooper, Controller, and Charles Myers, Sales Manager, were the first to arrive in Mr. Gordon's office. Dan Tucker, Production Manager, came in a few minutes later and said that he had picked up Produce Inspection's latest estimate of the quality of the incoming tomatoes. According to the report, about 20% of the 3,000,000 pound crop was Grade “A” and the remaining portion Grade “B”.

Mr. Gordon asked Mr. Myers about the demand for tomato products for the coming year. Mr. Myers replied that they could sell all of the whole canned tomatoes they could produce. The expected demand for tomato juice and tomato paste, however, was limited. The Sales Manager then passed around the latest demand forecast (Exhibit 1) reminding the group that selling prices had been set in light of long-term marketing strategy of the company, and that potential sales had been forecast at these prices.

After looking at Mr. Myers' estimates of demand, Mr. Cooper said that it looked as though the company, "should do quite well on the tomato crop this year". With the new accounting system that had been set up, he had been able to compute the contribution for each product, and according to his analysis the incremental profit on whole tomatoes was greater than for any other tomato product. In May, after Red Brand had signed contracts agreeing to purchase the grower's production at an average delivered price of 18 cents per pound, Mr. Cooper had computed the tomato products' contributions (Exhibit 2).

Exhibit 1. Demand Forecasts

Product	Selling Price per Case	Demand Forecast (Cases)	Pounds per Case
24-2½ whole tomatoes	$ 12.00	800,000	18
24-2½ choice peach halves	$ 16.20	10,000	18
24-2½ peach nectar	$ 13.80	5,000	17
24-2½ tomato juice	$ 13.50	50,000	20
24-2¼ cooking apples	$ 14.70	15,000	27
24-2½ tomato paste	$ 11.40	80,000	25

Exhibit 2. Product Item Profitability (per case)

Product	24-2½ Whole Tomatoes ($)	24-2½ Choice Peach Halves ($)	24-2½ Peach Nectar ($)	24-2½ Tomato Juice ($)	24-2½ Cooking Apples ($)	24-2½ Tomato Paste ($)
Selling Price	12.00	16.20	13.80	13.50	14.70	11.40
Direct labour	3.54	4.20	3.81	3.96	2.10	1.62
Variable overhead	0.72	0.96	0.69	1.08	0.66	0.78
Variable selling	1.20	0.90	1.20	2.55	0.84	1.14
Packaging material	2.10	1.68	1.80	1.95	2.10	2.31
Fruit	3.24	5.40	5.10	3.60	2.70	4.50
Total Variable Costs	10.80	13.14	12.60	13.14	8.40	10.35
Contribution	1.20	3.06	1.20	0.36	6.30	1.05
Allocated Overhead	0.84	2.10	1.56	0.63	2.25	0.69
Net Profit	0.36	0.96	(0.36)	(0.27)	4.05	0.36

Mr. Tucker called Mr. Cooper's attention to the fact that, although production capacity was ample, it was impossible to produce all whole tomatoes because too small a portion of the crop was “A” quality. Red Brand used a numerical scale to record the quality of both raw produce and prepared products. This scale ran from zero to ten, the higher number representing better quality. “A” tomatoes averaged nine points per pound and “B” tomatoes five points per pound. Mr. Tucker noted that the minimum average input quality for canned whole tomatoes was eight and for juice six points per pound.[1] Paste could be made entirely from “B” grade tomatoes. This meant that whole tomato production was limited to 800,000 pounds.

Mr. Gordon stated that this was not a real limitation. Recently solicited to purchase 80,000 pounds of Grade “A” tomatoes at 25½ cents per pound, he had turned down the offer. He thought, however, that the tomatoes were still available.

Mr. Myers, who had been doing some calculations, said that although he agreed that the Company "should do quite well this year", it would not be by canning whole tomatoes. It seemed to him that tomato costs should be allocated on the basis of quality and quantity rather than by quantity only, as Mr. Cooper had done. Therefore, he had recomputed the marginal profit on this basis and from his results (see Exhibit 3), believed that Red Brand should use 2,000,000 pounds of the “B” tomatoes for paste, and the remaining 400,000 pounds of “B” tomatoes and all of the “A” tomatoes for juice. If demand expectations were realised, a profit contribution of $145,600 would be made in this year's tomato crop.

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[1] This meant, for example, that for every pound of “B” tomatoes used in a batch of tomato juice, one-third pound of “A” tomatoes would have to be used to maintain an average quality level of six points per pound for the batch.

Exhibit 3. Myers' Analysis of Tomato Costs

In calculating the cost of the tomatoes used in the different products, we should distinguish based on the quality of the tomatoes ("A" or "B"). Although average price paid for the tomatoes, namely 18 cents per pound, is for the entire crop, I suggest using different costs for the different qualities. Below is a suggestion on how to compute these costs.

Assume that

- x = cost per pound of "A" tomatoes used in a product (in cents)
- y = cost per pound of "B" tomatoes used in a product (in cents)

Then:

- (600.000 lbs. * x) + (2,400,000 lbs. * y) should equal (3,000,000 lbs. * 18), and
- x/9 should equal y/5

The first condition ensures that the total price paid for the tomato crop is correct, the second condition ensures that the tomato cost is directly related to its quality, measured by its point value.

The resulting prices are:

- x = 27.96 cents per pound
- y = 15.54 cents per pound

This gives rise to the marginal profit analysis given in Exhibit 4.

Exhibit 4. Myers' Marginal Profit Analysis of Tomato Products

Product	Canned Whole Tomatoes ($)	Tomato Juice ($)	Tomato Paste ($)
Selling Price	12.00	13.50	11.40
Variable Costs (excluding tomato cost)	7.56	9.54	5.85
Contribution (excluding tomato cost)	4.44	3.96	5.55
Tomato Cost	4.47	3.72	3.90
Marginal Contribution	(0.03)	0.24	1.65

Assignment

Red Brand Canners is an interesting case that captures several points that are important in real-world model formulation. It highlights the importance of distinguishing between information and facts that are relevant for decision making, and data that is not. Distinguishing between the two may be especially difficult because on occasion, confused or incorrect concepts will be strongly held by members of the management team. The Red Brand Canners case illustrates such a situation, where different decision makers have different opinions about the relevance of the data, and how it should be employed for making the decision at hand. Also, the case highlights the dangers of using intuitive reasoning when making business decisions. Moreover, in situations where we are faced with a "What's Best?" question, we often require a software tool to help us analysing the problem and making recommendations. In this workshop, we will use Excel's *Solver*.

We have dealt with the Red Brand Canners case last week. However, there are still several interesting issues that we have not yet discussed. In this workshop, you will be asked to go again through the entire process from building the model to making recommendations, and extending the model to incorporate new information and new options.

Make a report of about 3 pages (excluding figures, graphs and appendices) summarising your results, your interpretation of the results and your conclusions and recommendations. You can include graphs and outputs in an appendix, but make sure to summarise and interpret the results in your report as well.

1. The Model without the option of additional A tomatoes

Copy the file "RBC.xlsx" that can be found on blackboard. The spreadsheet contains the template for the model. Using the template, build a model for the problem Red Brand Canners is faced with, **disregarding the availability of the additional A tomatoes**.

- Make a recommendation about which products to produce in what quantities.
- How can you be sure that your recommendation is the best possible one?

2. Additional supply of A tomatoes

Save the model as "RBC 2".

Modify the model to incorporate the option of buying the additional 80,000 pounds of A tomatoes at 25.5 cents/pound as suggested by Mitchell Gordon.

- Should Gordon buy the additional A tomatoes?
- If yes, how should he allocate the additional A tomatoes to the different products?
- Is there only one optimal allocation?

Suppose the additional A tomatoes cost more than 25.5 cents/pound.

- Up to what price should Gordon be willing to pay?

3. Advertising

Save the model as "RBC 3". Continue with the same model (with the option to buy the additional A tomatoes included).

Suppose that the marketing department of Red Brand Canners feels that it could increase the demand for any of the three tomato products by 5,000 cases, by means of advertising.

- How much should RBC be willing to pay for such a campaign?
- At which product(s) should the advertising be directed?
- Show how you can use the Sensitivity Analysis report for making this decision.

4. Additional supply of B tomatoes

Continue with the same model (with additional A tomatoes and increased demand because of advertising – disregard the advertising cost).

Mitchell Gordon receives a call from Ed Dawkins, the Vice President of Operations at Tomaco, a company in the same business as Red Brand Canners, active in the Midwest. Dawkins tells Gordon that they are stuck with some B tomatoes that they cannot put to good use. Dawkins offers Gordon some of these tomatoes at 18 cents per pound, generally agreed as the "normal" tomato price. Mitchell Gordon refuses to buy the tomatoes, claiming that the 18 cents per pound is based on the fact that the incoming crop normally contains a mix of grade A and grade B tomatoes.

- What do you think about his reasoning?
- Would you buy additional B tomatoes at 18 cents per pound?

Use the sensitivity analysis report from your model in Part 3 to answer this question. Do NOT extend your model with additional decisions.

5. One year later

Start again with the original model "RBC.xlsx", and save it as "RBC 6" (no additional tomatoes and no advertising).

In April the year after, Red Brand Canners is preparing for the annual negotiations with the tomato farmers. Although the quality of the crop varies from year to year, the price and quantity are negotiated in advance. At a meeting, Dan Tucker, William Cooper, Charles Myers and Mitchell Gordon agree that this year, an acceptable price would be **20 cents per pound**, and they are debating how many pounds of tomatoes to contract for. Dan Tucker says that initial discussions revealed that they could order **up to 13 million pounds** of tomatoes. Charles Myers says that **demand is pretty much the same as last year**, i.e. they would be able to sell as many whole canned tomatoes as they can make, and demand for juice and paste is again limited to 50,000 and 80,000 cases, respectively. Also **prices and production costs are stable** and would be the same as last year. The **only uncertainty is the quality of the crop**. Looking at historical data, Tucker observes that in the past there were basically three types of years. In "wet" years, like last year, the crop was quite poor, and contained only about 20% grade A. In "sunny" years, the percentage of A tomatoes was around 60%, and in "normal" years, the crop contained approximately 50% grade A tomatoes. Tucker also observed that about 25% of the years were "sunny", 50% "normal" years and 25% "poor".

- Assume you know that next year is going to be a sunny year, how many pounds of tomatoes would you advise RBC to buy? Call this ***S***. How about for a normal (***N***) and poor (***P***) year? Remember that RBC can order at most 13 million pounds.
- Suppose you order ***S*** pounds of tomatoes. What would be the possible outcomes, given that the year could be sunny, normal or poor? Perform a scenario analysis. Do the same for ordering ***N*** and ***P*** tomatoes.
- Given the probabilities of sunny, poor and normal years, what is the average result of ordering ***S***, ***P*** and ***N*** tomatoes?
- How many pounds of tomatoes would you advise RBC to buy?

TIPS

– Use the Solver for this question.
– Don't forget to change the price of the tomatoes to 20 cents per lb. ($200 per 1,000 lbs.)
– RBC has to pay for the tomatoes it orders, not for the ones actually used. Leftovers cannot be returned nor sold.