Cal’s Calzones

Calvin Cannelloni, an industrious MBA student at the Brandeis IBS, has a strong entrepreneurial spirit and a pressing need for cash. He has a real knack for Italian cooking, and his friends always rave about the calzones he makes. Recognizing the opportunity to turn his culinary skills into a source of income, he has decided to go into business. He is convinced that MBA students (and their friends) at the International Business School are starving in the hours between 10 pm and 2 am, when they are either studying and in need of a snack or doing something else that makes them equally hungry. Since there are no other convenient places for these potential customers to get a tasty treat at a price within their budget, Cal has decided to give the business a shot. He needs your help to evaluate the design of the company’s production process and to figure out how to make some key decisions such as what price to charge, how to promise delivery times, and what equipment to acquire.

A calzone is sometimes considered a folded pizza. It consists of pizza dough stuffed with a mixture that generally includes some Italian cheeses and other ingredients, such as prosciutto, salami, pepperoni, sausage, chicken, shrimp, crab, green peppers, jalapenos, spinach, mushrooms, walnuts, pineapple, and anchovies. It is baked so the crust forms around the hot melted cheese engulfing the other flavorful ingredients. Some of its greatest fans claim it originated in New York City, where the art of folding a slice of pizza is urban legend. One can eat a calzone with no utensils, indeed using only one hand. It is the ultimate in convenience for the pizza lover who is too busy to stop and savor a pizza, and it is a gourmet treat for some who consider it a delight to eat in its own right.

The Business Concept

Cal’s idea is to offer made-to-order calzones offering any combination of stuff-ins that the customer wants. There are several factors that differentiate Cal’s Calzones from competitive late-night snacks, such as frozen calzones or fresh-baked cookies at the mall. First, customers will be free to choose whatever variety of ingredients they choose for the calzone fillings. Second, the calzones are guaranteed to be completely fresh. Since all calzones will be baked only after the customer has ordered them, the product will literally be oven-fresh. Third, Cal’s secret ingredient (so secret that he would not reveal it even to the case writer) makes his calzones exceptionally tasty. He has entered his calzones in three different cooking competitions and has brought home the blue ribbon for first place every time.
The Production Process

The recipe for making Cal’s Calzones is pretty simple. First, mix together the calzone stuffing. For each calzone, use 1/2 cup part-skim ricotta, 1 1/2 ounces diced mozzarella cheese, and 1 tablespoon grated Romano cheese. To this basic cheese mixture, add the combination of ingredients specified by the customer and mix thoroughly with the cheese mixture. Next, prepare the dough for stuffing. Punch down a pre-measured ball of dough. Press the ball with the palm of a hand to make a disc shape. Lightly flour both the work surface and dough. Roll the dough with a rolling pin to a 1/8 inch thickness and about 12 inches in diameter. Lightly sprinkle flour on the dough as needed to prevent sticking. Next, stuff and fold the calzone. Put the filling on one half of the disc, leaving a half inch border around the edges. Brush the border with water, fold the dough, and press the wet edges together. Puncture the top of calzone with a fork to allow steam to escape during cooking. Next, put the calzone in an oven at 450° and bake for 15 minutes. The calzone should be golden brown and nicely crusty.

Cal has made arrangements with the IBS to use an oven located in their World Court. Because the oven is otherwise idle when he wants to use it, the school has agreed to allow him to use the oven at no cost (and will even pay for the electricity). Cal already has the pans, bowls, dough mixers, forks, brushes, spatulas, and rollers he needs. The ingredients for one calzone cost $1.20, and the waxed paper and box to wrap and pack it cost $0.20.

Cal has done some repeated studies to measure how long it takes for each activity in the process. Based on his initial analysis, he thinks two people are necessary to run the production process. He wants to work himself, at least to start, to save on labor costs, to assure the product quality (by making sure his “special touch” is there), and to maintain the confidentiality of his secret ingredient. He has recruited his good friend Pedro Dean to help as the second person running the process.

A friend of Cal’s with a background in information technology built a web-based order taking system that Cal can run on his personal computer. Customers can enter their orders over the internet, send emails with their orders, or even send orders in text messages from their mobile phones. This method of order taking does not require any personnel time.

Because Cal’s Calzones are advertised as made-to-order, all activities in the physical production are started only after they receive an order. The first production step is to wash out the mixing bowl from the previous batch, add the cheeses and stuff-in ingredients according to the customer’s specifications, and mix all the ingredients. (Cal’s secret ingredient is apparently added to the cheese before the cheese is mixed in, so “it’s already in there.”) The bowl can hold enough ingredients for three calzones. It takes one minute to complete the washing and mixing, regardless of how many calzones are mixed in the batch. In other words, it takes the same time to mix a batch of three calzones as it does to mix a batch of only one. The second step is to roll and form the dough into the crescent-shaped shell, which requires two minutes for each calzone. The final step before baking is to place the prepared dough on the baking pan, put the filling on top, and form and seal the calzone. This activity takes one minute for each calzone. The plan is for Cal to do these steps up to this point in the process.
Pedro will take over and do the remaining activities. His first task is to load the calzone trays into the oven and set the timer for 15 minutes of baking time. Loading one or two trays takes 1 minute. The oven has two racks, which means they can bake two calzones simultaneously. (However they must avoid opening the oven during a baking cycle. When they are busy, they always load two pans at a time in roughly the same time it takes to load one.) Once the baking time has elapsed, Pedro will take the pans out of the oven. He does this rather quickly, so we can ignore the time required to remove the pans from the oven. The calzones must then cool on their pans for three minutes, after which time he transfers them into a packing box lined with a sheet of wax paper. It takes one minute per calzone to transfer and pack. The last step is for Pedro to process the payment, usually a credit card charge, and attach the receipt to the box so it is ready for pick up. It takes two minutes for this last step.

Questions

To keep things simple as they start, Cal is going to sell the calzones in orders of two identical calzones. In the following analysis, assume that all orders are for two identical calzones.

1. What is the minimum time it will take to fill a rush order? What could you do without spending any money to reduce this minimum time to fill a rush order?

2. What is the maximum number of orders you can fill per hour in steady state? Assuming you are open for four hours each night, what is the maximum number of orders you can fill in one night?

3. Cal can purchase a fan to circulate air over the calzones while they are cooling. The fan will cost $35, and it will reduce the cooling time from 3 minutes to 2 minutes. Assuming he would need a payback period of 4 weeks or less, should he buy the fan? How does your answer to Question 2 change if the cooling time is increased from 3 minutes to 5 minutes?

4. Pedro is known to be somewhat unreliable. Cal needs to know what will happen if Pedro does not show up for work. What is the maximum number of orders that can be filled per hour if Cal is working alone?

5. A customer calls in with a new order (which has been entered on-line) and wants to know how soon she can pick it up. You have one order waiting to be processed. Pedro is just about to start loading the two calzones of another order into the oven, and Cal is just about to begin the washing and mixing for another order. Assuming they process all orders in the sequence received, what due-date time should you promise?

6. Cal has learned that he can hire Brandeis undergraduates who are reliable and capable of doing these activities for wages of $8 per hour. Assume that Cal hires two undergraduates to perform the tasks planned for Cal and Pedro. What is the contribution margin (revenue – variable costs) per hour? Assume an order of two calzones sells for $10.
7. A few months into their operations, demand for the product has grown as Cal’s Calzones have become fashionable midnight snacks. Cal is sure they can sell at least fifteen orders per hour. He has an opportunity to rent industrial ovens, just like the one they now use, at a cost of $10/hour that the oven is used. The supplier has offered one, two, three, or four ovens at this rate. Assuming the rest of the process is kept as is, should Cal rent ovens, and if so, how many? Again, assume the undergraduates do all the work for wages of $8 per person per hour and that each order of two calzones sells for $10.