

Chapter 8

A More Realistic Case — Daily Bread, Part 3

Daily Bread's Top Management Meeting and Dilemmas

On Friday, March 17, at 6pm, the management team of Daily Bread (the same company mentioned in Chapters 1 and 4) assembled in a private room at a local hotel, close to the bakery, to discuss the offer from Events to Remember. Clark, the CEO of Daily Bread, intended to use the new offer as an example to enter into a strategic discussion about how Daily Bread might safely grow.

Clark reminded his staff that the offer is to supply a variety of Daily Bread products to every event organized by Events to Remember for prices that are only 60% of Daily Bread's list prices!

The company's CFO, Raphael, shared his initial data analysis of the quantities required by Events to Remember. At the reduced prices, it would mean an average daily revenue of \$491.04, out of which \$245.28 is the cost of materials. (Note: the detailed calculations from his analysis will be presented in a table later in this chapter.) Accordingly, the daily Throughput (T) would be \$245.76. Also, on the meeting's agenda is the offer from the National Children's Hospital to buy 800 regular donuts every day but for only 70 cents each, instead of 78 cents, yielding \$560.00 daily, of which \$171.60 is the cost of materials. The resulting Throughput from this second deal is \$388.40 per day¹

Linda, the VP of Marketing and Sales, explained the benefits of Events to Remember's offer. "This deal is not just about the money generated directly by the sales. I understand that sales at 40% off list price is not terribly attractive. The point is the exposure that Daily Bread will get at

¹ In Chapter 4 the deal with the children's hospital was analyzed but a certain complication was added, concerning another smaller hospital that might also demand the same reduction in price. We do not reuse that complication here. Instead we are dealing with two, seemingly independent opportunities which require the capacity of the same resources.

these events. Events to Remember is going to offer the entire variety of our products. At most events, there will be a stand with our products and a large sign with our logo and name. Small baskets of our products will be part of the decoration on every table. Each basket, which is a take-home gift, will carry our signage. I don't mean to be crass but its customers are rich, which is ideal for our future positioning. So, even if Raphael claims that the deal results in a loss, we should look at it more as an investment in advertising and marketing. I need that exposure in our best potential market! My intuition, based on my 14 years of experience in bakery products, tells me this will create a clear image of Daily Bread as THE bakery products for the high-end market."

Raphael, the CFO, clarified: "I didn't say the deal would generate a loss. If I considered full cost allocation, then it is a loss. From a marginal costing point of view, it yields a very small margin. I'm concerned because I think it is possible to get much better deals. For instance, the Children's Hospital deal yields much more even though we sell less. On the other hand, I see the advantage of receiving income instead of having to pay for a marketing campaign as a byproduct of the deal."

At that point, Clark pulled rank and took the lead in the discussion: "I'd like to get a good assessment of the potential for any loss on the deal, but it must be realistic and take into account our current state of fairly low profitability. If there is a possibility of a loss from the Events to Remember deal offset by huge benefits due to the indirect marketing campaign, then I'd like a conservative assessment of the potential increase in sales to evaluate the overall impact."

"Actually, Clark, you're going to need both a conservative, call it pessimistic, and an optimistic assessment to validate what might be the full range of impacts from such a significant decision." Raphael interjected. "Remember, we also have an offer from a large hospital where the price reduction is more acceptable than what Events to Remember is willing to pay. I believe Linda can win more deals like that."

Linda promptly characterized the second opportunity "Selling donuts to hospitals will not improve Daily Bread's image in the market. The food in hospitals is of the lowest level and everybody knows it! I'd prefer that no one knows that the donuts in the hospital are from Daily Bread. Personally, I believe that a low price to Children's Hospital would not impact the price to the other hospitals we already sell. But, if we start selling to hospitals more broadly, the lower price could undermine our prices to other major clients. The high socioeconomic market segment is the one on which we need to focus. This is a clear strategic opportunity."

Clark answered, "I understand your point; however, we need numbers to make a decision. Can you provide me with some?"

Robert, the VP of Operations, decided this was the appropriate moment to participate in the debate. "Before you go into just the financial aspect of those deals, the first question is: **can operations deliver?** I'm concerned that we might not be able to supply both Events to Remember and the new hospital simultaneously. I want to thoroughly check the volume from

both deals. I intentionally keep some protective capacity to be able to withstand some incidental peaks in demand. We just need to make sure that none of our other clients is impacted. I want to be certain that our protective capacity is maintained.”

Clark continued along the same line of inquiry. “I assume you are mainly worried because of the ovens. Can’t we quickly gain capacity from Oven #2, which operates only 12 hours a day? Events to Remember mainly puts on their events in the afternoon or evening, while right now the pressure is on us to supply early in the morning.”

Robert retorted: “Yes, but it could be expensive. We can definitely use more of Oven #2, which we are only using from 6pm until 6am. It is idle during the rest of the day. However, I’d need to hire another technician to ensure smooth operation of all the ovens. The cost of electricity will also go up; energy is a substantial expense, as you know. We need to take into account that Oven #2 is older and less efficient than Oven #1.”

Robert continued to layout the picture from the angle of operations, “Now, we’d also probably need to employ a few more people to prepare the products before they go into the ovens. I know you all complain that the ovens’ utilization efficiency is not high enough. The problem is, in order to get more product through, we need to maintain a smooth flow to and from the ovens and the pace is not all that uniform right now. We might have better overall utilization when Oven #2 becomes fully operational 24 hours a day, but don’t expect miracles. Now, if the exposure from Events to Remember boosts sales from our regular market, then I’m really uncertain we’d be able to deliver, day in and day out, to the very high on-time standards our customers have grown to expect.”

Linda said, “We spoil our customers and that’s exactly what I want! Our competitors are all over the place on delivery timing, sometimes fine, but often quite late. I pick up a significant amount of ad hoc business because of it. It is often a reason we win new customers. They get sick and tired of the hassles. If we lose our near perfect on-time-in-full credentials, we’ll be under pressure to differentiate on price; yet, everybody tells me we aren’t earning enough as it is.”

Raphael chimed in, “Actually, from the load numbers I have examined, my impression is that both opportunities can be undertaken. We might need a few more people. I’m not sure about it, but it could be very worthwhile. Several months ago, I was exposed to a somewhat different way of presenting the required information for such decisions. Let’s give it a try.”

He hands out a single sheet of paper to the rest of the management team and continued: “Table 8-1 represents the margins when we subtract just the truly variable costs (TVC). The practical meaning of the Throughput, or T, is the money from sales that we get to keep offsetting the cost of running the bakery:”

Table 8-1 Daily Bread Current Average Daily Production Load

Products	Price /unit	TVC /unit	Throughput /Unit	Daily Sales in units	Daily Throughput
Bread (basic)	\$1.20	\$0.3600	\$0.8400	4000	\$3,360
Bread (premium)	1.50	0.4500	1.0500	3000	3,150
Donut	0.78	0.2145	0.5655	6000	3,393
Donut (special)	0.81	0.2350	0.5750	4000	2,300
Roll	0.72	0.2200	0.5000	6000	3,000
Roll (special)	0.78	0.2560	0.5240	4000	<u>2,096</u>
Total					\$17,299.00

“The average daily Throughput had better cover all the other costs of our operations, which I call Operating Expenses or OE. Our daily OE averages \$16,872, so it leaves us with an average daily net profit before taxes of \$427.”

Raphael continued his explanation, “If you’ll look at the second table which shows the impact of the Events to Remember deal, based on predicted average quantities per day (without any boost to regular sales), it adds the following revenues and resulting Throughput:”

Table 8-2 Anticipated Typical Daily Orders from Events to Remember

Event to Remember Products	Qty /day	Regular Price	Events to Remember Price	Revenue	Throughput
Bread (basic)	120	\$1.20	\$0.720	\$86.40	\$43.20
Bread (premium)	120	1.50	\$0.900	108.00	54.00
Donut	160	0.78	\$0.468	74.88	40.56
Donut (special)	160	0.81	\$0.486	77.76	40.16
Roll	160	0.72	\$0.432	69.12	33.92
Roll (special)	160	0.78	\$0.468	<u>74.88</u>	<u>33.92</u>
Total				\$491.04	\$245.76

“Likewise, the National Children’s Hospital deal adds the following financial impact, if you’ll look at Table 8-3:”

Table 8-3 Anticipated Daily Orders from National Children's Hospital

National Children's Hosp. Product	Qty /day	Regular Price	National Children's Price	Revenue	Throughput
Donut	800	0.78	\$0.700	560.00	\$388.40

As Raphael explained the tables, Clark seemed downcast. Looking up from his calculator, he asked, “So, both deals only increased our daily Throughput by \$634.16? It’s just 3.7% more T. Somehow I thought the impact would be far greater.”

Raphael answered: “Yes. But, assuming we don’t need to spend more Operating Expenses, and this assumption must be carefully checked, then our daily profit would grow from \$427.00 to \$1,061.16. Therefore, the potential growth in profit, without even considering increases to our regular sales, is almost 150%!”²

Before this overwhelming news had a chance to sink in, Robert intervened again: “Wait a minute, don’t get excited yet. This is only true if we have enough capacity currently, otherwise we’ll need to activate Oven #2 for more hours every day and that’s not cheap! I almost hate to point out here that we are looking at the sales of a typical day. However, there are days when demand is higher, such as Mondays. The protective capacity I maintain takes those normal fluctuations into account.”

Clark responded, “Okay, we need to somehow evaluate our capacity boundaries and the cost of activating Oven #2 for additional time. Robert, can you explain how you calculate the capacity of the ovens?”

Robert responded, “My best assessment is we can produce a maximum of 50,000 regular donuts. That quantity would fill the ovens, using Oven #2 the way we currently do – only 12 hours a day. Now, to make our different products comparable, I translate all the other products into donut-equivalents. Regular bread, for instance, is equivalent to 3 donuts and rolls are 1.5 donuts each, from the perspective of their required space and time in the oven. So, our basic capacity unit is one donut. Every product’s capacity requirement is expressed in those terms.”

Robert went on, “Let me emphasize that we can NEVER reach that theoretical maximum of 50,000 units. I use a practical maximum planned capacity of 95% of the 50,000 donut limit, to make sure we can withstand any incidental fluctuations and maintenance problems, plus peaks in demand. After all, in our business and with our quality commitments, we just can’t hold inventory for more than 24 hours. Even with 5% slack in our production capacity, I’m forced to crank up extra hours of Oven #2 periodically during the year to catch up. If I didn’t have that option, I’d have to leave more like 15% to 20% spare capacity.”

Raphael took over, saying, “Robert and I worked on the capacity data and it is represented here.” He passed out a second sheet of paper to each of them with four capacity charts.

² \$634.16 in added profit / 427 in current profit

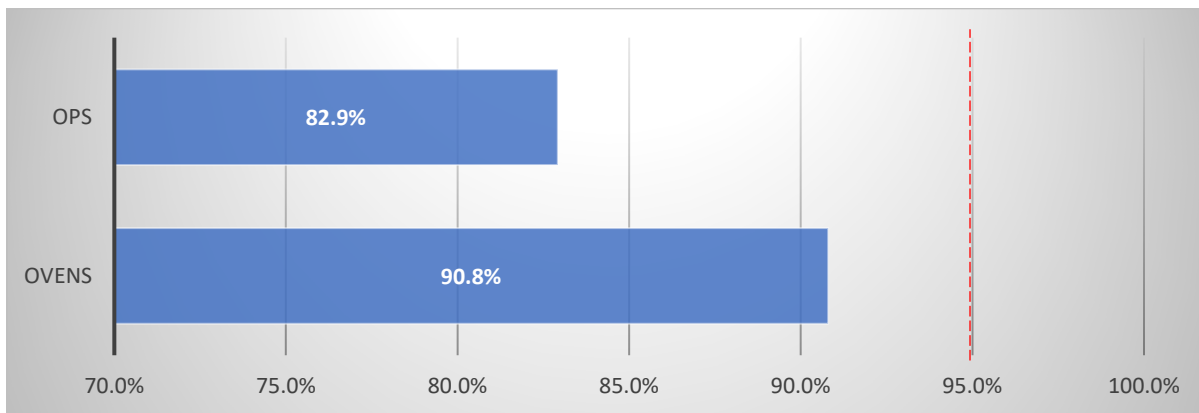


Figure 8-1 Current Capacity Profile for Daily Bread

“This is the capacity profile of a typical day.” Raphael said, pointing to the top chart on the second page.

Raphael went on, “As Robert told you, on Mondays, the load is higher but the ovens still don’t penetrate the 95% limit as marked on the chart by the red dotted line. Most of our customers ask for a fixed quantity every day, so the daily fluctuations aren’t bad. I wonder how Events to Remember’s actual demand is going to fluctuate day to day. Anyway, Events to Remember is a small part of our overall production and their fluctuations should be easily handled by the protective capacity Robert maintains.”

“You can see that operations – our direct labor – are less loaded than the ovens and they remain below the 95% line. We don’t have much slack to play with here. Robert insists that the 95% limit should not be penetrated to ensure smooth feeding of products into the ovens. Otherwise, we’ll end up wasting what capacity we have on the ovens.”

Robert interrupted to reinforce what Raphael is telling them, “Please guys, don’t forget Murphy’s Law. Unless everything, and I mean everything, goes perfectly, we can expect total chaos in the bakery when our plan exceeds a 95% load on any resource group. Sorry to interrupt, Raphael, but I just can’t emphasize enough the importance of dealing with reality and not theory for this decision.”

With a nod of thanks to Robert, Raphael continued, “Now, let’s look at that same chart, if we were to add the average daily orders we expect from Events to Remember:

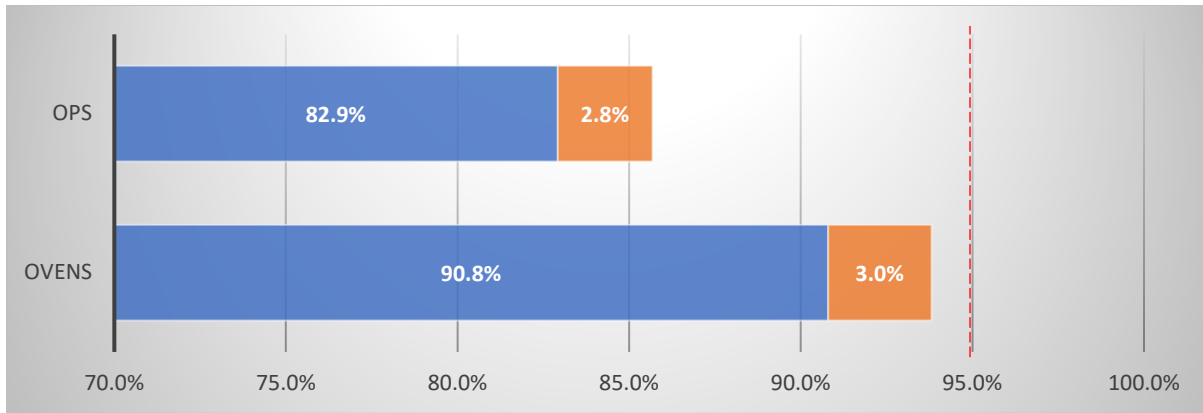


Figure 8-2 Capacity Chart showing Current Volume + Events to Remember

“As you can see, I’m showing the new demand from Events to Remember in orange and added that utilization onto our current loads. Now, all this additional load can be accommodated from our spare capacity. Thus, there would be no change in our operating expenses.”

“Let’s go on to look at the typical day’s load, plus the 800 donuts for the hospital, for the time being, without the Events to Remember order. I want you to see that we can handle that additional order alone.”

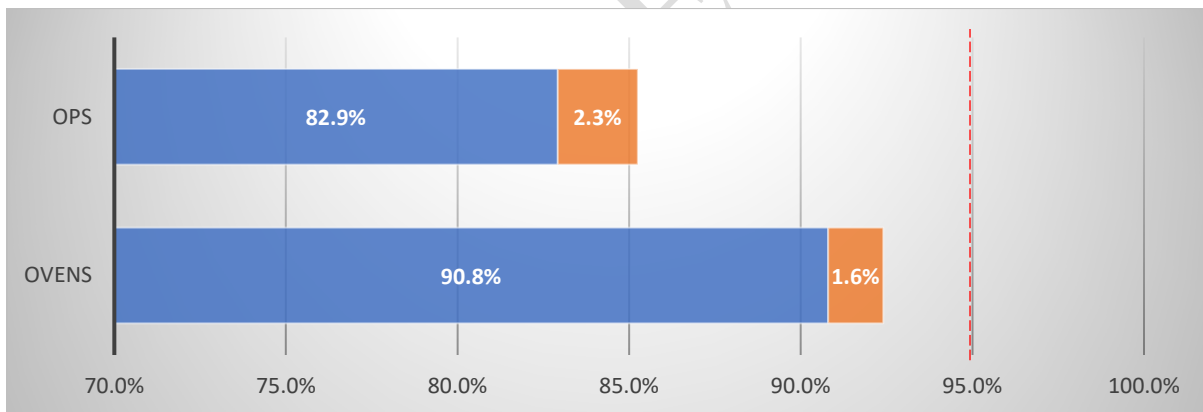


Figure 8-3 Capacity Chart showing Current Volume + National Children's Hospital

Clark added, “It is amazing to see what these relatively small orders do to our profitability and capacities. I had no idea that highly discounted orders, which I frankly thought would be real losers, actually make such a contribution to the bottom line. Does everybody find this kind of meeting where we review our opportunities against these capacity charts as useful as I’m finding it?”

There were general murmurs of assent. The members of the management team were nodding their heads and looking around at each other, seeing firm agreement.

Raphael continued his presentation: “As you can see from the first page, the one with the tables, selling an extra 800 donuts for just 70 cents brings more Throughput (\$388.40 versus \$245.76) and requires less capacity than the Events to Remember deal.”

Now, Linda interrupted: “But, the Events to Remember deal might result in more regular sales at our regular prices! How do you account for that?”

Raphael explained, “That is going to take a little more effort. There are a couple of caveats we need to check before we consider the increase in regular sales. Note that, if it is possible to accept both customers without having to increase capacity, then there is no point discussing which one brings more Throughput for utilizing the additional capacity from our key resources. We want both orders, since both have a positive impact on the bottom line. It is only when we run out of capacity that we should check whether it is better to add capacity or raise our prices enough to curtail sufficient orders to remain within a load we can handle.”

He continued, pointing at the last capacity chart, “If you will look at this chart, it indicates what both deals do to our capacity after handling normal daily sales.”

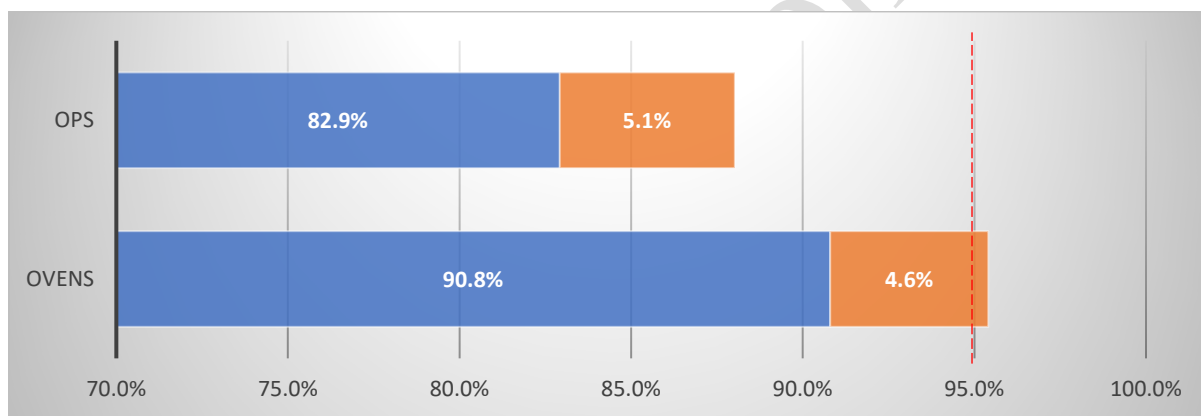


Figure 8-4 Capacity Chart Current Volume + Both New Customers

“What we see here is that we are on the verge of a problem. While our staff is still capable of producing everything without overtime or additional people, the ovens have penetrated beyond the 95% line, although only by 0.41%.”

Robert reacted to the precise calculations: “When you print out these charts with decimals and everything, they appear to be very precise numbers but they certainly are not! As I have explained, the capacity units I provided are approximations. These are a typical day’s sales – averages. They fluctuate. And, the 95% line is my best guess but it is still just that.”

“When the numbers on the production plan are just a little beyond my limit, I prefer to take a conservative approach and increase capacity by extending the hours of Oven #2. However, that means extra costs which offset at least some of the additional Throughput. Still, I’d rather avoid scrambling and having to make apologies to customers for late or missed orders. After all, we are talking about Daily Bread’s reputation here! On the other hand, going barely past my admittedly

arbitrary rule of thumb would probably not create a problem, with the exception of a few days each year. I just get nervous that you all will come storming into my office and blame me when your pet customer gets shorted.”

Raphael carried on, “Right, this is a business decision that’s above my pay grade too. Let me reinforce what Robert just said: adding capacity is only one way to deal with running out. The alternative way is to reduce the sales of products that yield less Throughput per capacity consumption of those resources that are exhausted. We can theoretically achieve a reduction in sales of specific products by raising prices, however, we can’t be certain how successful that strategy will be.”

“Even a small price increase may eventually cause too many customers to switch to a competitor but we won’t necessarily know right away. As Linda pointed out to me a year ago, a lesson I still remember well, this is because we are not a really significant vendor for most of our customers. It won’t kill them to just pay the increase for a while until they have the chance to evaluate alternatives. Worse, this also means that we wouldn’t get the relief we were seeking right away on our constraint resources. It pays to be cautious here, because we necessarily rely on opinions that could easily be too conservative or not safe enough. That is why I like Clark’s approach of utilizing a reasonable pessimistic to optimistic range for us to consider.”

Linda responded, “What exactly do you mean by ‘it pays to be cautious?’ We always try to be as conservative as we can and still reality sometimes beats us. So, we need to be even more conservative? I see myself as a conservative and responsible marketing person. I hate to take chances unless I’m pretty darn certain. I don’t want to drive any of my customers away. They are too hard to win over in the first place. That would put an extra burden on my salespeople. More importantly, I think they’d be demoralized if we drove away the customers they are so proud of winning.”

Raphael responded, “Being cautious means carefully considering all the ramifications. No, we don’t want to drive customers away, but we might need to consider such a move in order not to drive away ALL of our customers because we can no longer meet our commitments! All I suggest is to try to get a realistic picture built upon the opinions and intuition of everyone on this team that looks reasonably like what could happen, the good and the bad. We assess the range and then make the decision. As a finance guy, I want to translate the inputs and outputs into numbers. Recognizing that there is uncertainty leads me to look for a range of possible outcomes.”

Clark jumped in as well, wearing his CEO’s hat. “Guys, guys, I see what you are saying. We all should remember that we are in business to make money. We will listen to everybody and make as good an assessment as we can. But, our priority is to increase our earnings year after year. If necessary, those sensitive salespeople will have to learn to get sales at good prices and to understand the impact of any reduction in price on Throughput. The sales that don’t produce enough Throughput across our most constrained resource are subject to being dropped anytime demand is greater than our safe capacity, even if that means losing those customers.”

“Plus, I know how salespeople work. After all, I used to be a salesman myself! It is the customer who butters your bread. A smart salesperson goes to bat for their customers, usually by giving them the **best** possible prices and service. We don’t know how elastic our current prices are. I’m game for testing the limits and I’ll take responsibility for the outcomes.”

Raphael nodded his agreement now that his boss had taken the risk of others being blamed off the table, he continued. “Good. Now, let’s see what happens after taking these two deals when regular sales grow due to the fantastic exposure our products will get at occasions organized by Events to Remember. Linda, can you give us a reasonable pessimistic assessment of how much sales will increase?”

Linda: “I cannot give you a number. Any commitment to a specific number is almost certainly a lie. Let me only say that such exposure should give us, overall, at least 5% more sales after 3 - 6 months, unless we spoil our A+ reputation and ship half-baked rolls to a major conference or some other such disaster. On the other hand, if we make a favorable impression in the eyes of the highfalutin market segment, then our sales will grow nicely; say by more like 10%, again within 3 to 6 months.”

Raphael seemed pleased with her answer: “That is good enough. When it comes to assessing the future, we’ve got to live with a certain level of vagueness when we make decisions. Linda’s intuitive sense regarding increased sales is enough to outline the potential range of results, both financial and to our capacity status.”

“To understand the overall impact of the decision on our financial performance, let’s assume every product would increase its sales by 5%.” Raphael walked over to his open computer and started typing. “Let me adjust the first table with the increased number of units sold. Hang on, this won’t take a minute. I have it all set up and just need to input Linda’s low and high side estimates.”

They fell into chatting with one another while they waited for Raphael to adjust his spreadsheet and turn on the overhead projector that he had requested the hotel to provide in the meeting room, so that each of them could see the impact. There was excitement tempered by anxiety that they wouldn’t be able to say yes to the new business.

Raphael finished and duplicated his screen to share with them, saying, “This Table 8-4 is the one you saw before with the added assumption of 5% more sales.”

Table 8-4 Both New Customers + 5% Sales Lift

Products	Price /unit	TVC /unit	Throughput /Unit	Daily Sales in units	Daily Throughput
Bread (basic)	\$1.20	\$0.3600	\$0.8400	4200	\$3,528
Bread (premium)	1.50	0.4500	1.0500	3150	3,308
Donut	0.78	0.2145	0.5655	6300	3,563
Donut (special)	0.81	0.2350	0.5750	4200	2,415
Roll	0.72	0.2200	0.5000	6300	3,150
Roll (special)	0.78	0.2560	0.5240	4200	<u>2,201</u>
Total	(Includes ΔT from +5% Volume = \$864.95)				\$18,163.95
Added ΔT from Events to Remember					245.76
Added ΔT from National Children's Hospital					<u>388.40</u>
Total T					18,798.11
Less OE without added capacity					<u>16,872.00</u>
New Daily Net Profit					\$1,926.11

“As you can see from the second to last row, our current daily Operating Expenses are \$16,872. So, the potential exists for a daily profit of \$1,926.11, if it is possible to contain Operating Expenses at that rate of daily flow?”

Robert is surprised and exclaims, “Wait a minute. No way! What about the materials we purchase? When we produce more, we need more raw materials. Then, with these volumes we would certainly need to add hours on Oven #2, which means more OE.

Raphael soothed him by saying, “First of all, we don’t need to worry about purchasing more materials, because those costs are handled by the Throughput calculations and are not part of the operating expenses. Unless you tell me there is a problem increasing your purchases of raw materials – it’s not an issue.”

“Regarding the possibility of penetrating into the protective capacity of the ovens, and also that of direct labor, let’s review the result of the detailed calculations. You can see it on this chart.” He showed Figure 8-5 on the screen.

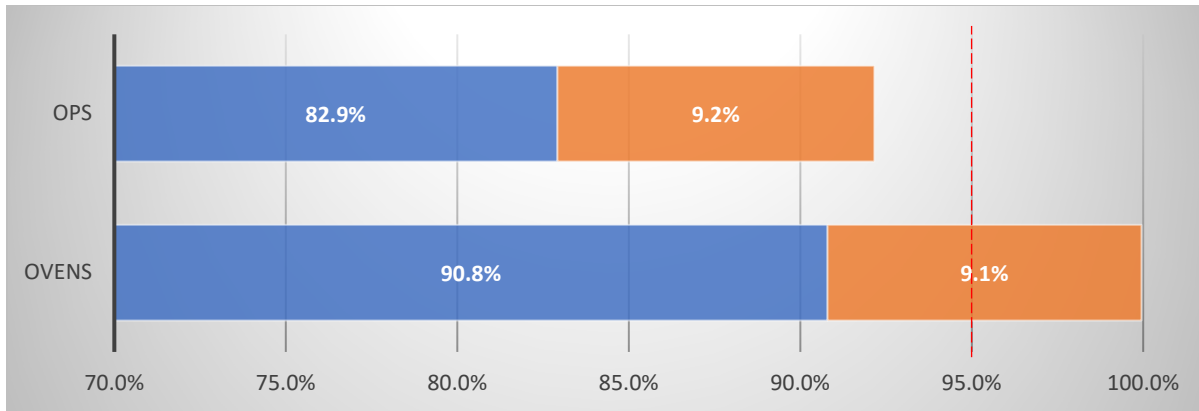


Figure 8-5 Current Volume + Both New Customers + 5% Lift

They all looked at the chart on the screen. Once everybody had a chance to review the update, Raphael continued his analysis. “Based on Robert’s cautions, it is clear to us all that this load is unacceptable. If we can’t resolve it one way or another, the quality of our products and mainly our on-time delivery performance to our clients, would take a severe hit. Generally speaking, there are two ways to resolve overloaded capacity.

He put his index finger up, “One – **produce less of some of regular products.**” He added a second finger for emphasis, making a ‘V.’ “Second: **quickly increase capacity.**”

“The option of limiting the sales of one or more products reduces the total Throughput, as well as the load on our resources. The right approach is to choose products that yield lower Throughput per oven-hour, thus, ensuring our total Throughput goes up, not down! I’m sure Linda can tell us more about the negative consequences of telling loyal customers that we are no longer able to supply them. Right, Linda?”

Linda’s head dropped and it was a moment before she said anything. Finally, she raised her eyes and looked directly at Clark, not Raphael, and said, “Well, I’d like you to understand the possible ramifications on sales. This is a complicated topic. I’d love to dump one particular, relatively small, distributor. But, then we lose all the products that distributor is currently buying, not just the products we’d like to reduce. Actually, this is the same risk we face with curtailing sales of a particular product to any customer – the distributor or retailer might feel forced to look elsewhere and stop buying our other products as well.”

Clark responded: “As we’ve discussed, a risky, but possible, way to reduce the demand for one particular product is to increase its price. As you say, we cannot know in advance the exact impact of a given price increase and, therefore, we don’t know how much it should be. I’m aware that some customers claim that increasing the price even on just one SKU is unfair. But as demand increases, this is what usually happens – the price goes up – supply and demand.” He crossed his forearms with his hands extended, making the familiar X-shaped supply and demand curves.

Clark continued, “I’ve been thinking about that issue for some time, because I feel our prices for regular bread and possibly donuts are too low. This is the main reason I wasn’t happy with the offer from Children’s Hospital. Still, I understand the merits of selling a large quantity that doesn’t compete with our regular sales.”

Raphael, who was still standing in front of them, said, “All right, let’s see if we can avoid even a small risk of lowering our sales volume through price increases. First, let’s analyze the option of adding capacity. We went through the cost of energy and included an additional technician for Oven #2. Robert, can you summarize what the union agreed to?”

“Sure,” Robert replied. “When I approached the union leaders about the extra technician, they liked the idea but want it to be continuous scheduled time. Specifically, they want to avoid 15 minutes here and an hour there. They feel it isn’t fair to a technician to have him sit around, not always being paid. If a guy drives in, it needs to be worth his while. I understood their issue and agreed but I told them I didn’t want to be forced to always run Oven #2 for a whole shift as we’ve had to do in the past when we needed to catch up with demand. After some discussion, we agreed to add the tech we need to operate Oven #2 in two-hour increments. Each block of two hours buys us 5% more daily capacity through the ovens, enough to bake up to 2,500 additional donut-equivalents.” Robert looked at Raphael and nodded to let him know he was finished.

Raphael jumped right back in, “To add two hours of Oven #2, the additional expenses of the technician and power would be about \$300, which does not include any overtime from direct labor. Here is the capacity chart after adding two more hours on Oven #2.” All the eyes in the room darted to the screen to see what is presented here as Figure 8-6.

“While Throughput remains the same, expenses go up by \$300. Still, the open question is whether the additional capacity is sufficient.”

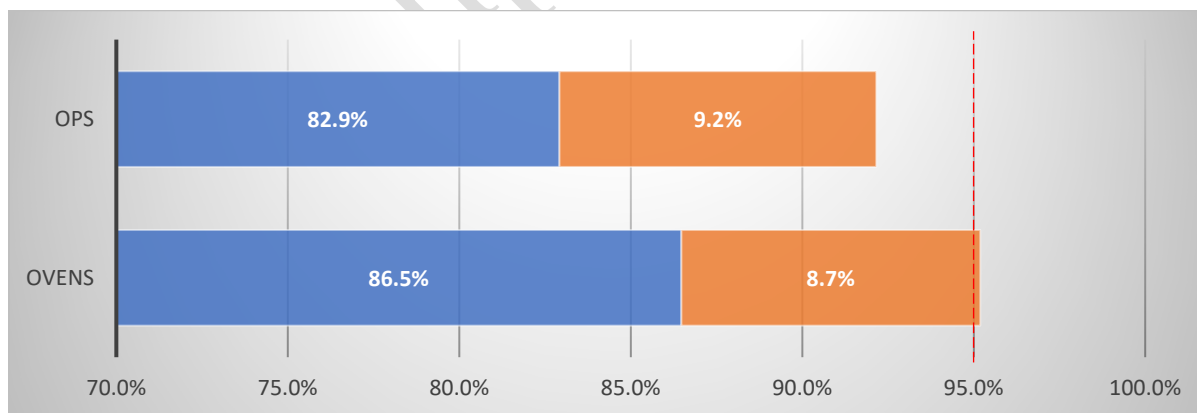


Figure 8-6 Current Volume + Both New Customers + 5% Sales Lift with 2 extra hours on Oven #2

Robert’s brow was furrowed. He spoke up. “I really don’t want to be the one who always sounds pessimistic, but my main problem now is the load on my direct labor. Especially when the load on the ovens is also high, there is a need to guarantee smooth supply of ready-to-bake products. In other words, when the ovens are already heavily loaded, it pays to ensure we don’t waste any

critical oven time by not being ready to load and unload them. So, to be safe, we'll probably need some overtime to reduce the pressure on the direct labor to keep pace with the ovens. Guys, my experience is that if I take one resource to 95%, I better ensure the others are no more than 90%. It gets crazy if more than one resource gets overloaded. You don't want to see that, believe me."

Raphael responded, "OK, suppose we add 10 hours of overtime – say five people working two additional hours each. This would also cost \$300." His fingers were flying over the keyboard on his laptop. In seconds, a new capacity chart was projected. "So, the daily net profit would end up at \$1,326.11³, a very nice growth in profit. Our current profit is only \$427. The multiplication of profits by 3.1 makes our current \$427 in daily net profit look downright puny! Here is the full impact of adding 10 man-hours of overtime on capacity."

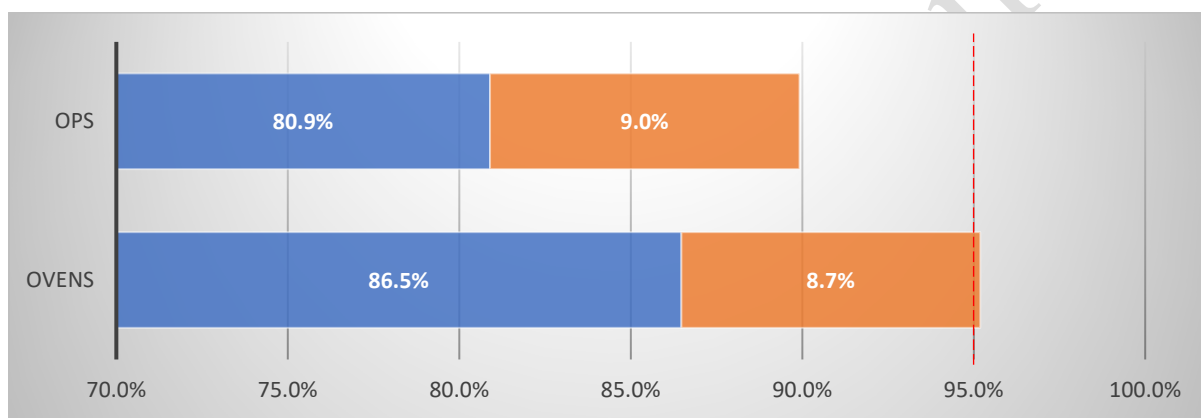


Figure 8-7 Current Volume + Both New Customers + 5% Sales Lift with 2 extra hours on Oven #2 and ten hours of Overtime

Robert nodded. "This will do! I can manage the two new discount customers, plus an additional 5% of our regular load and still maintain our operational excellence. However, what if the increased regular demand is even higher given Linda's optimistic estimate? Then, the additional capacity might not be enough."

Clark commented, "Good thinking. I'd love to multiply our profit before taxes. For me, it is almost too good to be true. The fact that the Events to Remember deal does not cause an outright loss is a huge comfort. With such a quick analysis of any idea based on the intuitions of both Linda and Robert, the picture of how our company actually works is much clearer. It helps me overcome my fears."

"Wait a minute." Linda interrupted them before they could move on by asking, "Robert can you help me out? I'm confused. It's probably something obvious, but why has the capacity needed for our regular business fallen? Look right here on the original sheet you handed out with the capacity figures." Her red fingernail stabbed at the original blue bars. "The capacities are 82.9% for operations and 90.8% for the ovens before the additional demand is considered. We haven't

³ \$1,926.11 potential net profit - \$300 for 2 oven-hours - \$300 for 10 hours of overtime

changed that basic demand at all. Yet, the blue bars on the screen now read 80.9% and 86.5%. Both are down. Why?”

Robert answered her. “Linda, you are absolutely right. The basic original load did not change at all. But, remember that we have changed the capacity by adding more time both in operations and on the ovens. The numerator stayed the same but the denominator got bigger. That accounts for the drop. Given our increased capacity, the old load uses up less of the total available capacity. Makes sense?”

Linda nodded. “Of course! Duh. I get it now. Sorry to slow everybody down. I was stuck on that point and I wanted to make sure I was with you before you went any further. Please, carry on, Raphael.”

Raphael smiled at her, thinking to himself that he wished more people wouldn’t pretend to understand finances, just to protect themselves from looking stupid in the eyes of others. He appreciated Linda even more for her bravery and self-deprecating humor. He glanced around the room, thankful to be a member of the top management team at Daily Bread. Then, he projected the updated profit calculations, as shown in Table 8-5.

Table 8-5 Updated net profits based on pessimistic sales lift with added capacity of Oven #2 and Overtime

Products	Price /unit	TVC /unit	Throughput /Unit	Daily Sales in units	Daily Throughput
Bread (basic)	\$1.20	\$0.3600	\$0.8400	4200	\$3,528
Bread (premium)	1.50	0.4500	1.0500	3150	3,308
Donut	0.78	0.2145	0.5655	6300	3,563
Donut (special)	0.81	0.2350	0.5750	4200	2,415
Roll	0.72	0.2200	0.5000	6300	3,150
Roll (special)	0.78	0.2560	0.5240	4200	<u>2,201</u>
Total	(Includes ΔT from +5% Volume = \$864.95)				\$18,163.95
Added ΔT from Events to Remember					245.76
Added ΔT from National Children's Hospital					<u>388.40</u>
Total T					18,798.11
Less Current OE plus 2 hours of Oven #2 plus 10 hours of OT					<u>17,472.00</u>
New Daily Net Profit					\$1,326.11

Clark continued, “So, if we consider this as the pessimistic scenario, we also need to check the optimistic assessment. Robert needs to be prepared. What higher costs would be required to produce the optimistic demand?”

Raphael said, “Okay, let’s check the load first this time. There is no point me projecting potential profits until we know if we can make it.” His fingers clicked the keyboard of his laptop for a few moments. He quickly said, “Nope, the additional two hours of Oven #2 and 10 hours of overtime aren’t close to being enough. Robert, come help me here.”

Robert got up and walked over to where he could see Raphael's laptop. They collaborated, mumbling and pointing for a minute. Eventually, Robert nodded and returned to his seat.

Raphael quipped, "Yep, with 10% more business, the load on both the ovens and the direct labor force blew through Robert's capacity limits."

Nodding his agreement, Robert explained, "Okay, we know what we have to do here. We'll need yet another two hours from the oven and two more 10-hour blocks of overtime, bringing the required total OT to 30 hours."

As he said this, Raphael projected the now familiar bar chart shown in Figure 8-8.

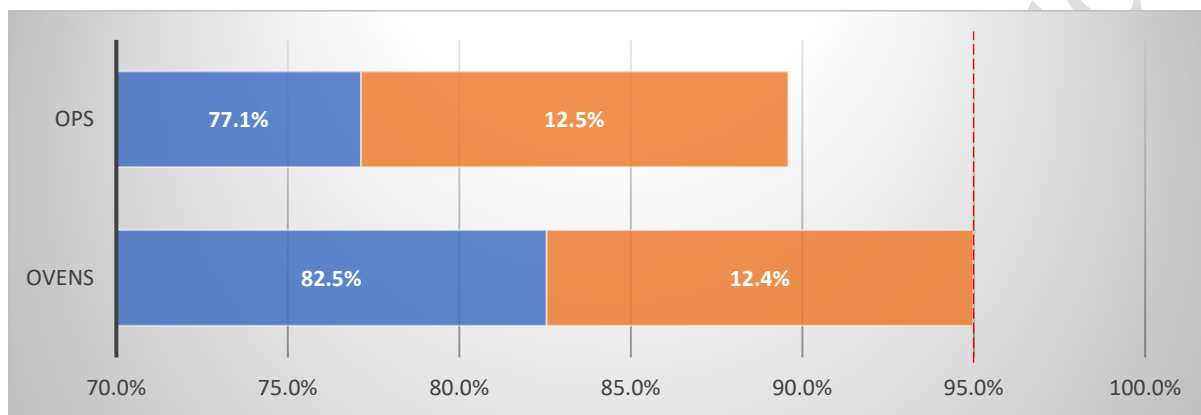


Figure 8-8 Current Volume +10% Sales Lift + Both Customers with 4 hrs of Oven #2 and 30 hrs of Overtime

"I can't wait to see how much we make under this scenario!" Linda said.

"Isn't this strange?" Raphael said with a puzzled look on his face, "Let me show you." And, with that he projected Table 8-6 on the screen for them all to see.

Table 8-6 Net profit with +10% sales lift + Both Customers with 4 hours of added capacity on Oven #2 and 30 hours of Overtime

Products	Price /unit	TVC /unit	Throughput /Unit	Daily Sales in units	Daily Throughput
Bread (basic)	\$1.20	\$0.3600	\$0.8400	4400	\$3,696
Bread (premium)	1.50	0.4500	1.0500	3300	3,465
Donut	0.78	0.2145	0.5655	6600	3,732
Donut (special)	0.81	0.2350	0.5750	4400	2,530
Roll	0.72	0.2200	0.5000	6600	3,300
Roll (special)	0.78	0.2560	0.5240	4400	<u>2,306</u>
Total	(Includes ΔT from +10% Volume = \$1729.9)				\$19,028.90
Added ΔT from Events to Remember					245.76
Added ΔT from National Children's Hospital					<u>388.40</u>
Total T					19,663.06
Less Current OE plus 4 hrs of Oven #2 plus 30 hrs OT per day					<u>18,372.00</u>
New Daily Net Profit					\$1,291.06

“A better response from customers of 10%, instead of 5%, makes the projected net profit **drop** from \$1,326.11 to \$1,291.06! While it is still much better than what we have today, I guess all that high-priced extra capacity uses up more OE than the T increases. That surprises me! Yep, the Δ OE for the optimistic evaluation is \$1,500 per day⁴, which is \$900 more than the pessimistic Δ OE of \$600. At the same time, the added T between the optimistic and the pessimistic is only \$864.95.”⁵

Raphael continued, almost as if he were speaking to himself, “The conclusion we can draw is that the current prices we charge don’t always cover the Δ OE of extra hours of Oven #2 and the cost of overtime. **Crap!**”

Raphael realized he hadn’t given them any sense of the other option, reducing demand, might do to the capacity problems they were facing. He decided to do that right away. Otherwise, how would they be able to develop any intuition about which of the different approaches to utilize and when?

As he finished his thought, Raphael looked up. Seeing he still had their attention, he carried on, “Now, I suggest we check into the option of reducing sales, instead of adding any capacity, to understand how that scenario would impact our results. This Table 8-7 includes one column that is more important than the rest. The column in the middle labeled ‘Throughput/Donut Eq.’ shows the Throughput contribution from one standard capacity unit of the ovens, our most loaded resource.”

Table 8-7 Throughput Generators using Ovens (8 items)

Products	Throughput /unit	Oven Donuts	Throughput /Donut Eq.	Base Qty	Δ Qty	Throughput
Events to Remember	\$245.7600	1,504	\$0.1634	0	1	\$245.76
Bread (basic)	0.8400	3.0	0.2800	4000	400	3,696.00
Roll (special)	0.5240	1.5	0.3493	4000	400	2,305.60
Bread (premium)	1.0500	3	0.3500	3000	300	3,465.00
Roll	0.5000	1.4	0.3571	6000	600	3,300.00
800 NCH Donuts	388.40	800	0.4855	0	1	388.40
Donut	0.5655	1	0.5655	6000	600	3,732.30
Donut (special)	0.5750	1	0.5750	4000	400	<u>2,530.00</u>
Total						\$19,663.06

As they scrutinized this latest table, Raphael explained what they were seeing. “It is not surprising that the Events to Remember deal is at the top of the list of worst contributors since the 40% reduction in price provides a meager Throughput, while the load to produce those

⁴ \$300/2hrs of oven time x 2 + \$300/10hrs OT of 5 workers per day x 3

⁵ 19,663.06 of T with both new customers plus 10% sales lift - 18,798.11 of T with both new customers plus 5% sales lift

products remains the same. However, since that deal is the direct cause for the fantastic increase in regular sales, we'd be crazy to eliminate it. In the future, when we achieve a stable higher demand without being dependent on this kind of marketing, we should re-consider the role of Events-to-Remember, depending on our capacity profile at that time."

"The next best option is to limit the quantities of regular bread sold. If the combined quantity of regular bread is limited to 2,800 units, then my calculations confirm that the plant can handle both new customers, plus a 10% increase in regular sales of all other products. The capacity bar chart looks like this." See Figure 8-9.

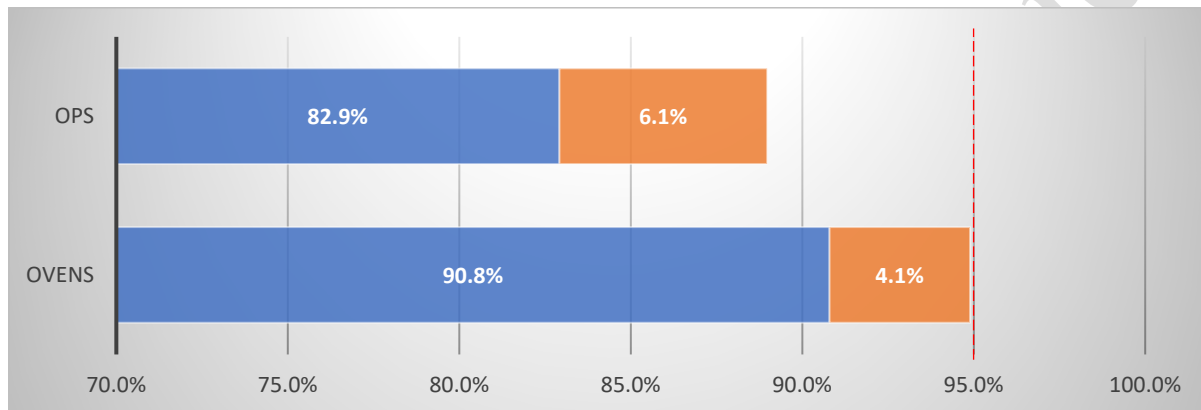


Figure 8-9 Current Volume w/ 2,800 Basic Bread Limit + Both New Customers + 10% Lift (Except Basic Bread)

"I've got good news and bad news. The good news is, if we ditch sales of just 1,200 loaves of our regular bread sales, and not accept any of the lift on that category that results from the Events to Remember exposure, from a capacity point of view, there's no need for any added Operating Expenses at all! However, dropping sales of basic bread by 1,600 units reduces Throughput by \$1,344.00⁶. This action drops total Throughput from \$19,663.06 to \$18,319.06. That's the bad news."

Raphael continued on, "Overall, in this scenario, the resulting net profit is \$1,447.06⁷. This is the best profit yet, if we can hit exactly that amount. What these numbers are telling us is that our profit is quite sensitive to the number of loaves we sell."

Linda followed up on Raphael's caution, "So, resolving the lack of capacity by limiting the sales of bread is fully dependent on my team's ability (or lack of it) to sell 1,600 units, or any other number, less than the expected demand without collateral damage to sales of our other products."

Raphael went on, "I made a diagram of the options we just went over. Let me type in the net profit amounts. In each of them, ΔNP refers to the additional profit above the normal profit of \$427." His fingers danced again over the laptop's keyboard for no more than a minute. "There you go. This is a summary of our six options:" See Figure 8-10.

⁶ 1,600 units of dropped sales x \$0.84 T per unit

⁷ \$18,319.06 of T - \$16,872 of OE

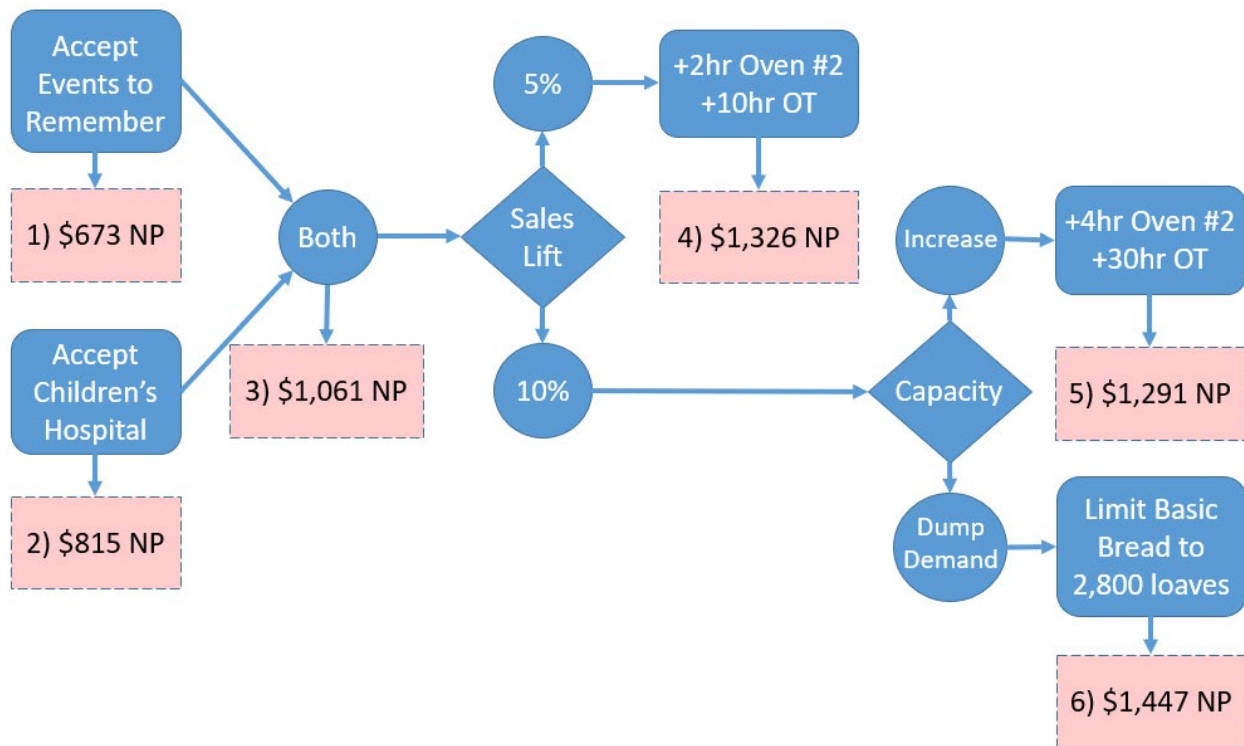


Figure 8-10 Summary of Options for Decision Making

Clark rose from his chair and dramatically bowed to his CFO. “Thank you, Raphael. I don’t think I have ever had such great data presented quite this well.” The rest murmured their assent, as Raphael sat back down in his chair, waving his hands at them to stop.

Once they quieted back down, Clark’s face became much more serious. He looked around the table, catching each person’s eye, one by one. Then, he said, “Friends, we are now in a situation where we should check our pricing.” They all looked around at each other, wondering where that comment had come from and what he meant. After all, company profit was going to increase dramatically, so why delve into pricing issues now?

Clark went on, showing them his ability to think out into the future, by saying: “The goal of this company is to make more and more money as time passes. We can’t do that without growth in our revenues. Actually, now that I know what it is, I prefer to look at our growth in Throughput. Now, we have to ensure that our Operating Expenses (OE) do not grow even faster. This beautiful decision diagram is warning us that we have to be very careful.”

He continued, “I mentioned to you before that I sensed our price on basic bread, one of our staples, is too low, of course given certain reasonable assumptions about the potential impact of a price increase on the demand. For the first time, I have seen the data that proves it.” He turned directly to the CFO and said, “Thank you, again for such a clear presentation, Raphael!”

As he looked back at his team, he could see that they didn't fully understand him. So, he explained: "One reason companies go out of business or stagnate is because, to grow revenues, they feel compelled to first buy new capacity, taking on OE. Until they gain enough new T to become a larger, more profitable entity, they don't earn enough T to support their expenditures. We are flirting with that situation right now! We make less money with ten% sales lift than we do with five%. This means that the cost of adding extra capacity isn't covered by the Throughput we gain from the additional sales. Now, this does not mean all our sales generate insufficient T to cover the cost of extra capacity. Therefore, we should focus our price analysis on the products that yield the least T per capacity of our ovens and our operators."

"If our customers like our products and service, we owe it to them to find a way to satisfy their demand, even if we are forced to use expensive added capacity. However, we have to insist on gaining additional profit for our greater efforts, meaning that the ΔT must be bigger than the ΔOE for the extra capacity. When we have enough confidence in our ability to attract more demand, we will be able to add the appropriate man-hours at our regular pay rates and then operate the ovens for only the cost of the energy required. In other words, once we know the true sales lift, we'll hire more people. We need to be careful that every increase in OE is eclipsed by the increase in Throughput it makes possible. Raphael's new process we went through plus the supporting tools to visualize the loads and the profitability scenarios allow us to be both daring and yet check carefully the ultra conservative side."

Clark continued to explain his vision. "If the demand were to persist at higher prices, then we'd be able to afford maintaining more manpower than we need on average, provided we still have extra oven-hours to run when there is high side fluctuation. This situation is especially handy when lucrative new short-term opportunities are identified. It is cheaper, also better for most of our people, to work regular hours rather than be expected to do overtime on top of their regular hours."

Robert interjected, "You are right Clark. It is not always easy to find volunteers for even one or two hours of overtime at strange hours. At first people jump on it to give them the money to do something fun or special but it becomes a burden after a short while. If we do it a lot, I'm worried about turnover."

Clark nodded and resumed his train of thought. "Our basic bread is the natural first candidate for a price increase. If the maximum capacity of our ovens is 50,000 donuts per day in 36 oven-hours⁸, then in one hour we can do 1,389 donuts⁹ or 463 regular bread loaves¹⁰. Given that the T per loaf of bread is 84 cents, the T we generate from baking regular breads for one hour in one of

⁸ Oven #1 for 24 hours per day and Oven #2 for 12 hours per day

⁹ 50,000 donut-equivalents per day / 36 hours per day

¹⁰ 1,389 donut-equivalents / 3 donut-equivalents per loaf

our ovens is \$389¹¹. Raphael, what's the extra cost of an oven-hour plus the overtime needed to flow products through it?"

His CFO was ready with the answer, which showed he was tracking Clark's line of thinking. Raphael said, "It is \$375 per hour¹². However, let me warn you, that amount is only correct if we use all the extra hours for baking. Any unused hours would raise our effective cost per hour of premium capacity."

"You see?" Clark asked them. "At best, \$375 of Δ OE per premium hour is too close to \$389 in Δ T per hour from producing bread. If the exact quantity we need is somewhat less than what can be produced in two or four oven-hours the Δ OE might not be covered by the Δ T."

Raphael provided some perspective by adding, "Clark, 'might not' might not be strong enough." He smiled at his pun and continued, "If we waste more than 3.6% of any block of premium capacity, we will lose money on any regular bread we make during it and sell!"¹³

Robert was scratching his head as he said, "Wow. That really puts what you were saying into perspective, Clark."

Linda added, "Yeah, all these numbers are great but what I want to know is, do I tell my salespeople to put on the brakes with regard to selling bread or what?"

Clark smiled at her and responded, "Thank you. That is a great question you asked, Linda. It challenges us to break our inertia around our main staple, bread. Before we had the insights from Raphael's new process, we would have just earned less money than we could have and been blissfully ignorant. This new knowledge gives us a target to improve the T per loaf of bread and find less expensive ways to temporarily increase capacity. I think we should raise the price by 15 cents and see what it does to demand. We might want to also increase the price of the premium bread to keep the relative price difference between the two the same. He turned to Linda and asked, "Linda, what do you think? Will it work?"

Linda digested his words for a minute. She continually suffered from salespeople who promise the moon and then deliver much less. She had sworn to herself that she would not become one of them. Finally, she said, "Boss, the market has a lot to say about prices. Our customers are aware that we are not the only bakery they can use. That being said, it is my sense that raising prices today from \$1.20 per loaf to \$1.35 would not cause much of a negative reaction from customers. We haven't raised prices on bread for years. My market surveys from the salespeople indicate that competitor prices range from \$1.25 to \$1.45 on basic breads. We have been aggressive on bread pricing. On the premium breads, I'm comfortable, for now, with going up 20 cents per loaf. I expect these price increases will have a limited impact on the demand – maybe the

¹¹ 463 loaves x \$0.84 of T per loaf

¹² For example, they required 4 extra oven-hours plus 30 hours of overtime to accept the two new customers and the optimistic sales lift. The added cost for the premium capacity per hour was $(\$300 \text{ per } 2 \text{ oven-hours} \times 2 + \$300 \text{ per } 10 \text{ hour block of overtime} \times 3) / 4 \text{ hours}$.

¹³ 100% - $\$375 \Delta$ OE per hour of bread produced / $\$389 \Delta$ T per hour's worth of bread sold

demand would remain the same, instead of increasing by 5% or 10% like I previously suggested.”

Raphael was ready to check the ramifications of increasing the prices on both categories of bread, assuming the original quantities of bread would remain stable – up because of the Events to Remember marketing and down an equal amount due to price competition. He asked Linda, “What do I do about the bread prices for Events to Remember?”

She responded, “My deal with Events to Remember is 40% off our list prices. So, if we go up, they go up. No way am I going to argue to hold their prices.”

After a short break of 10 minutes Raphael was ready with the figures: “Let’s start with the price increase on the two breads and sales lift of 5% except on the bread. Here is the overall impact.” He projected what is shown in Table 8-8.

Table 8-8 The impact on NP of price increase plus 5% sales lift

Products	Price /unit	TVC /unit	Throughput /Unit	Daily Sales in units	Daily Throughput
Bread (basic)	\$1.35	\$0.3600	\$0.9900	4000	\$3,960
Bread (premium)	1.70	0.4500	1.2500	3000	3,750
Donut	0.78	0.2145	0.5655	6300	3,563
Donut (special)	0.81	0.2350	0.5750	4200	2,415
Roll	0.72	0.2200	0.5000	6300	3,150
Roll (special)	0.78	0.2560	0.5240	4200	<u>2,201</u>
Total	(Includes ΔT from +5% Volume = \$539.45)				\$19,038.45
Added ΔT from Events to Remember					270.96
Added ΔT from National Children's Hospital					<u>388.40</u>
Total T					19,697.81
Less Current OE plus 2 hours of Oven #2 plus 10 hours of OT					<u>17,472.00</u>
New Daily Profit Net Profit					\$2,225.81

“Assuming the sales of the two bread items neither grow nor drop, due to the price increase, the resulting T goes up significantly because every dollar of the price increase goes directly into the T. As we have learned, it is important to see the capacity profile including the additional capacity.” See Figure 8-11, which he then showed them.

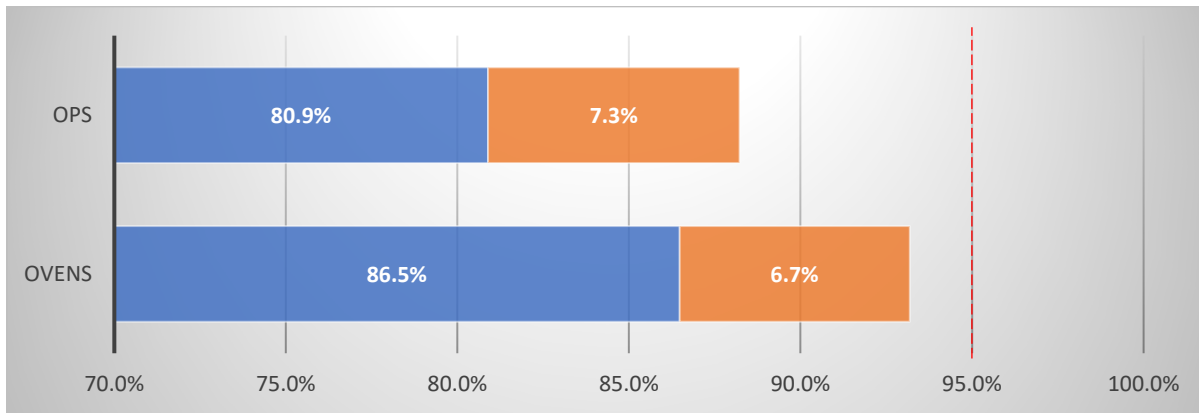


Figure 8-11 The plant load after a price increase on breads and 5% sales lift on other product categories

“As we see both the ovens and our people, with 10 hours overtime every day have plenty of protective capacity. Ready to see the impact of sales lift of 10%?” Seeing heads nodding, Raphael projected Table 8-9 on the screen.

Table 8-9 The impact on NP of price increase and 10% sales lift

Products	Price /unit	TVC /unit	Throughput /Unit	Daily Sales in units	Daily Throughput
Bread (basic)	\$1.35	\$0.3600	\$0.9900	4000	\$3,960
Bread (premium)	1.70	0.4500	1.2500	3000	3,750
Donut	0.78	0.2145	0.5655	6600	3,732
Donut (special)	0.81	0.2350	0.5750	4400	2,530
Roll	0.72	0.2200	0.5000	6600	3,300
Roll (special)	0.78	0.2560	0.5240	4400	<u>2,306</u>
Total	(Includes ΔT from +10% Volume = \$1078.9)				\$19,577.90
Added ΔT from Events to Remember					270.96
Added ΔT from National Children's Hospital					<u>388.40</u>
Total T					20,237.26
Less Current OE plus 4 hrs of Oven #2 plus 20 hrs OT per day					<u>18,072.00</u>
New Daily Profit Net Profit					\$2,165.26

Raphael explained what they were seeing. “Once again, what we see here is that the Throughput from the increase in sales fails to cover the cost of the further increase in capacity, both the oven and the manpower. But, have a good look on the capacity profile after adding the 4 oven-hours and 20 hours of overtime.” He displayed the bar chart shown in Figure 8-12.

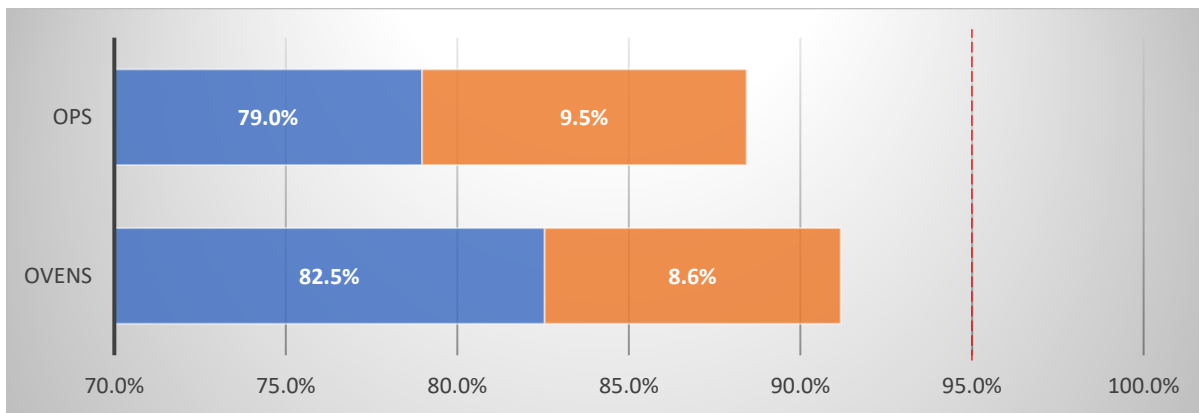


Figure 8-12 The plant load after a price increase on breads and 10% sales lift on other product categories

“In order to process the additional sales lift on the four non-bread product categories, it requires a second block of 2 hours of the oven and also a second 10 hour chunk of labor at overtime rates, however, barely so. Had we kept it at one block of extra oven time, the load was 95.5%, barely over Robert’s 95% utilization limit. With the extra block of oven time, the load is only 91.17%. Really, it is almost the same story with the labor. We can almost do it with only one ten-hour block.

Clark beamed “That’s good for now. It will be hard to hit the 10% sales lift figure anyway. If we do come up a little short, we’ll get away with only an extra two hours using the oven and ten hours of overtime, plenty of extra T and a huge net profit. If we do happen to hit the +10% high side target, Linda, can you lose the few loaves of bread necessary?”

“Now, you are talking!” Linda said. “I know exactly how to reduce bread sales by small amounts, like a few hundred loaves. Remember the distributor I mentioned before. They could find themselves on allocation during heavy production days. That’s easy peasy!” She was smiling contentedly.

Clark pointed at her with a smile and said, “Yep, you’re on it! We’ll also have to check our assumption that the impact of the price increase on the bread products will be limited. Maybe there will be some lift after all.”

Robert chimed in, “Eventually, we’ll come to better, more flexible, arrangement with the union. They wanted a block of time to make it worthwhile for the employees to stay over. It doesn’t make sense that we can ask five people to stay for an extra two hours but not give them thirty minutes more once they are already there. The same thing for the tech that supports the oven. Why wouldn’t he prefer the extra half an hour too, right? I’ll talk it over with the steward. When we get to the point of needing to hire more full-time employees, the cost of such capacity increases will be at much less of a premium.”

Clark followed that by commenting, “As I said, we definitely know what to do now to continue improving. Raphael will you please show an updated version of that awesome decision diagram, so we can see the big picture?”

Raphael responded, “Aye, aye, Captain. As you wish.” Almost immediately, Figure 8-12 appeared on the screen.

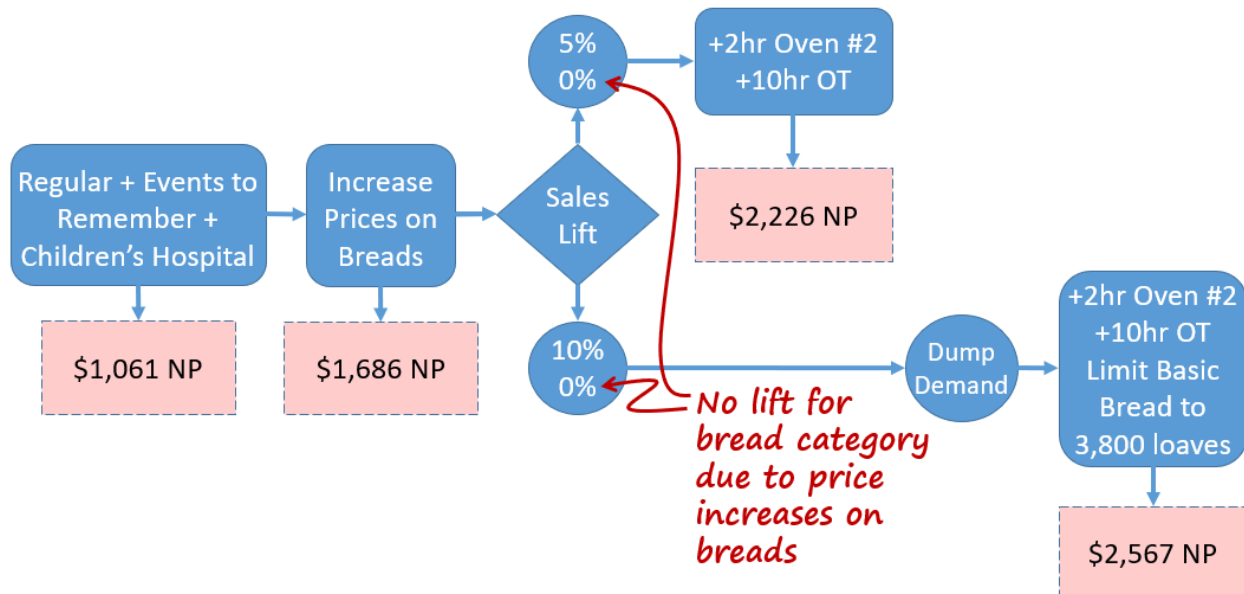


Figure 8-13 Summary of Options for Decision Making Including Price Increases on Breads

Clark spoke up again, “Great work, Raphael! I’m impressed all over again.”

Raphael felt he should use an abundance of caution and reiterate a point that was now obvious to him but he wanted to be sure the others really understood, so he said, “Please remember that, since OE increases in stairsteps, there will be places along our path between these numbers with higher and lower profitability. The point is, we shouldn’t focus on finding little niches of maximized profitability. We ought to be thinking about continuing our growth.”

Clark carried on with, “I agree. Thank you for making that clear.”

“Well, it’s obvious that we want both deals. Keep in mind, as good as Linda is, even she can’t accurately guess how much the demand will grow due to the deal with Events to Remember. Furthermore, once we start to supply their events, the boost in sales won’t be sudden. We can wait and see how much the demand actually grows. Robert, be ready to add capacity when necessary. You better get ready to add the first two hour block on Oven #2. Then, the necessary man-hours to maintain the smooth flow through the ovens. You understand the implications of our fluctuations in demand better than anybody else and how to maintain a Capacity Buffer to protect the flow of our products. You are authorized to use overtime at your discretion, without the normal approval from me.”

“Linda, I want you to stay on top of how our price increases are impacting sales and whether there is any unexpected impact on the sales of other products. I don’t want to be caught by surprise here. As soon as you become aware that some of our assumptions are incorrect, call for a meeting so we can all review it.”

“Raphael’s what-if scenarios taught me that unless we get enough Throughput from our products, we are in danger of being unable to maintain profitable growth through this ungainly phase in which we must rely on very expensive emergency capacity. We shouldn’t limit the sales of a product that is important to our good customers but I want more than enough Throughput from it to cover the costs of premium OE!”

Clark continued. Speaking to them all, “I’m very encouraged. It seems our little bakery is going to make much more money. I’d like everyone to be on the lookout for more opportunities like these in the future. We now know how to obtain pertinent information, including reasonable uncertainty levels and how to analyze any idea, no matter how crazy it seems. After all, I never expected those two opportunities would have such an impact on our bottom line. And, if you think about it, **the new opportunities were not actually the big contributors. It was the indirect benefit of the analysis that helped us finally raise prices that haven’t made sense for years!**”

“I have a wild idea that I’d like to check with all of you soon – to offer daily direct-to-home delivery of our products very early in the morning. Nobody is offering such a service in our city. We’d probably need to use a third-party logistics provider for such a move. The question is: will the approach increase our bottom line or decrease it?”