

BCOR 3750

Simulation Model (Project #3)

Situation: You want to meet a friend for breakfast and you are told “why don’t we meet at my sister Lisa’s coffee and pastry shop called ‘Sips and Sweets’. It is just a five-minute walk from where you live and close to the beach. After coffee, we can return back to your place to discuss a potential business deal I am working on.” You agree and walk to the shop only to find a line going out the door. You hear people raving about how great the products are; however, you also hear complaints how “all of a sudden there was always a line” and that “now it takes forever to get to your order”. You finally enter the quaint 800 square foot establishment and see two barista stations with empty cups scattered throughout the stations and a few stools for patrons.

You and your friend enter the shop and Lisa walks over. Here is your conversation:

Lisa: *“Hey there! How are you two doing? Sorry for the wait but for the last month we have been slammed. We open at 6:00 AM to 6:00 PM (from Sun Up to Sun Down) and we always have lines.”*

You: *“We saw a few people leave because they could not wait in line.”*

Lisa: *“I know I am losing business because of the long lines. I thought about adding another station; however, that would require more room and an additional barista. When we first opened, I installed two stations on the right side of the counter area when I first started the shop and that was perfect but then we received was a highly favorable review by local food critic...”*

You: *(cutting into your statement of the favorable food critic review) “that’s great news...”*

Lisa: *“...That is when the problems started because people came from far and wide and now we cannot keep up. I have a long-term lease on the location so I cannot just up and move. The other reason I cannot leave is because the shop is along a path to the beach so I get all of the foot traffic as well as the locals who come by.”*

You: *“Why not just add another station?”*

Lisa: *“As you can see, the existing two stations are on the right side of the building so we could receive orders on the left side and support the drive-thru (which is on the right side). To add another station on the right side, I would need to get rid of my drive thru—which I cannot do because about a third of my business comes from drive-thru.”*

You: *“It looks like you have a huge island in the center where you have supplies and display items.”*

Lisa: *“Yes. If you look up, you will see there are two giant pillars which are the support beams for the building. We are the bottom floor but there are apartments above. Since they are the support beams, I cannot move them so replacing the islands is not an option. All I can do is shorten the depth of the pastry display on the left and setup a new station in that area. The real decision is not “whether” to add a new station but decide what type of station to install. Here are my two options and costs:*

Hot Drink Only Station: Install coffee makers and an espresso machine.
Relatively inexpensive but very limiting in capability.

COST: \$9,000

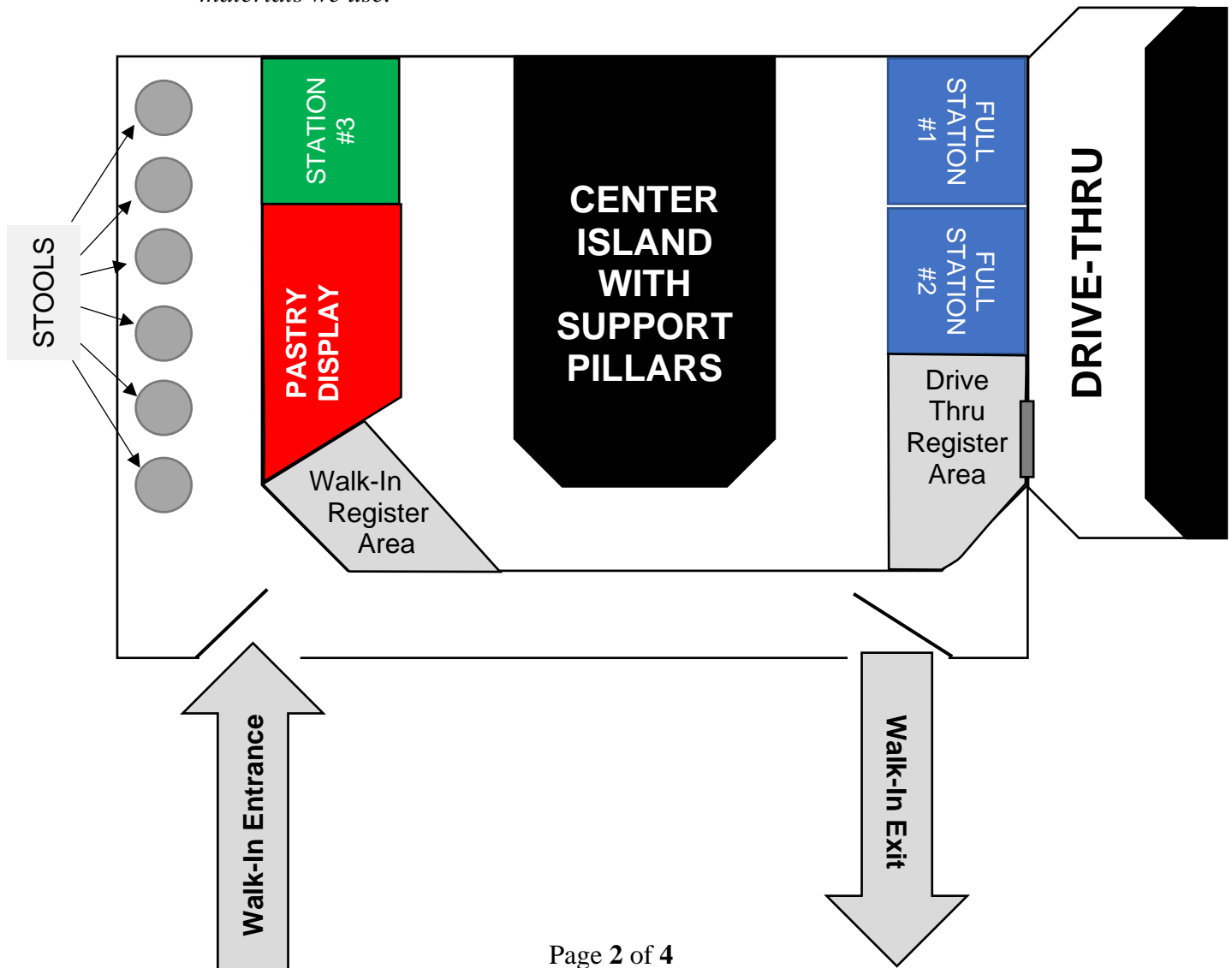
Full-Service Station: Install a coffee maker, an espresso machine, ice-maker,
blending station, and a wash station. Takes care of all needs.

COST: \$17,000

Lisa: “I just had a contractor sketch out the area last week.”

You: “Do you have a blueprints so we can review?”

Lisa: “Yes. You can see we have a few stools we are sitting on right now while you wait for your drinks. The two stations (in blue) are the existing stations as well as the cashier for the walk-ins and the drive thrus (in grey) while the proposed third station is in green. To create the station, we would cut out a quarter of the pastry display. You can see the giant island in the center which is used to store the products and materials we use.”



You: “You know...when I was in school, I used a technique called ‘line queue simulation modeling’ to model this type of scenario.”

Lisa: “If you could simulate these scenarios to show me the profitability of each of the decision, that would be fantastic! Since you are friends with ‘sibling’ here, I feel comfortable sharing my financial information with you...here are the pieces of information you need about the drinks and my business to effectively model the scenario. My goal is to expense the cost of the improvement as a fixed cost over a one-year period so the ‘hot drink only’ \$9,000 option would expense at a rate of \$750.00 per month while the ‘full-service’ \$15,000 option would expense at a \$1,250 per month.”

You look over the register information and you discover the following:

- There is no difference in the type of drinks ordered between the drive-thru and the walk-ins...so the drive-thru to walk-in mix or volume is not a factor you need to model.
- You observe the following arrival times from watching the camera footage:
50% = 1 Minute / 35% = 2 Minutes / 10% = 3 Minutes / 5% = 4 Minutes
- You return to discuss some clarification notes with Lisa and are able to develop an input summary table (see next bullet point).
- Based on the register data, there are three types of drinks produced:

| Type of Drink | Station Needed to Produce | Sales Price | Cost of Goods Sold | % of Sales Mix | Minutes To Produce | Notes |
|---------------|---------------------------|-------------|--------------------|----------------|--------------------|--|
| Hot Coffee | Hot Drink Only Station | \$4.00 | \$1.20 | 50% | 2 Min | The hot drinks just require an espresso machine and a basic coffee making setup. |
| Cold Coffee | Full-Service Station | \$4.00 | \$1.00 | 20% | 5 Min | The lower cost is due to the “ice” taking up room in the cup (as opposed to coffee) which means you are selling a full cup of coffee for the price of “water” which reduces your Cost of Sales from 30% down to 25%. The issue is they require an ice machine to make the products and due to the large island, you need to add the ice machine and plumbing to create the drinks. |
| Blended Drink | Full-Service Station | \$5.00 | \$1.90 | 30% | 8 Min | The blended drinks take up the most room since they need both the ice maker and room for the blenders to make the drinks. The blended drinks have a COS of 38% making them the most expensive of all products. |

- Reviewing the financials, you see the monthly “Fixed Costs” total \$17,500 per month (accounting for wages, location lease payment, insurance, utilities, etc.).
- Adding the additional barista to staff the third station is estimated to increase the fixed costs by \$2,500 per month. As such, the estimated monthly fixed costs are expected total \$20,000 per month with the addition of the third station.

PROJECT DELIVERABLES

PART I (70 Points):

- Create a model that can:
 - Simulate three coffee making stations. The first two stations are the existing full-service stations while the third workstation can be either a “hot only” or a “full-service station” (you model must accommodate turning on the third station then designating the type of station it is to be.
 - Calculate three profitability scenarios:
 - 1) Current state with two-full-service stations
 - 2) Third station being a “hot drink only” station
 - 3) Third station being a “full-service” station
 - Simulate thirty (30) days of operations for each of the three scenarios listed above.
 - Create a simple income statement which calculates the:
 - Total 30-Day Revenue
 - Total 30-Day Variable Costs
 - Total 30-Day Fixed Costs
 - Net Profit for the 30-Days
 - Create a compare/contrast table which compares the following:
 - Total Net Profits in a 30-Day Time Span
 - Total Customer Drinks Served
 - Average Drinks Served Per Day
 - Average Daily Wait Times

Part II (30 Points):

- Write a one-page memorandum to Lisa which:
 - Explains the simulation model and methodology (1 paragraph).
 - Describes the characteristics and profitability of the current state and the three scenarios analyzed (1 paragraph per scenario for a total of three paragraphs).
 - Identify your recommendation and why you selected this recommendation. Reference your simulation model results and focus on both the efficiency and profitability of your recommendation (1 paragraph).

On-Time Due Date/Time:

90% Credit:
75% Credit:
50% Credit:
25% Credit:
0% Credit:

Fri, Apr 30, 2021 @ 11:59 PM

Sat, May 1, 2021 @ 11:59 PM
Sun, May 2, 2021 @ 5:59 AM
Sun, May 2, 2021 @ 11:59 AM
Sun, May 2, 2021 @ 5:59 PM
Sun, May 2, 2021 @ 6:00 PM