Jameika Baysinger
Tyler Nullmeier

Project Report: Improving Inventory Precision

Introduction

Sprouts Farmers Market is a supermarket chain with an existence based on opportunity. The chain was originally created to respond to a growing demand in organic and minimally processed foods. Since its founding in the early 2000s, Sprouts has opportunistically spread to more than 240 stores, in 15 states, across the United States. With this project, we wanted to present one Sprouts supermarket with another opportunity: the opportunity to reduce frontend stock-outs with Lean Six Sigma.

The impacts of frontend stock-outs are as vast as they are veiled. As a result, we focused our first examination of the problem on four categories: cleaning supplies, shopping bags, weekly and monthly ads, and register display items. In all categories, stock-out impacts range from wasted time to lost income. When magazines, snacks, or ads go out of stock, income is wasted because potential purchases are shunned. When stock-outs occur in bags or cleaning supplies, customers may become unhappy at an unclean store or lack of bag choice. Additionally, cleaning supply stock-outs may represent lost income if frontend employees must requisition cleaning supplies off store shelves. We believe these problems are worth addressing. Our goal is to prevent total stock-outs in the frontend by improving the process of inventory management.

Methodology and Results

Improvement Cycle #1: Understanding Your Process

With a SIPOC diagram, we could understand the process that the frontend manager goes through when determining when and how many supplies he needs to order during each ordering

period. By using a flowchart, we could dissect and discuss all the possible steps that could occur during this entire process. These steps produced data that will be instrumental in determining what causes frontend stock-outs. We obtained the data for our diagrams by working directly with the frontend manager of Sprouts. This manager oversees the observing and ordering of supplies in the frontend.

By creating the SIPOC diagram, shown in Appendix A, we walked through the entire process of ordering new inventory, going through stock-outs, and acquiring new shipments. The SIPOC diagram shows us that there are not many suppliers involved in the process, but due to the in-store duties, the overall process is quite complex. There are many steps that occur in the overall cycle of ordering to reordering. These steps are looked at more closely in the flowchart, shown in Appendix B. There are many decision points that play a major role in whether the frontend manager should place an order for new inventory, or wait to place an order. To cut down on total stock-outs of frontend inventory, many of these steps could be altered or eliminated to allow the frontend to run more efficiently.

Based on our investigation in this cycle of the project, we have concluded that this extensive process can be improved to better accommodate the frontend staff and ensure that Sprouts customers have a better experience. If we were to repeat this process, we would spend more time alongside the frontend manager to find out if there is an easier way to keep track of inventory without having to wait until there is almost a stock-out, and we would collect data for a longer period. By monitoring a longer period, we would be able to obtain a better sense of how the inventory behaves throughout the year.

Improvement Cycle #2: Measuring Current Process Performance

During this phase, we were faced with a few options. We could have used a histogram to track percentage of stock remaining after a certain time to determine the magnitude of the problem. Alternatively, we could have used a run chart to track changes in stock levels over time to spot trends and determine if stock levels reached their lower extrema at specific times. We wanted to focus on specific items where stock-outs are most common to learn why these stock-outs occur. Whereas the histogram would not clearly map items to stock levels, and the run chart would not properly highlight stock-out events, a Pareto chart accomplishes both tasks. From this, we concluded that a Pareto chart was the best tool for our job of establishing a baseline measurement.

We obtained our data through archival research. Sprouts allotted us their internally-kept stock records, on all frontend items, from the beginning of this year until June 22, 2017. These records detailed when a stock-out occurred and what items were affected. From these records, we compiled five categories of items: bags, magazines, snacks, monthly/weekly ads, and cleaning supplies.

Our Pareto chart in Appendix C revealed that bags, snacks, and monthly/weekly ads account for 80.31% of frontend stock-outs. With bags accounting for the most stock-outs at 46 occurrences and 36.22% of the cumulative sum, some part of the inventory process is not working correctly for this item. With this data in hand, we know we should focus on bags, snacks, and ads if we want to target the most pressing issues. Additionally, this area is where we are the most likely to find a problem.

If we were to revise this process, we would spend a longer period collecting data, and we would collect data from more sources. Some of the data we used seemed like it was submitted in

a hurry. On occasion, we saw records that were potentially duplicates of other records, as well as records with potentially incorrect time fields. If we could have collected data in real-time from frontend workers, perhaps with forms, then we could have compared this data to the archival data, and been more confident that our data was accurate.

Improvement Cycle #3: Identifying the Cause of the Problem

With the ushering in of a new cycle, we were faced with another selection of tools. This time, the goal was to find problem causes. We determined in Cycle 2 that bags go out of stock most often. In Cycle 1, we learned that some items, such as bags, are bought as needed, while others are bought on a schedule. In both cases, the ordering process is complex. From this, we found that we needed a better understanding of elemental interactions in the inventory management process. A cause-and-effect diagram was the best tool for this job.

We gathered the information for our cause-and-effect diagram by using unstructured individual and group brainstorming to identify categories and causes; then we used why-why analysis to determine sub-causes. Our cause-and-effect diagram in Appendix D illustrates that many problems contribute to stock-outs. For example, the diagram details two ways orders could be delayed. In one case, incorrect inventory records could cause orders that result in fewer items than necessary. This error could delay orders and result in stock-outs.

With these potential causes detailed, the next step was to identify the root cause. First, we picked six problematic areas from our cause-and-effect diagram: ordering structure, cost-cutting, employee inaction, logging process, supply management, and usage patterns. After detailing our potential root causes further, we opted to use the nominal group technique (NGT) to facilitate decision-making because NGT gave us the most detailed look at a group consensus. It seemed

erroneous to use NGT with only two opinions; therefore, we asked six Sprouts employees to help. We used a Google Forms form, linked in Appendix E, to simplify their contribution process. With eight people involved in the decision-making process, the NGT results in Appendix E illustrate that most group members believed the centralized ordering structure was the root cause, with unpredictable usage patterns close behind. Thus, we determined the root causes of stock-outs in Sprouts to be the centralized ordering structure and unpredictable usage patterns.

If we were to repeat this process, we would use a Pareto chart instead of NGT. We did not realize that our results would be very controversial. The additional data offered by a Pareto chart would help quell potential controversy.

Improvement Cycle #4: Determining Recommended Solutions

Once we began the final cycle of our investigation, we brainstormed potential solutions to our root causes. To help us identify the solutions that would be easiest to implement and most impactful, we chose to create a PICK chart. This allowed us to rank all our brainstormed ideas to determine which ones to focus on. While many of our ideas came from within our team, some were influenced by the opinions of the Sprouts employees who took part in our NGT survey. This allowed us to incorporate our personal opinions with what actual employees thought would be the most beneficial to the company.

Through our brainstorming efforts, we generated ten ideas, seen in Appendix F. Some examples include computerizing the inventory instead of keeping everything written down, allowing other employees to put in order requests when they see fit, and performing daily inventory checks. Ideas in hand, we created our PICK chart, found in Appendix G. With our

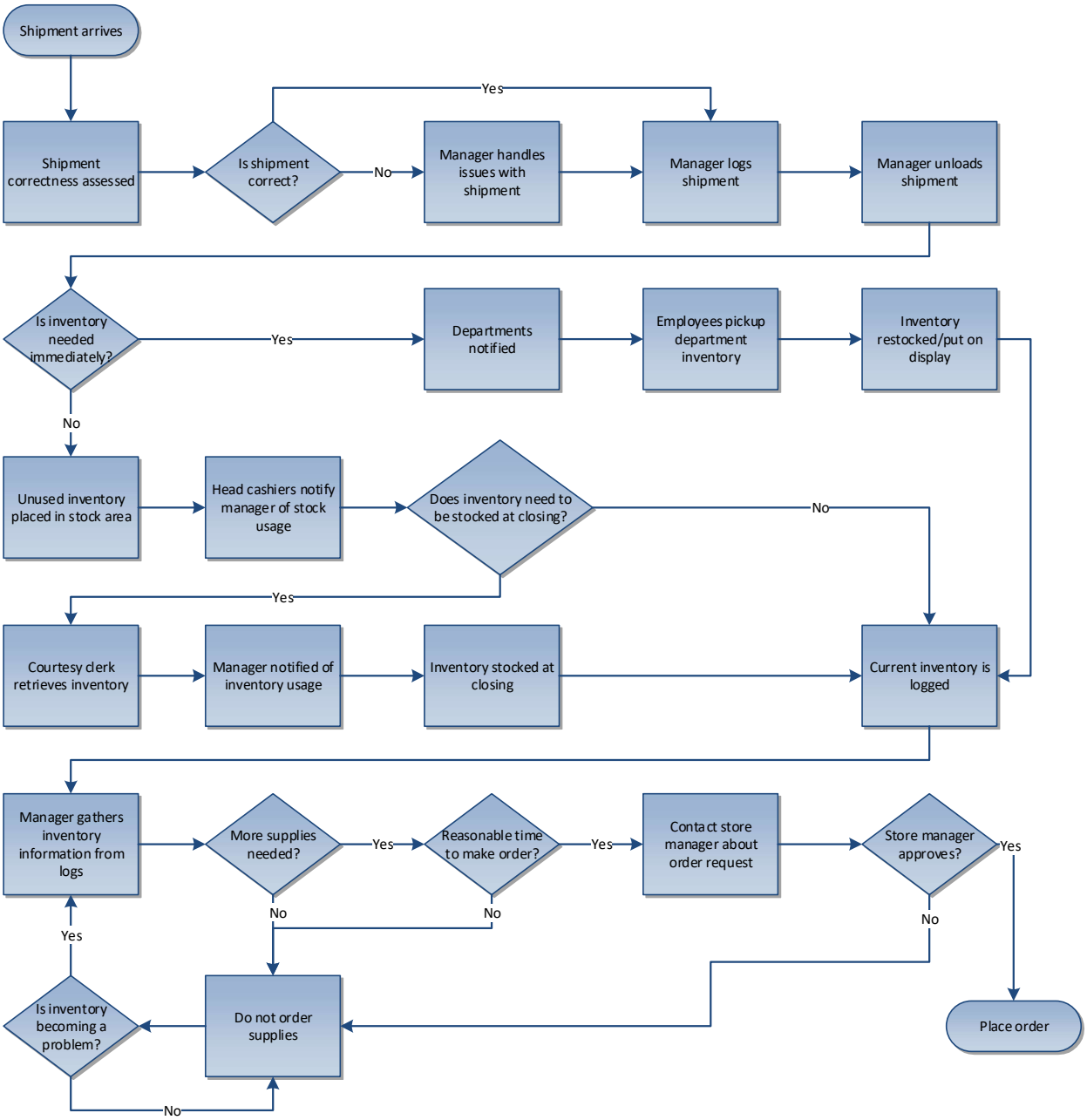
PICK chart, we identified ideas (7) to perform daily inventory checks, and (3) to allow for interim orders to be placed between the regular ordering cycle, as ready-to-implement solutions. On the other hand, ideas like (8) computerized inventory records, and (1) having a decentralized ordering structure were deemed challenging because they would either be very expensive, or require extreme administrative change. The only idea we deemed worthy to kill was (4) log item usage in real-time due to how resource intensive it would be.

Upon determining the results of our investigation, we will be working with Sprouts in implementing these new ideas in the upcoming weeks. Our results focus on the idea of "beating" the problem before it arises. By staying proactive and on top of inventory records, it is less likely for a total stock-out to occur. If we were to repeat this process, I would suggest that we come up with more than ten potential solutions. As is, most of our solutions would be challenging to implement. With more potential solutions, the likelihood of an ideal solution increases. While it would have been nice to present more than two ideal solutions in our PICK chart, the data we gathered reveals much more than those solutions alone. With the proper amount of time and consideration, there is no shortage of ways to reduce frontend stock-outs at Sprouts Farmers Market.

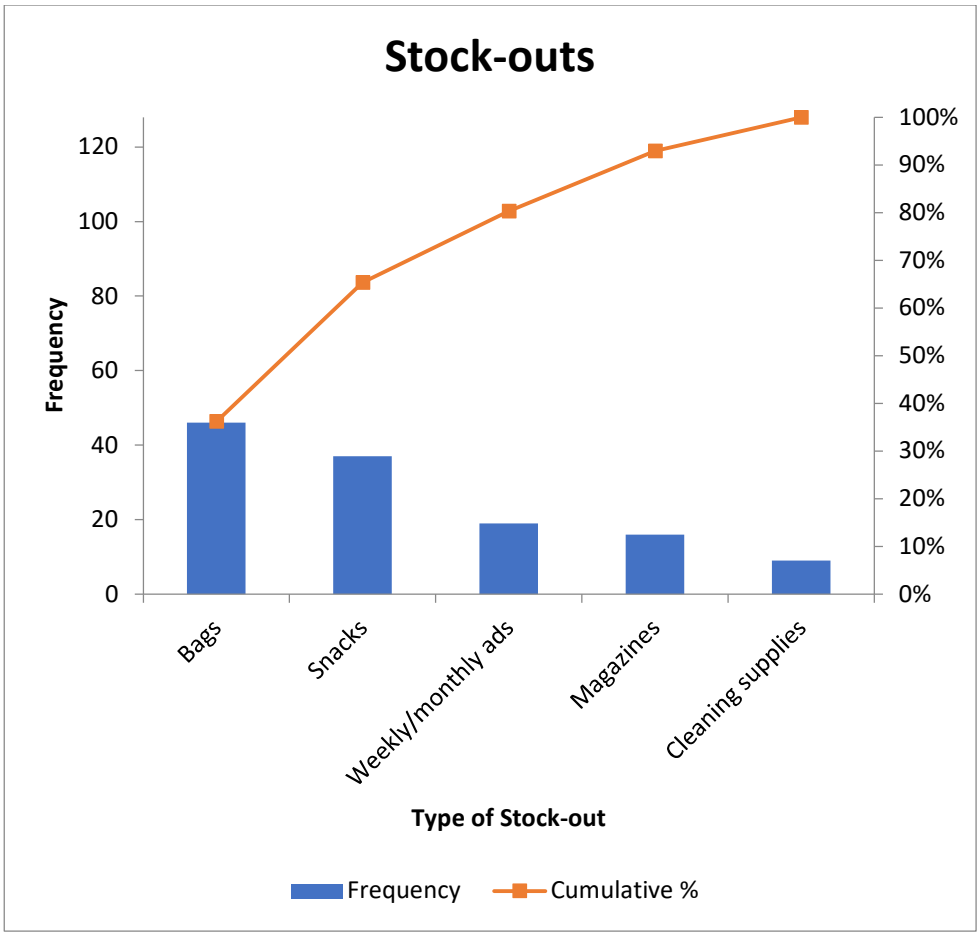
Appendix A – SIPOC Diagram

Suppliers	Inputs	Process	Outputs	Customers
Vendors Warehouses Job Market	Cashiers Sprouts employees Paper bags Cleaning supplies Register display items Delivery trucks	1. Orders arrive 2. Items unloaded and logged 3. Items distributed to departments 4. Necessary items handed out 5. Head cashiers notify manager of needed items 6. Manager logs inventory usage 7. Order placed for new inventory	Stocked inventory Satisfied customers Inventory logs	Sprouts customers Frontend employees

Appendix B – Flowchart



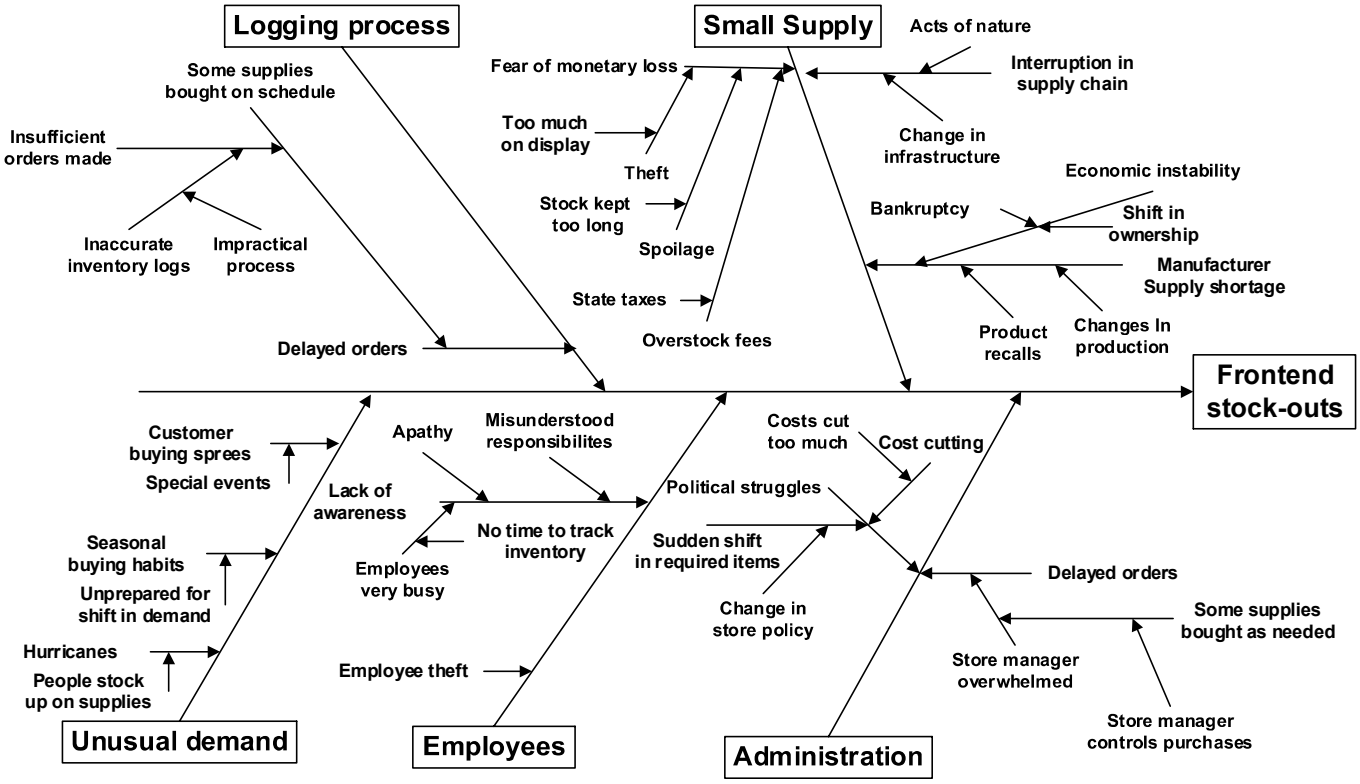
Appendix C – Pareto Chart



Bins	*Frequency*	*Cumulative %*	*Bins*	*Frequency*	*Cumulative %*
1	9	7.09%	Bags	46	36.22%
2	16	19.69%	Snacks	37	65.35%
3	19	34.65%	Weekly/monthly ads	19	80.31%
4	37	63.78%	Magazines	16	92.91%
5	46	100.00%	Cleaning supplies	9	100.00%
More	0	100.00%	More	0	100.00%

Jameika Baysinger
Tyler Nullmeier

Appendix D – Cause & Effect Diagram



Appendix E – Nominal Group Technique

A. Centralized ordering structure (store manager handles orders)
B. Departmental/store-wide cost cutting
C. Employees ignore responsibilities
D. Impractical inventory logging process
E. Supplies micromanaged too much (not enough supplies kept in holding)
F. Unpredictable usage patterns

Root Cause of Stock-outs

Idea	Tyler	Jameika	Karina	Adara	Jacquelin	Rick	Max	Roy		Total
A	6	6	5	5	5	5	5	2	=	38
B	3	3	3	4	2	6	3	1	=	25
C	2	2	1	2	1	4	4	5	=	21
D	4	1	2	1	3	3	2	3	=	19
E	5	4	4	3	4	2	1	4	=	27
F	1	5	6	6	6	1	6	6	=	37

6: Most likely to cause stock-out
1: Least likely to cause stock-out

Google Form:
https://docs.google.com/forms/d/e/1FAIpQLSd5qEoVDSrFTnbQ6XE49KpM5NtwPMbOMo9xTVutuIT-RiY2eA/viewform?usp=sf_link

Jameika Baysinger
Tyler Nullmeier

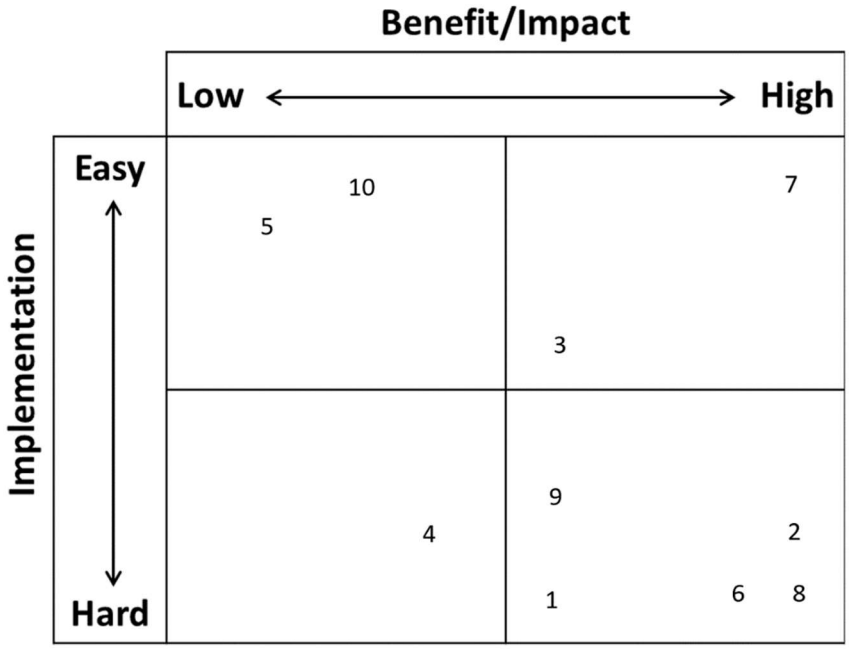
Appendix F – Brainstorming Solutions

Root Causes:
Centralized ordering structure
Unpredictable usage patterns

Potential Solutions:

1. Decentralize ordering (allow others to place orders)
2. Proactively order in advance of demanding events
3. Allow interim orders (between cycles) to meet demand
4. Log item usage in real-time
5. Track usage patterns more
6. Create inventory management task force
7. Perform daily inventory checks
8. Computerized inventory records
9. Create a set weekly inventory shipment based on highest used products
10. Have cashiers keep track of # of bags (by the bundle) they use during each shift

Appendix G – PICK Chart



Possible:

5. Track usage patterns more
10. Have cashiers keep track of # of bags (by the bundle) they use during each shift

Implement:

3. Allow interim orders (between cycles) to meet demand
7. Perform daily inventory checks

Challenge:

1. Decentralize ordering (allow others to place orders)
2. Proactively order in advance of demanding events
6. Create inventory management task force
8. Computerized inventory records
9. Create a set weekly inventory shipment based on highest used products

Kill:

4. Log item usage in real-time