Minute Maid Park Concessions System Redesign

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Abstract

This improvement project addresses the challenge of redesigning the Minute Maid Park concessions warehouse and associated processes to streamline and optimize operations for the Houston Astros food and beverage contractor, Aramark. This project aims to identify the full scope of the current warehouse system while identifying key factors related to the facility and processes that present opportunities for improvement. We used a bounded case study methodology involving multiple, iterative sequential data collection and analysis cycles. Our primary data collection methods were inductive interviewing of key stakeholders and visual observations of the warehouse facility and its processes. Several significant findings emerged: an absence of a comprehensive resource representing the whole system, the system has layered complexities operating across four distinct components, the presence of underutilized, overutilized, and sub-optimally utilized spaces, the Minute Maid Park operating schedule results in unique staff-related challenges, and Aramark is not using the Yellowdog inventory management software to its fullest capacity. From these findings, we proposed six recommendations: refer to the existing system as a reference in the new design, use newly developed employee resources, strategically redesign the facility to improve process flows, organize product placement for streamlined process optimization, leverage employee knowledge and skills for training and evaluation, and increase the use of Yellowdog.

Organization Context

For our capstone project, we partnered with a Major League Baseball (MLB) team, the Houston Astros ("Astros") organization and their catering supplier Aramark Corporation ("Aramark"). The Astros are recent two-time World Series champions and one of the premier teams in MLB. As one of four professional sports franchises that reside in Houston, along with soccer, football, and basketball teams, the Astros hold a prominent place in the local culture of Houston and the surrounding area of southeast Texas. Their facility, Minute Maid Park, is located in the heart of the downtown area and sits adjacent to one of the city's busiest freeways, giving much of Houston's commuters an unobstructed view of their favorite team's home field. Aramark is one of the world's largest arena and stadium concession and vendor relations organizations with multiple local-Houston contracts including the National Football League Houston Texans team and of course, the Houston Astros. Aramark runs most food and beverage services within the Astros Minute Maid Park, including oversight of the related warehouse and food preparation areas.

The scope of Aramark's services for the Astros requires them to manage a highly complex system that spans from inventory ordering to point-of-sale. A range of factors impacts the process, including the variety of inventory items, the differences in required food storage temperatures, the large number of point-of-sale locations in the ballpark, limited physical space, variable event timing and scale, and the array of laws governing the storage of liquor and food products. In addition to Astros baseball games, Aramark also services the varied special events at Minute Maid Park. Essentially, the Astros have outsourced the entirety of their concessions business to Aramark, trusting them to ensure that the fans attending events have the best experience possible while producing maximum profits for both organizations.

There is a myriad of employees that are directly involved in the work encompassed by our project. PJ Sadler, District Manager for Texas, and Jimmy Coatsworth, the Concessions Manager, Minute Maid Park, represent Aramark leadership on site. There are three mid-level managers that report directly to Coatsworth, two warehouse managers and one commissary chef. In addition, the warehouse staff consists of various shift supervisors, full-time employees, and numerous temporary staff that are regularly contracted through a temp agency during the baseball season. There are two Astros executives that worked directly with our team on this project. Marcel Braithwaite, the Senior Vice President of Business Operations, and KB Kalsi, the Director of Project Management.

The two Astros executives and the two executives from Aramark represent our top-tier stakeholders for this project as they are the primary decision makers for any recommendation implementation. However, the warehouse managers and staff have a vested interest in the recommendations made and findings discovered by this project as they are the ones whose day-to-day jobs will be impacted the most. Additionally, as the frontline workers, the warehouse staff will have a more intimate understanding of the current processes in place, including its weaknesses and strengths. Subsequently, their input was highly valuable to our process.

At Aramark's request, the Astros have agreed to renovate the concessions warehouse with the goal of streamlining their processes and maximizing profits. Ultimately, our project seeks to first, provide a holistic picture of the processes involved in the concessions warehouse and food and beverage systems. And second, make recommendations based on observations and research regarding how these processes could be improved. These two insights aim to inform the Astros organization, and their staff of architects, on their approach to the physical facility redesign. Furthermore, we aim to inform the Aramark staff on ways they could optimize their processes within the confines of the new facility.

Problem of Practice

Minute Maid Park originally opened in 2000, and its warehouse facilities no longer meet the demand for Aramark's operations. As a result, the Astros organization determined that significant structural changes are needed and dedicated funds necessary to redesign and rebuild these facilities within the available space. The problem faced by the Astros and Aramark organizations is how to execute this redesign, and subsequent system changes, for maximized outputs.

When initially exploring a project with the partner organizations, our team met with the four executives from the Astros and Aramark at Minute Maid Park to do an initial walkthrough of the facilities. During this meeting, SVP Marcel Braithwaite disclosed that although they have internally come to the conclusion that a facility redesign is needed, they have not explored any possible solutions to their situation from an academic standpoint. They acknowledged that their facility is being maxed beyond its intended capacity when the facility was built over twenty years ago, and further growth of the concessions business is being hampered by limitations of the warehouse and current system. Aramark employees have done the best they can under the circumstances, but all four leaders in the meeting agreed that the demand for more product exists and that the processes currently being employed by warehouse staff are not efficient.

Aramark staff have already taken some steps to improve accountability and to streamline existing processes. Examples of these steps include designating a verifying station, dedicating a hallway for prepared foods, and creating temporary storage units at each vendor location for beverages to facilitate faster restocking. However, due to the shared docking space, limited square footage of the warehouse, storage and preparation centers layout, and a lack of effective managerial facility space, those efforts have limited effect.

During the regular baseball season, the concessions department makes approximately $1M-$1.5M in total revenue per game. This number increases to $2M during playoff games and can get as high as $2.5M during the World Series. However, the executives we spoke with, along with the Aramark warehouse managers, agree that concession revenues could increase if the warehouse facility had more capacity for inventory, and costs associated with delivering the product internally could decrease with a more streamlined system and a facility that was designed with current demands in mind.

Figure 1: Minute Maid Park Concessions Warehouse Layout shows the current layout of the facility in question. The blue sections represent where dry goods are stored, the orange sections are coolers and freezers, and the yellow sections are a mix of dry stock areas and coolers that are designated for beer. The grey section represents where cleaning supplies are stored. The diagram illustrates one of the biggest issues with the current facility: choke points. There is only one way in and one way out of the dry goods storage area, which includes the bulk of the beer storage. This design produces high traffic area in a shared ingress-egress causeway within the warehouse, and is just one example of low-efficiencies that the facility layout produces.

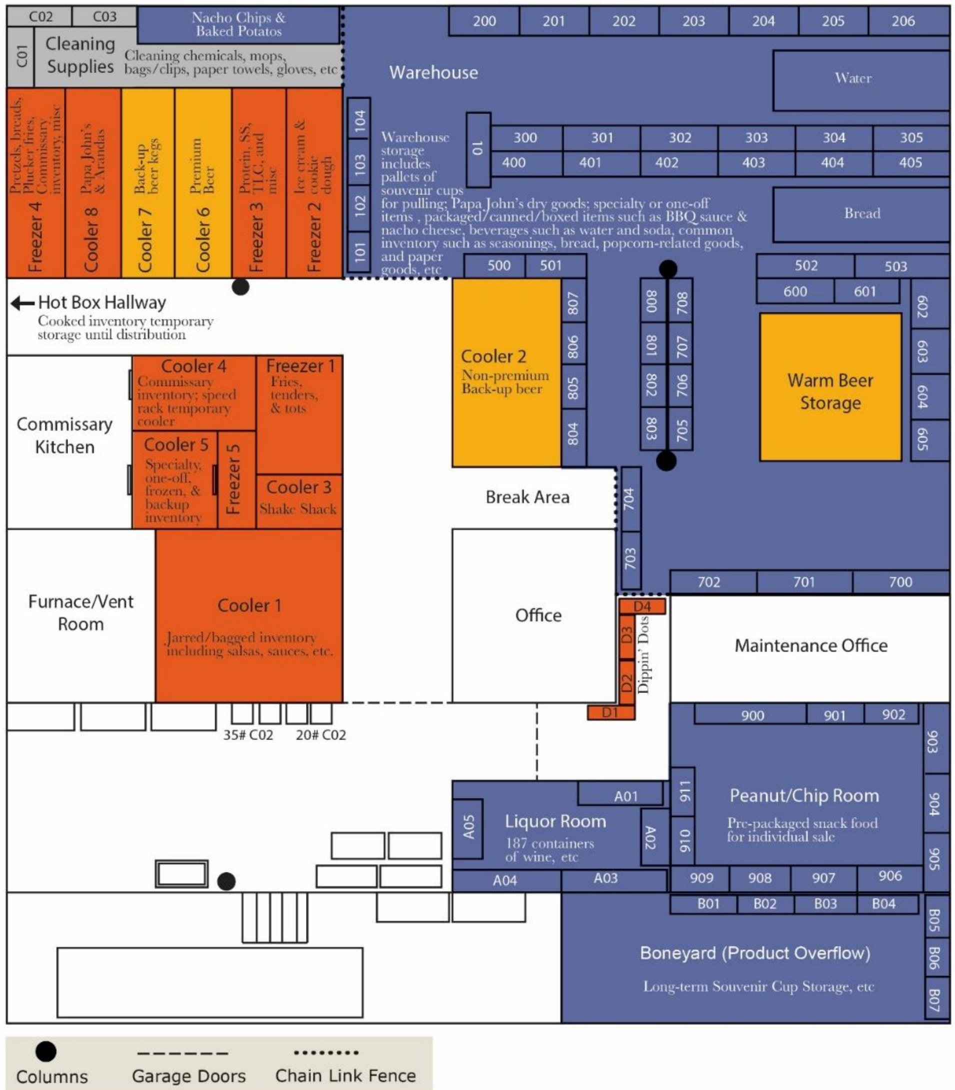

Figure 1: **Minute Maid Park Concessions Warehouse Layout**

Review of Literature

During an initial site visit to the ballpark, Astros and Aramark representatives provided a walk-through of the physical warehouse facility that allowed our team to see the facility's current state of operations. Two primary warehouse-related themes quickly emerged from our tour and discussion: a) the physical warehouse facility and layout and b) the various processes involved, such as receiving, storage, processing, heating and cooling, and distribution of concessions inventory goods throughout the warehouse.

The interrelationships between physical warehouse facilities and the processes involved provided a perfect starting point for our review of existing literature. Our selected search resources included Vanderbilt University libraries, Google Scholar, and common source information from articles identified through traditional internet searches using the Google search engine. However, an initial search of Google Scholar for the term "warehouse" returned approximately 1.4 million possible results. We noticed that many sources that included a reference to the term "warehouse" also referred to a secondary term, "warehousing." Subsequent searches using the term "warehousing" returned approximately 381,000 possible results. We recognized the need to understand these two basic search terms and formulate a strategy to narrow the focus of our search around the specific problem of practice.

Warehouse and warehousing share the same root word but are not necessarily the same in meaning. A warehouse is any physical building designed to keep stored items secure. Warehousing is the process of using and optimizing a warehouse, which includes product maintenance, handling, and other services (Johnson, n.d.). A warehouse is the physical place where warehousing processes occur. These two important concepts are different yet interrelated, so we needed to incorporate both in our literature research as we sought to identify efficiencies and strategies for optimization within the physical warehouse and related processes.

Warehouse Facility and Layout

- ***KEY TAKEAWAYS:***
  - *There is no accepted comprehensive systematic method for warehouse design; however, there are methods for addressing various aspects of warehouse design.*

- *The five major decision-making areas involved in warehouse and system design are: overall structure, department layout, operation strategy selection, equipment selection, and sizing and dimensioning.*
- *To some degree, warehouse design is an iterative process, as it may not be possible to identify an "optimum" solution.*

Our first targeted area of literature examination was the warehouse facility and layout in a ballpark concessions-type environment. The physical space and its layout are essential because the warehouse represents the bounded environment where all warehousing activities occur. The physical structure and space constraints, financial and labor resources, and operational needs resulting from concessions inventory and supply chain demand directly influence the warehouse facility and layout configuration. The warehouse is much like a puzzle, and activities must be organized in an efficient layout for everything to fit (Frazelle, 2016).

While much of the literature addresses particular aspects of a warehouse, very few resources outline the warehouse design process as a whole (Baker & Canessa, 2009). Despite the importance of warehousing to customer experience and cost levels, a comprehensive systematic method for designing warehouses is noticeably absent, and a comprehensive synthesis of available techniques is lacking as a basis for overall warehouse design (Baker & Canessa, 2009; Rouwenhorst et al., 2000).

Without a defined and accepted methodology, most warehouse designers develop their own approach (Oxley, 1994). Subsequently, designers typically use terms such as "eye-ball the data" and "make some initial design decisions...based on intuition, experience, and judgment" (Govindaraj et al., 2000, p. 1100). However, there is a wealth of materials for analyzing particular aspects of warehouse design, including layout, order picking policies, and equipment choice. For example, one resource outlines a framework of warehouse design steps by several contributors from 1973 to 2006 (Baker & Canessa, 2009).

One process model example includes determining warehouse requirements, designing material handling systems and facilities, and then developing the facility layout (Heskett et al., 1973). A second example includes defining system requirements, obtaining and analyzing data, determining operating procedures and methods, preparing possible layouts, and assessing and identifying preferred warehouse design (Oxley, 1994). These models present similarities in their approach to designing a physical warehouse. These common elements will guide our research team as we assess the current ballpark warehouse environment and work towards developing a methodology for the ballpark warehouse redesign.

While a comprehensive warehouse design framework does not exist, there are some broad models that help highlight key decision-making areas often present in the warehouse design process. One model identified in the literature prescribes five major decision-making areas: overall structure, department layout, operation strategy selection, equipment selection, and sizing and dimensioning (Gu et al., 2010). This approach centers on macro-level areas for consideration but does not represent a one-size-fits-all model. It is important to recognize that many detailed, case-specific variables influence each warehouse design. *Figure 2: Foundational elements of warehouse design* illustrates the interrelationships between these areas and acts as the foundation for other frameworks for warehouse design and operation problems we identified in the literature (Manzini et al., 2011).

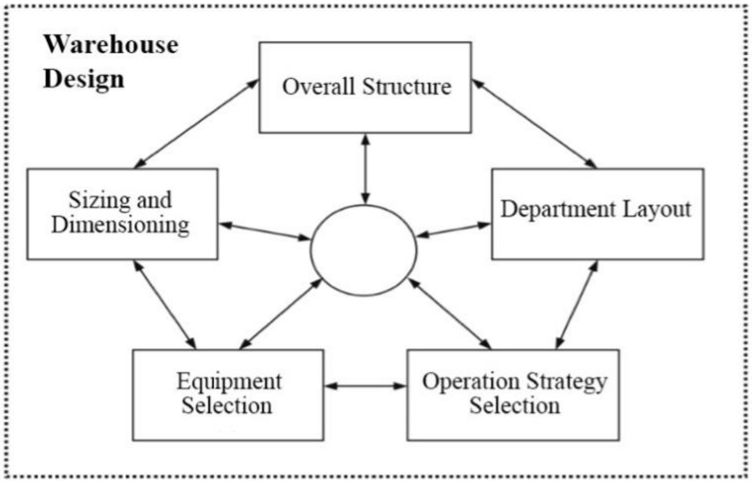

***Figure 2*: Foundational elements of warehouse design**

As depicted in *Figure 2: Foundational elements of warehouse design*, the five major decision-making areas are interrelated and critical to an effective and efficient design. These include:

1. The overall warehouse structure—or conceptual design—determines a) the material flow pattern within the warehouse, b) the specification of functional departments, and c) the flow relationships between departments.
2. Department layout is the detailed configuration within a warehouse. The layout configuration can include locations for inbound docking, equipment, storage, processing, and outbound distribution of goods to customers.
3. Operation strategies have broader effects on other design decisions and therefore are critical to include in the design phase. These could include inventory storage, heating & cooling, food preparation and staging, and distribution strategies that are structured to interact with the physical warehouse configuration.
4. Equipment selection and location decisions determine the automation level within the warehouse and impact critical aspects of the overall system, such as storage, order picking, processing, and sorting of physical inventory.

5. Sizing and dimensioning decisions determine warehouse departments' physical requirements and strategies for physical space allocation (Gu et al., 2010).

Warehouse design is highly complex, and designers typically tackle these complexities by describing step-by-step approaches. The main aspects of warehouse design fall under three broad headings: a) determining the requirements, b) designing the material handling systems, and c) developing the layout (Heskett et al., 1973). These common themes are interrelated, and a degree of reiteration is necessary as it may not be possible to identify the "optimum" solution for all warehouse scenarios owing to the high number of possibilities at each step.

Warehousing Systems and Processes

- ***KEY TAKEAWAYS****:*
    - *Eliminating and simplifying work content is critical to warehousing improvement.*
    - *A three-level model differentiates critical warehousing decisions.*
        - *Strategic decisions concern big-picture and long-term issues.*
        - *Tactical decisions concern detailed logistic issues that are key to accomplishing strategic-level decisions.*
        - *Operational decisions concern independent and quick turnaround decisions.*
    - *When making warehousing decisions, it is critical to consider available resources and key trade-offs between competing objectives.*
    - *A warehouse has three primary stages of process flows: receiving, storage, and shipping; decisions for defining these flows begin during the design stage.*
    - *Warehouse design and warehouse operations are separate but related issues.*

Next, we examined the roles of warehousing systems and processes within a warehouse facility. Warehousing plays an indispensable role in business and supply chain strategy;

however, many warehouse design projects are set into place without designers understanding the root cause of problems or adequate exploration of real opportunities for improvement (Frazelle, 2016). Although the common denominator for warehouse improvement is eliminating and simplifying work content, doing so without addressing root causes may not result in the intended outcomes. These considerations are essential to our research problem. Any processes and sequences our partner organizations implement will influence critical system factors such as concessions inventory flow and customer experience. Subsequently, we must explore the problems of practice beyond surface evidence for our recommendations to be effective and efficient.

Warehousing systems and process optimization depend on effective decision-making that improves warehouse performance. One popular method for approaching critical decisions uses different levels of decision-making within a warehouse setting (Rouwenhorst et al., 2000). At the onset, *strategic*-level decisions include the big picture, long-term decisions that require high investment. These decisions include the overall warehousing system type and high-level process flow design. The process flow design defines the required processes occurring within the warehouse, and selecting processes requires the availability of specific systems. For example, a warehouse manager can only implement sorting processes based on whether a sorter system exists that can handle the products.

Tactical-level decision-making follows a more logistical progression from the strategic level to make medium-term decisions. These decisions effectively carry out the strategic planning at a more detailed level, with lower impact, a shorter time horizon, and minor investment requirements (Rouwenhorst et al., 2000). Tactical decisions typically concern the dimensions of resources and spatial relations, such as storage system sizes, the number of employees working in a given space, zone dimensions, the dimensions of dock areas, and the warehouse layout. Tactical decisions typically also cover several organizational issues, including determining policies and which type of material-handling equipment employees will use.

Finally, *operational*-level decisions encompass more independent policies and choices made with the quickest turnaround. Considerations such as personnel assignments and daily product routing fall within this level (Rouwenhorst et al., 2000). As strategic-level decisions constrain tactical decisions, both will constrain operational-level decisions. *Figure 3: Decision-making levels for a warehouse setting* illustrates the relationship between the three tiers and their respective dimensions of impact-over-time and relative order of decision-making. As shown, strategic-level decisions are the foundation for all others that follow, and decision-makers should consider these issues prior to moving on.

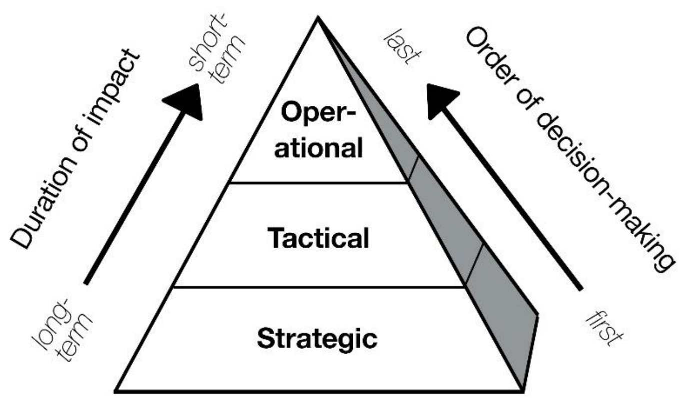

***Figure 3*: Decision-making levels for a warehouse setting**

Given that no overall accepted systematic procedures exist to design warehouses, when considering the three levels of decision-making on warehousing processes, it is critical to consider available financial and physical resources and key trade-offs between competing objectives (Rouwenhorst et al., 2000). Our research team must consider the unique goals, resources, and constraints surrounding the Minute Maid Park warehouse facility. Furthermore, when implementing recommendations, our partner organizations should consider these three approaches to optimize the warehousing processes in both the long- and short-term to meet the organizations' unique needs.

There is a general framework for process flows of physical inventory items through a warehouse (Rouwenhorst et al., 2000). This framework identifies three primary stages:

- *Receiving* is the first process encountered by an arriving item.
- *Storage* involves placing items in designated locations, consisting of a reserved area to store products in the most economical way (bulk storage) and a forward area, where products are stored for easy retrieval.
- S*hipping* includes where staff check orders, pack and eventually distribute inventory. In the context of our research study, the shipping stage equates to the distribution points to consumer sales locations across the ballpark facility.

The most important decisions for defining a process flow begin at the design stage, and there are a number of policies that a warehouse might want to implement. Examples include a dedicated storage policy, which prescribes a particular location for each product to be stored; a random storage policy, which leaves the decision to the warehouse operator; a class-based storage policy (ABC zoning), which allocates zones to specific product groups (often based upon their turnover rate); or correlated storage, which stores products at nearby positions if they are often required simultaneously (Rouwenhorst et al., 2000).

Many general configuration elements discussed in the literature on observed practices translate into detailed decision elements. Examples include the degree and type of automation and sorting solutions, permanent versus temporary staff, cut-off times for handling shipping orders, and the integration of various zones and processes in each of the warehouse operations (Karagiannaki et al., 2011).

Given the complexity and variation of warehouse and warehousing systems, it is vital to consider warehouse design and warehouse operations as separate but related issues (Manzini et al., 2011). This relationship is of central importance for general warehouse planning and our project. Each domain significantly impacts the other, and any decisions made within one should consider potential outcomes for holistic performance. For example, department layout is a design consideration that will significantly impact the operational efficiency of order picking and, therefore, should factor into the decisions regarding which method to use (batching, routing, or sorting). Furthermore, one must consider the constraints of a warehouse's size and dimensions in selecting the best operational approach for storage and internal location assignments.

Figure 4: Framework for warehouse design and operation problems illustrates one classification of warehouse design and operations. It reiterates that while the two concepts have their own considerations, they are related. Designers should consider both in their evaluations as the strength of how these two domains function together will ultimately determine overall performance.

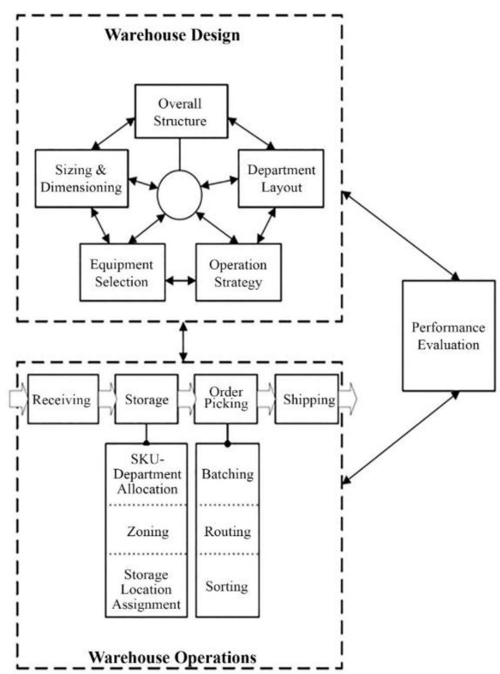

***Figure 4*: Framework for warehouse design and operation problems (Manzini et al., 2011)**

Conclusion

Our literature review provides the foundation for our team to develop a conceptual framework for approaching our problem of practice. As we develop a framework to approach the Astro's concessions warehouse redesign, it is clear that we must consider both the existing physical warehouse facility and the warehousing processes, along with the interrelationships of each.

Conceptual Framing and Project Questions

Our literature review yielded several existing conceptual frameworks relevant to our problem in practice. The framework that most closely addresses our area of research is the 2007 model of "framework for warehouse design and operation problems" (Gu et al., 2010, p. 540). This model (see *Figure 2*) drew from several existing frameworks to create a better understanding of the interplay between decision areas within a warehouse. Furthermore, the framework illustrates a connection between a warehouse's physical and operational aspects that is central to addressing our problem. We recognized early that these two narrower areas of focus—facilities design and warehouse and concessions systems—informed each other. For example, facility design impacts how organizations implement warehouse processes and systems. Moreover, the demands placed on existing systems, and various optimization opportunities found therein, provide critical information that architectural design teams can utilize in their process. As such, this model served as an ideal starting point for framing our problem.

Although Gu's model pointed us in the right direction, it only partially addresses our project's problem of practice. As such, we have adapted it to create a conceptual framework more specific to our context (see *Figure 5: Conceptual Framework*). For example, the facility design needs of Minute Maid Park are unique compared to most related literature due to the physical constraints of being within a ballpark, the required cooking and food preparation zones, and the temperature zones needed for various concessions and related laws and policies. Therefore, we adapted this portion of the model to encompass these critical elements and further amended the existing aspects detailed in the model.

For our problem of practice, we concluded that the overall layout was the central element impacted by the scope of other facility-related decisions. As such, we updated our conceptual framework to include this as a central facility design factor. Additionally, we omitted any “operation strategy” elements from this portion of our model due to our focus on the interplay of operation strategy with facilities design in a more large-scale way, as illustrated by other elements we have incorporated into the framework.

As with the facilities design portion, we also found that the warehouse operations segment of our reference model did not fully align with our problem of practice context. We reconceptualized it as a “Warehouse & Concession System,” as the demands of catering functions significantly alter the system from a typical warehouse. Our updated model introduced flow steps of “Cooking/Prep Sones” and “Moving and Stocking.” We further amended shipping to “Distribution/Sales” to more accurately reflect the output mode at our site. We opted to remove some of the secondary details included in the original model to instead illustrate critical elements we anticipate impacting system decisions and functioning at our site. We based these elements on initial conversations with our partner organizations and themes that emerged from our literature review.

Our updated model illustrates a shift towards centering the interaction between decision areas in two primary ways. The first is a central "System Engineering and Implementation" element that overlaps the model's design and system portions. This addition is fundamental to addressing our problem of practice, which seeks to resolve how Aramark might best design and implement a system responsive to its physical space. This unifying element illustrates how a physical facility and a process system can facilitate one another. Secondly, we expanded from the original model's singular box indicating “Performance Evaluation.” While this showed the flow from operations and design to overall output, it did not capture the iterative improvement process inherent in the problem we are addressing. As such, we added an element indicating a cycle for continual improvement through ongoing iterations of observation, evaluation, and adjustment.

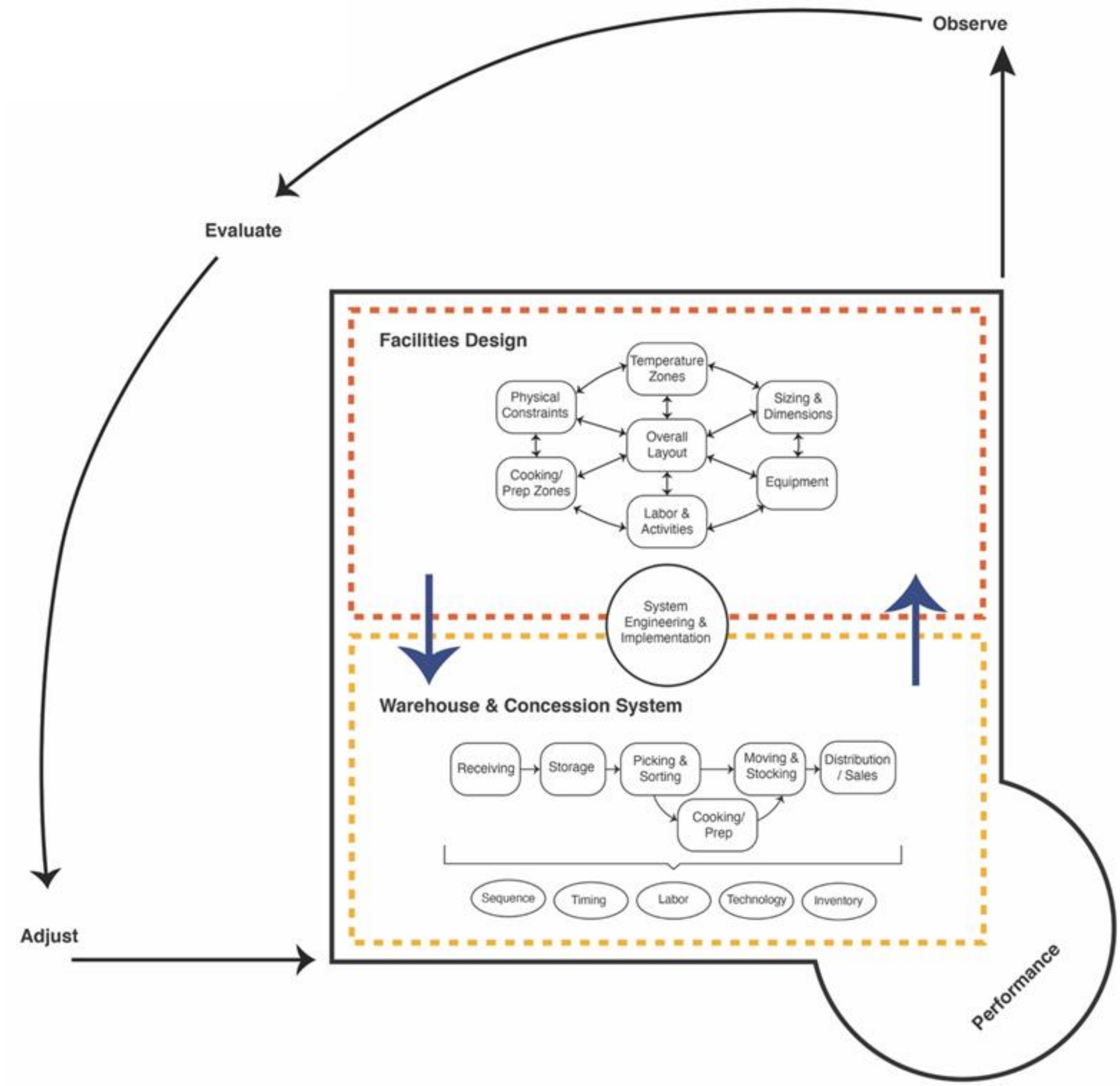

***Figure 5:* Conceptual Framework**

Our conceptual framework provides a comprehensive map for the sensemaking of data we gathered throughout the project. We aim to give recommendations directly related to changes that will aid in redesigning the physical space to accommodate the system better and, conversely, adapt the system to better function in the physical space. This focus on the relation between space and function will encompass elements finitely within each of the two sections, but only as they relate to the larger scale system engineering and implementation planning. Further, we are providing recommendations to help inform decision-making at the strategic and tactical levels while aiding the organization in understanding how to best approach ongoing operational decisions beyond our scope.

Project Questions

Our goal was to identify paths for improvement while considering future scalability so that our partner organizations can make internal decisions based on data analysis and strategic understandings of the problem. Our capstone project approached the problem of practice facing the Aramark and Astros organizations using three guiding project questions:

1) What is the full scope of the current concessions warehouse system?
    a. How does the current concessions warehouse system operate within the existing facility?
    b. What standard operating procedures (SOPs) do Aramark's warehouse teams follow within the current concessions warehouse system?
2) What key facility-related factors of the current system present opportunities for improvement?
3) What key process-related factors of the current system present opportunities for improvement?

Project Design

Our capstone is a quality improvement project that used a bounded case study methodology. Proper studies of this nature examine the particularity and complexity of the unique circumstances of each case (Stake, 1995). Subsequently, we used multiple iterative, sequential data collection and data analysis cycles to focus our observations and interpretations of the data, building depth and meaning for the study.

Data Collection

With our theoretical framework and project questions serving as the guide for data collection, our team collected observational data through inductive interviews, email and text exchanges with warehouse managers, and direct observations across seven onsite visits between October 6, 2022, to November 18, 2022. For the initial site visit, all research team members were present for a comprehensive guided walkthrough of the entire Minute Maid Park facility. The host leadership group, comprised of two Astros executives, one Aramark executive, and two Aramark warehouse managers, conducted the tour. The purpose of this visit was to obtain a broad understanding of the warehouse facility, processes, and scale of the operations as well as take photos of the parts of the facility most relevant to the problem of practice.

We conducted six additional site visits. During each subsequent visit, we met with various personnel, including warehouse managers, frontline employees, third-party vendor representatives, and Aramark and Astros executives. Our primary data collection methods were observation, inductive interviewing of key stakeholders, and visual observations of the warehouse facility and its processes. Each visit and data collection round followed up on questions and curiosities that emerged in the analytic memoing after the previous visit, thus making the process iterative in nature (Stake, 1995). In this way, the analytic memoing served as a preliminary analysis tool that led to a data collection process that spiraled towards a tighter focus and specificity over time.

Figure 6: Bounded case study approach illustrates the cyclical nature of our data collection methodology. The blue dots represent site visits where our team collected data through direct observations, open-ended interviews, and recorded analytic memos. The orange dots represent post-visit activities of data analysis in which our team developed a systems process

map based on the data and identified information gaps in areas such as logic and process clarity. We used these gaps to formulate analysis-informed questions which guided subsequent visits. Ultimately, we ran through this iterative cycle six times allowing us to acquire purposeful, focused data and gain a holistic view of their processes and facility usage.

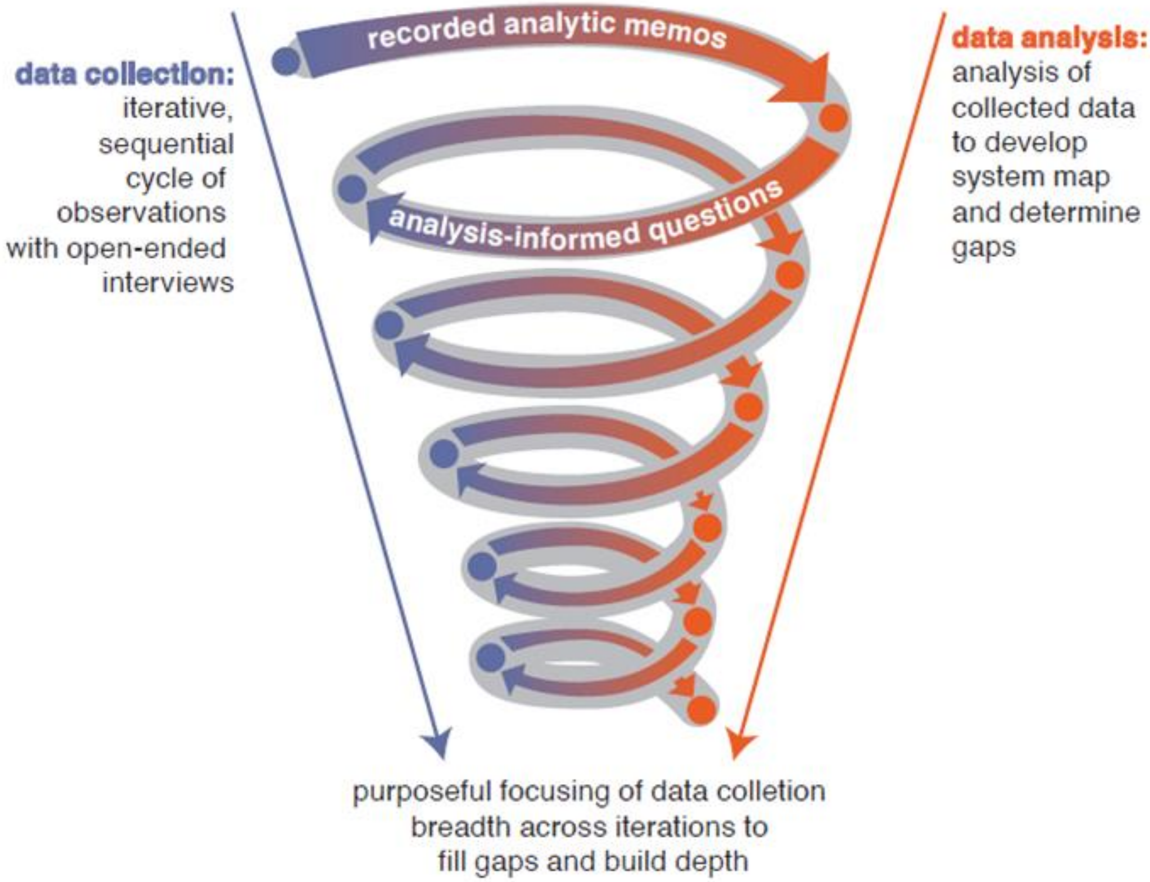

Figure 6: **Bounded case study approach**

To conduct site observations, we worked with our partner organizations to target high-volume days that allowed us to view the warehousing system at its peak functioning. We captured observation data over six visits during the MLB postseason. Each of these visits lasted approximately two to four hours. *Table 1: Site Observations* details each visit by providing the date—and weekday—of each visit along with some situational context explaining what the work environment and circumstances were during the visits.

Table 1: **Site Observations**

Site Visit Date	*Situational Context*
Thursday, October 6, 2022	No games played. Initial site visit conducted by members of the Astros and Aramark leadership teams. Purpose of the visit was to familiarize ourselves with the facility and identify the problem of practice. The team had a home game the day previous. It was the last game of the regular season and the team would not host another home game until Game 1 of the playoff series on Oct 11.
Friday, October 21, 2022	No games played. Astros hosted a playoff game the night before and did not have any other guaranteed home games scheduled. Their next game was a road playoff game.
Tuesday, October 25, 2022	No games played. Astros had won their playoff series and knew they would have home games in the upcoming World Series to prepare for. However, they did not know who their opponent was or when the next series would start yet. Subsequently, they were limited with what inventory they could order due to freshness considerations.
Thursday, October 27, 2022	No games played. Astros were to host Game 1 of the World Series the next day and were gearing up for the additional inventory that would be produced for fans. In addition, the stadium had to accommodate significantly more media coverage and their warehouse dock space was occupied by media trailers and equipment.
Friday, November 11, 2022	No games played. Season was over and warehouse personnel had begun the process of preparing the facilities for the offseason.
Monday, November 14, 2022	No games played. Season was over and warehouse personnel had begun the process of preparing the facilities for the offseason.
Friday, November 18, 2022	No games played. Season was over and warehouse personnel had begun the process of preparing the facilities for the offseason. There was a charity gala event this night that the facility teams prepared for. The regular concessions inventory was not used, but the personnel were utilized in the preparatory process.

Based on Project Question 1, our initial agenda was to identify how the concessions warehouse system operated within the current facility layout and what standard operating procedures (SOPs) Aramark's warehouse teams were following. Early discussions with Jimmy Coatsworth, Aramark's Concessions Manager, led us to believe that no single individual who understood the entirety of their system and all its integrated processes would be readily available. Subsequently, we focused our observations on learning each step of the concessions inventory process, starting with what demand signals drive the ordering process, initial receiving of inventory goods, storage and internal transportation procedures, processing, delivery, distribution throughout the ballpark, and post-event activities.

Throughout each data-collection visit, we followed frontline workers through each stage of their processes, noting activities that both followed and deviated from the stated policy. We completed thorough walk-throughs of every part of the facility relevant to our project, including all vendor locations, taking photographs of relevant spaces and measurements of storage capacity. In addition to gathering input from frontline workers during site visits, the head commissary chef and three warehouse managers participated in guided observations. Through informal interviews and interactions, we utilized in-depth, open-ended conversations during site visits and supplementary phone calls, texts, and emails.

Each visit followed a similar pattern: we arrived on site around 8:00 am and were escorted through the facility by one of Aramark's employees who provided detailed explanations of the process, systems, inventory, and other relevant information to the problem of practice, as well as answered any clarifying questions that arose. This process took approximately two-to-three hours. In addition, we shadowed employees and vendor representatives as they conducted their daily duties to make additional observations. These exchanges varied depending on the activities observed but typically lasted another hour to an hour and a half. We concluded each visit with a short conference with Aramark managers to review observations made that day.

Rather than transcribing notes onsite, we dictated observations using a smartphone device and the Google Recorder app. Google Recorder provides transcriptions of recordings and saves them on cloud servers for access and download. After each site visit, we reviewed the transcribed notes from the recording device, identified pertinent information from the visit, and added that information to a bulleted list of qualitative data using Word documents. Finally, using the electronic recordings, we transcribed the data files and organized Word documents for review and verification after every visit.

Data Analysis

Our project design included two primary phases for analyzing data based on the respective project questions. Phase One aligned with Project Question 1, and Phase Two aligned with Project Question 2 and Project Question 3.

In Phase One, we worked to learn the full scope of the current concessions warehouse system, including how it operates within the existing facility and identifying standard operating procedures (SOPs) that the Aramark teams follow within the current concessions warehouse system. Using the collected data, we created a process map detailing the system as we understood it. To do so, we collaborated as a team on each data point relevant to the system to reach a consensus understanding of each step in the process. Once we reached a consensus, we used an online lucid chart software program to create the process map. We provided four different iterations of the map to Aramark employees for member checking, review, and feedback for updates. Each subsequent site visit provided new data points to add to the map, areas to update, and gaps in our understanding to amend. This process was an essential part of our data analysis as the final version of the process map verified that our understanding of the system was complete and accurate, thus allowing us to move forward confidently with Project Question 2 and 3.

Once our comprehensive understanding of the existing system and space was member checked by Aramark team members, we used Adobe InDesign to produce a polished final copy of the process map. We also used Adobe InDesign to recreate and update a map of the current warehouse space—provided by the Astros—for clarity and to supplement the process map. Appendix E contains a copy of these documents.

In Phase Two of the data analysis, we turned our attention to data coding. Project Question 2 focused on identifying key facility-related factors of the current system that present opportunities for improvement. Similarly, Project Question 3 had the same focus but with process-related aspects of the system. Many data points addressed both questions, while others were relevant to one or the other. Consequently, an in-depth coding process was necessary to organize our data and have a reliable method for approaching the analysis and emergent findings.

Data Coding Process

Our research team participated in multiple coding and review rounds. We started with a Word document containing all the relevant transcriptions from our onsite observation visits. We organized the document as an outline with significant observations written out in sentence format and related observations included as indented sub-levels to the outline. For example:

1. The nacho chips section is in the back by the cleaning supplies and has ten pallet spaces.
    a. Eight pallet spaces are used for chips and are typically stacked up to about seven feet in height, with each pallet holding 50 boxes of chips.
    b. The other two spaces usually contain boxes of foil-wrapped potatoes for the commissary.

Furthermore, we organized the Word document by observation date and time. For example, we made recordings as we conducted site visits and dictated observations into the recording device. The site visit on Friday, 10/21/22, had nine different recordings. One such recording occurred at 9:32 am, which we arranged into four outlined observations, three of which had several sub-levels of noted observations outlined.

From there, we created a codebook using an Excel spreadsheet that included all the outlined observations from the Word document, with each observation (and outlined sub-levels) occupying a row of the spreadsheet. We assigned each observation a three-digit number, while sub-level outlined observations were assigned the primary level's number with an alphanumeric sequence—for example, 001, 001a, 001b, 002, 003, 003a. There were 350 observations in total. We included identifiers such as recording time signatures and site visit dates. Columns for "Date," "Recording Time," and "Observation #" were situated on the far left, and we entered the corresponding data for each observation in its respective cell.

Ideally, codebooks include themes drawn from the conceptual frame and inductive themes recognized through an initial data review (Merriam, 1998). So, to develop our initial list of codes, we reviewed our conceptual framework and determined five categorical themes related to the specific context of our problem of practice. These themes included observations about technology systems, sequencing, facility layout, labor, and physical constraints. Subsequently, a column for "Parent Codes" was added, and we assigned each observation a code.

Identifying parent codes during a first pass through of data allows researchers to begin considering additional sub-themes, or "child codes," informed by a conceptual frame and potential themes noticed through an inductive process (Merriam, 1998). Subsequently, as a group, we reviewed our parent codes and conceptual framework, identified multiple child codes, and created a column for each.

After each team member completed an initial data review, new themes emerged that we had not identified previously. These codes were “Data Related,” “Vendor Relations,” and “Communications.” Additionally, we recognized that we needed to clarify that the child code “Zones” referred to zones within the warehouse and that “Layout” referred to the overall layout of the entire Minute Maid Park facility. *Table 2: Parent and Child Codes* contains the complete lists of parent codes and their respective child codes.

Parent Code	Child Code
Facility	Stadium Layout Temperature Warehouse Zones
Inventory Management	Data Related Inventory Goods Technology Systems Vendor Relations
Resources	Equipment Labor
Retardants	Physical Constraints Choke Points
Systems	Activity Communications Process Sequence Timing

***Table 2*: Parent and Child Codes**

Like much of our project, our process for assigning child codes was iterative. We reviewed the observations in the spreadsheet, and coded those we considered personal notes and identified observations we would include in the process map, which we highlighted in yellow. Then, team members reviewed the data again and independently assigned child codes to each observation not designated as a personal note. For example, the observation “Ticket sales project attendance” could be child coded as *Data Related*, *Process*, and *Timing*. We then engaged in inter-rater reliability assessments as a form of internal checks to ensure accuracy. Doing so improved our accuracy over time and facilitated additional conversations that resulted in us clarifying codes and a more analytic process.

Our inter-rater reliability process entailed team members independently reviewing the entire list of observations and determining which code(s) fit best with each data point. Many observations contained more than one element from the coding, so the most meaningful approach was to apply multiple codes to each relevant data point where appropriate. After we completed an initial coding round, we combined the analyses and compared the assigned codes. We designated data points with complete agreement on the child codes as “aligned,” those with some agreement and some disagreement as “partially aligned,” and those with no agreement as “not aligned.” We then discussed each “'not aligned” data point as a group, giving each researcher a chance to explain their perspectives until we reached a consensus and adjusted the coding accordingly. This process changed all “not aligned” data points to “aligned.” We then reviewed all the data points we initially designated as “partially aligned” again and reconciled the variances to determine the final coding. See Appendix D for an excerpt from our codebook (the entire codebook can be accessed here).

It is best practice when designing preliminary findings to draw on relevant codes related to each project question (Merriam, 1998). With our data now triple-coded, we were poised to identify meaningful findings across our three project questions. We began this process by adding two columns to our codebook; one for indicating data related to Project Question 2, and the other for indicating data related to Project Question 3. We did a full review of the data to reach a final consensus on which points were relevant to the two questions.

We then took the three project questions to synthesize initial findings. We utilized the Phase I deliverables (process and facility maps) to establish findings for Project Question 1. We reviewed the data identified as relevant for Project Question 2 to draft related findings and completed the same exercise utilizing relevant data for Project Question 3.

Once we had established findings related to each project question, our team completed one additional review to refine and establish final findings. For this last review, we returned to the larger corpus of data once more to review and test findings against our understanding of the problem of practice and collected data. Reviewing the larger body of data to look for anything confirming or refuting preliminary findings is one more tool to ensure accurate and applicable findings (Merriam, 1998).

Findings

Key Findings: Phase One – Project Question 1

In Phase One of our project, we aimed to answer the question: What is the full scope of the current concessions warehouse system? In addition to identifying the product cycles of various inventory items, we also learned how Aramark teams operated within the existing facility, what standard operating procedures (SOPs) were in place, and how well the staff followed them.

1. *While official standard operating procedures exist, we did not observe a comprehensive resource for frontline staff to reference and follow.*

Many of the Aramark staff's accepted practices appear to be undocumented operational processes that have evolved over time. Some practices work well, while other less efficient practices have evolved out of necessity and habit. Through our observations and conversations with company representatives, it became clear that frontline employees are focused on their assigned work and often do not have a detailed awareness of the process and requirements of other roles within the warehousing operation or how their job might impact others and vice versa.

Furthermore, very few individuals, if any, knew the entire concessions warehouse system. Our team had to observe and consult managers, chefs, frontline workers, and vendor employees to fully understand the current system, including facility usage and processes. To encapsulate this system, our team created a process map and facility layout (see Appendix E).

2. *The current concessions warehouse system can be divided into four distinct components. Those components are:*
    a. *Order through delivery*
    b. *Inventory warehouse storage*
    c. *Inventory internal distribution*
    d. *Post-event activities*

As our team built a comprehensive process map of the current system, we recognized four unique systems that worked sequentially, each with a distinct start and end point. This finding is significant when trying to improve the system as a whole. For example, we can recommend changes to one sub-system in a silo without impacting the other three sub-systems.

There are four categories of inventory goods. Each category has its own unique process. Those categories are beer, dry inventory (including any non-alcoholic bottled beverages that do not need cold storage), fresh and frozen inventory, and chemical and cleaning inventory. Identifying the above categories was critical to understanding the second system component: inventory warehouse storage. Inventory goods from each category have a different process; we should not expect them to follow the same life cycles within the system. Subsequent recommendations must consider this.

Key Findings: Phase Two – Project Question 2

In Phase Two of our project, we aimed to identify key facility- and process-related factors of the current system that presented opportunities for improvement through Project Question 2 and Project Question 3, respectively.

Three primary findings emerged when reviewing the data for Project Question 2: under-utilized spaces, over-utilized spaces, and non-optimally utilized spaces. We arrived at these as tentative findings by organizing relevant data points on an Ishikawa-style diagram to categorize supportive data (see Appendix B), which we then utilized to draft tentative findings for Project Question 2. We then substantiated these findings through a full data review, refining and amending them as necessary.

1. *The organizations currently underutilize available space within the facility*.

The facility services room and the liquor room provide significant opportunities to improve optimization through more intentional use in the facility redesign.

- The facility services room is directly adjacent to the warehouse and dock facilities. The organizations currently use this space to store laundry and house various equipment.
- The liquor room is located within the entrance area to the warehouse facility. This space is central within operations, but because a different department handles all liquor and alcohol within the facility (except for beer), its primary use is for short-term overflow storage for liquor in the case of large orders.

2. *Several areas are overutilized by staff throughout the warehouse facility due to a lack of alternatives, creating choke points for the system.*

Hotbox Hallway, the commissary, and the loading dock impede optimal functioning due to the spaces' usage or, in the commissary's case, a lack of necessary space. Each of these provides a significant opportunity for improvement through the redesign process.

Hotbox Hallway serves as a temporary staging area for prepared food distributed during events and a critical passageway for output. A single door opens directly from the far end of the hallway to the main corridor to the concourse. It is closed to warehouse traffic until after games have started. At this point, the main entrance to the warehouse closes, and the only entry into the facility is through Hotbox hallway. However, pre-event inventory distribution must go out through the warehouse's main entrance, thus requiring ingress to compete with egress.

The commissary currently only has one entry point, just before Hotbox Hallway. Subsequently, when the staff needs inventory for food preparation in the commissary, they must navigate through busy sections of the warehouse to retrieve it—Cooler 1 functions as the primary storage location for fresh food used by the commissary. The entrance to Cooler 1 is directly adjacent to the main entrance to the warehouse and across from the verifying station. Furthermore, the limited space within the commissary restricts the amount of food they can prepare in-house. This results in ordering some pre-cooked food, which could otherwise be prepared fresh, potentially for a lower cost.

Because of the facility’s physical constraints and layout, unnecessary congestion occurs due to limited options for ingress and egress throughout the warehouse. “Dead-end” alleys currently store bulky, high-quantity goods such as beer and bottled water or perishable goods with special storage requirements, like bread.

There is a single loading dock for the entire Minute Maid Park facility, which uses the main warehouse entrance as the only pathway for inventory delivered from suppliers to get transported into the warehouse for storage. Particularly at times of high functioning, this creates backups for vendors and inventory, with the dock floor often acting as temporary storage for multiple departments until they retrieve their inventory deliveries. This layout can also cause inefficiencies for certain items like ice. All ice for the stadium gets delivered to the loading dock, where it waits until staff can deliver it to freezers throughout the facility. Depending on the availability and efficiency of the staff, ice melting results in product loss. The proximity of the dock to the concessions warehouse exacerbates these issues leading to build-up and overflow of inventory that can impede warehouse functioning and efficiency.

Before events, Aramark staff returning from deliveries with empty carts to refill for their next load use the same warehouse entrance as staff leaving the warehouse to deliver inventory to internal vendor locations. Adding to the congestion, the verification station for outgoing inventory deliveries is at the same entrance location, so staff leaving the warehouse often wait in line, blocking off part of the pathway. Furthermore, due to Hotbox Hallway's closure before events, the only way from the warehouse's main entrance to the concourse is through the loading dock. Ultimately, the main warehouse entrance facilitates five different ingress and egress activities, all occurring simultaneously in the same location.

Figure 7: Ingress and Egress Map illustrates the issues involved with where items are stored, the pathways staff members must travel for pickup and delivery, and the congestion that occurs regularly at the warehouse's main entrance.

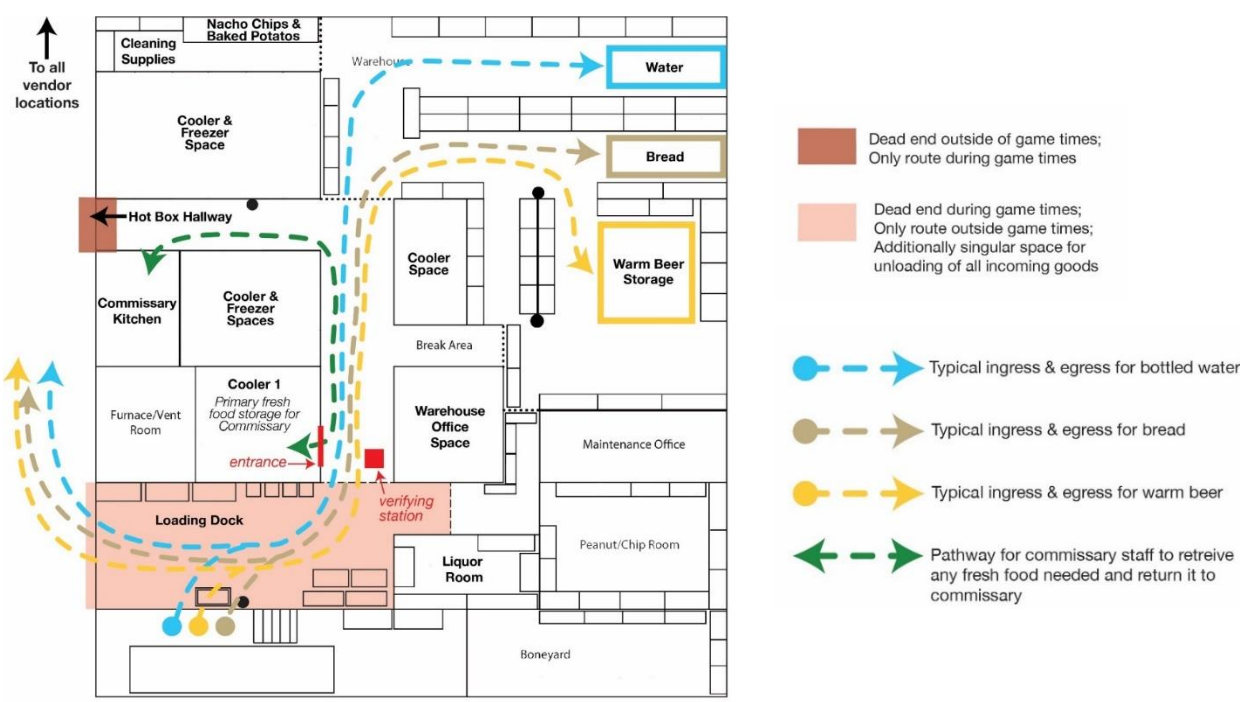

Figure 7: **Ingress and Egress Map**

3. The utilization of some physical spaces and inventory placement are not optimal.

Several areas are not under or over-utilized per se, but the design team should reconsider their usage to improve effectiveness in the new physical space.

- The current freezers and coolers leave unutilized vertical space, and the mechanical units generate added heat within the working space of the warehouse.
- Dry shelving spaces 700 to 702 currently hold souvenir cups relocated from the boneyard. These spaces are directly adjacent to warm beer storage, which at times can be inadequate for the quantity of beer Aramark cycles through regularly.
- A lack of embedded spaces for non-warehouse staff in the dock and concessions warehouse areas disrupt process flows. When these staff members are not available to perform critical duties for their incoming stock, it results in a back-up of inventory and the need for warehouse staff to step in and complete tasks that are not theirs. However, the existing office space for warehouse employees is not big enough to house more employees.

Similarly, the design team should consider inventory placement within the warehouse from a production framework rather than a storage perspective to improve effectiveness. Doing so will create more optimal pathways for pickup and delivery. For example, nacho chips and potatoes are currently located within the cleaning supply section. They occupy a ten-pallet space just off the entrance of the cleaning supply area in the back of the dry warehouse. Furthermore, the current layout stores bottled water in the far back-right corner of the warehouse at a maximum distance from the delivery dock. Whereas beer and soda are one of the last inventory items at the end of the row on the far-right side of the warehouse behind the office space. These items are high-volume and hefty inventory items, yet staff must navigate to the farthest points in the warehouse to retrieve them. Then they must haul them back through the warehouse navigating internal traffic with the bulkiest loads.

Key Findings: Phase Two – Project Question 3

The goal for Project Question 3 was to identify key process-related factors of the current system that presented opportunities for improvement. However, it is important to note that processes are intricately related to the physical space (facility) in which they occur. Subsequently, we found significant overlap between the findings of Project Question 2 and Project Question 3. Furthermore, we recognize that changes to the facility may require changes to the process and vice versa.

Based on our analysis, several factors emerged that present opportunities for warehouse process-related improvements. Like Project Question 2, we organized relevant data points on an Ishikawa-style diagram to substantiate supportive data (see Appendix C) for Project Question 3. Throughout our evaluation, it was critical to keep the role of the physical warehouse configuration in mind, as the physical layout of the warehouse and the warehousing process are interrelated. Therefore, the following findings should be considered relevant to the current facility and represent potential opportunities for improvement even if the facility were not to change.

1. *The nature of the Minute Maid Park business schedule poses unique challenges for process evaluation and staff training.*

The Astros typically have home stretches lasting five to seven days during the regular baseball season. During these stretches, games are usually on back-to-back days. Subsequently, Aramark teams have little time to evaluate how staff fulfilled operational duties and adjust before the next cycle begins. When the team is on the road, the Astros organization also uses Minute Maid Park for other functions such as concerts, private engagements, and other entertainment events. Consequently, the Aramark staff only has a little downtime until the offseason when many of their seasonal and temporary employees move on to other jobs.

Aramark fulfills much of its staffing needs at Minute Maid Park primarily through local temp agencies, and most of the organization's Minute Maid Park staff are seasonal and temporary employees. Additionally, given the seasonal nature of the stadium industry, Aramark experiences high turnover from its frontline employees. In spite of the temporary nature of most of its employees, Aramark had no observable documentation to illustrate standard operating procedures to easily reference in training and supporting new employees. We observed several deviations from the expected processes, such as deviations from the sequencing of internal distribution of inventory to vendor locations and bottlenecks caused by staff being unable to deliver goods due to locked doors and not having ready access to keys. These two deviation examples resulted from staff receiving stocking orders as they became ready versus in the designed sequencing order and the limited number of Aramark employees with master keys, respectively.

2. Aramark is underutilizing the Yellowdog inventory software system.

Aramark's underutilization of the Yellowdog inventory software system creates inefficiencies in the inventory reporting and ordering processes. Only two vendors have tablets installed with the Yellowdog software, leaving most to fill out reports on paper and requiring managers to input that data into Yellowdog manually. Furthermore, we observed legacy systems such as Excel spreadsheets still in use. One significant finding was that Aramark managers must manually check every order requested by vendors because they do not have confidence that vendors understand ordering logistics or do not trust that they actually need the inventory in the requested quantities. This process is potentially a result of the vendors not having access to Yellowdog through tablets or other electronic devices with the software installed.

Recommendations

We organized our recommendations by the project questions that guided this capstone. Each section begins with the project question and a table containing recommendations we made related to the project question for that section and the respective findings that justify them. In the tables, “PQ#” refers to the project question, and “F#” refers to the corresponding finding for that question. For example, PQ1-F1 represents Finding 1 from Project Question 1.

Following each recommendation is a detailed explanation with examples and specific, actionable items to consider. Some recommendations, such as Recommendation 2.1, have multiple suggestions that we recommend our partner organizations implement. Subsequently, the recommendation statements read as broad generalities that summarize the details in the accompanying content.

Project Question 1: What is the full scope of the current concessions warehouse system?

Recommendation	Correlated Finding(s)
1.1: Consider the existing system and processes during the facility redesign plans.	PQ1-F1, PQ2-F1, PQ2-F2, PQ2-F3
1.2: Continually update the Broadscale Summary of Minute Maid Park Concessions System process map.	PQ1-F1, PQ1-F2, PQ3-F1

***Table 3*: PQ1 Recommendations**

- ***Recommendation 1.1:*** *Consider the existing system and processes during the facility redesign plans.*

We concentrated our recommendations on actionable items that greatly improve the overall concessions system, and each recommendation aligns with specific findings. While some are related to warehouse processes, others are directly related to the facility layout and design.

We recognize that the facility's design will strongly impact the process systems implemented by Aramark teams. Subsequently, we suggest the design teams consider existing processes and how a new facility could improve them. We recommend that the design team consider the warehouse space as a production facility in addition to a storage facility. The process map (Appendix E) will be a critical resource to reference during the facility redesign planning.

- ***Recommendation 1.2:*** *Continually update the Broadscale Summary of Minute Maid Park Concessions System process map.*

The current system is complex and layered. We have created a robust, detailed process map that illustrates the life cycle of all inventory product categories. The process map navigates through four distinct system stages: ordering through delivery, inventory warehouse storage, internal inventory distribution, and post-event activities. We based the current version on the existing system used in the existing facility and developed a version of their facility map to correlate to the process map.

That being said, with facility changes, and evolving business demands, Aramark should expect changes to the system regularly. For example, while most of the processes will remain the same as far as sequencing and other aspects are concerned, we anticipate some changes, such as the placement and numbering of coolers and freezers, the storage location of high-volume items, and other updates based on our recommendations that follow. Online tools such as Lucid.app allows users to make, update, and revise charts of this nature easily. Subsequently, once the redesigned layout is available, we recommend that Aramark make any adjustments to the systems process map necessary to align with changes that may occur due to the new facility design and then continually update the tool as needed.

Project Question 2: What key facility-related factors of the current system present opportunities for improvement?

Recommendation	Correlated Finding(s)
2.1: In redesigning the physical facility, strategically reshape spaces to eliminate choke points and facilitate improved process flows.	PQ2-F1, PQ2-F2
2.2: Ensure that product and function placement in the newly designed facility is intentional to enable optimal process alignment.	PQ2-F1, PQ-F2, PQ2-F3, PQ3-F1

***Table 4*: PQ2 Recommendations**

- ***Recommendation 2.1:*** *In redesigning the physical facility, strategically reshape spaces to eliminate choke points and facilitate improved flow.*

Several aspects of the current facility create physical barriers to optimal functioning. The existing underutilized spaces detailed in Finding 2.1 leave ample opportunity to redesign the facility to alleviate the choke points noted in Finding 2.2. The process flow must be of central consideration in the facility redesign, specifically including the following items:

  - Move or combine the facility services room with other nearby spaces, such as the Astros engineering facility. This will provide a significant amount of additional space to integrate for improving warehouse ingress and egress, as well as flow within the warehouse.
  - Move or significantly reduce the liquor room, as its current size is unnecessary for its function. Again, the new design should repurpose this excess space for improved pathway development and the addition of necessary office spaces.
  - Create an additional entry point to the warehouse to accommodate an improved flow for egress and ingress. Ideally, the design should eliminate all "dead-end" alleys so that there are two ways in and out of all warehouse areas.

  - Expand the commissary to include a place for Hotbox Hallway to be contained within the commissary and create an external door for commissary personnel to exit for inventory distribution.

- ***Recommendation 2.2:*** *Ensure that product and function placement in the newly designed facility is intentional to enable optimal process alignment.*

Beyond fixed physical attributes, it is also necessary to adjust the space usage and product placement in the facility redesign to improve system functioning. We specifically recommend that Aramark and the design team consider the following adjustments and reassessments of appropriate placements within the facility:

  - Create space closer to the egress location for easier access and distribution of large-size and large-volume products such as beer, water, and bread. Consider placing high-turnover items more centrally to streamline their intake and distribution. Address these changes by considering item storage placement and the development of ideal egress pathways.
  - Expand office space to accommodate personnel from other departments for purchasing and receiving inventory from the docks.
  - Move cleaning supplies and break areas to the front of the warehouse space, leaving space near the commissary for more strategic product placement.
  - Consolidate cooler and freezer spaces to improve flow and storage opportunities. This change should include the installation of new floor-to-ceiling walk-in coolers and freezers to maximize the use of vertical space. Additionally, reposition the related mechanical units to take up less floor or vertical space and create a way for the hot air produced by them to flow away from the main warehouse space.

- Consider including an ice maker in the redesign—the current method of ice delivery results in product loss. A cost-benefit analysis would determine the relative cost of shifting to in-house production, both financially and in terms of space usage.

Project Question 3: What key process-related factors of the current system present opportunities for improvement?

Recommendation	Correlated Finding(s)
3.1: Utilize additional resources and employees' knowledge banks to strengthen training and warehouse process evaluation.	PQ1-F1, PQ3-F1
3.2: Use the Yellowdog inventory management software to its fullest capacity and require its use throughout the facility.	PQ3-F2

***Table 5*: PQ3 Recommendations**

- ***Recommendation 3.1:*** *Utilize additional resources and employees' knowledge banks to strengthen training and warehouse process evaluation.*

Aramark utilizes a staffing model dependent on seasonal and part-time employees hired through a temporary staffing agency. Aramark needs to maintain consistent, effective warehouse operations and practices as employees come and go. We recommend the organization print out an enlarged version of the systems process flowchart and post it in multiple, easily accessible locations throughout the facility, such as the warehouse entrance or employee break area. We also recommend that each new employee receive a printed copy of an updated warehouse process map as a visual reference aid. Since many of the part-time employees are first-language Spanish speakers, we recommend that the map be available in English and Spanish. During initial onboarding, Aramark should review the process map with each new employee during a comprehensive walk-through of the warehouse facility to help acclimate new employees to the warehouse layout and the operations processes.

We recommend that Aramark consider a mentor system to assign new employees to shadow and work alongside more experienced workers during the earlier stages of their job. Doing so facilitates visual and verbal context to employee learning and helps build a warehouse community resource for asking questions and receiving informal feedback. This model represents situated learning based on legitimate peripheral participation, where new learners master knowledge and skills while participating in meaningful production (Lave & Wenger, 2012). Through time, employees learn their specific job duties and acclimate to the broader warehouse community surrounding them.

Over time, the Minute Maid warehouse operational processes and procedures will likely evolve in aspects such as warehouse configuration and operations. We recommend that Aramark develop a standard process to capture user-centered feedback from warehouse workers and management weekly or monthly. They could do this through direct conversation, a short feedback form, or a "suggestion drop box." These types of user-centered approaches allow management to get feedback from the people who do the work by seeking to understand the obstacles these individuals confront in their daily tasks (Bryk et al., 2017). Combining user-centered feedback with management expertise can result in remarkable improvements to warehouse procedures and operations. Back-and-forth knowledge exchanges from different levels within the warehouse provide an iterative feedback loop between the front-line workers and Aramark management.

- ***Recommendation 3.2*** *Use the Yellowdog inventory management software to its fullest capacity and require its use throughout the facility.*

Aramark initially implemented Yellowdog software to aid with inventory tracking and automation. However, many manual legacy processes that limit consistent application and realization of Yellowdog benefits remain in use. Examples include paper inventory request forms, managers manually reviewing vendor requests, and Excel spreadsheets. Aramark will only realize the full benefits of the Yellowdog investment once the software capability is clearly understood, aligned with modern inventory management processes, and used by all applicable vendors. Subsequently, in coordination with the warehouse facility and related process redesigns, we recommend that Aramark develop an implementation roadmap to align and integrate relevant Yellowdog capabilities and features.

The organizational culture surrounding Yellowdog needs to advance from “an optional software tool” to “a central, organizational expectation of process modernization and warehouse performance.” To facilitate this shift in mindset, we recommend the following:

- We recommend that Aramark work with the Yellowdog software supplier to conduct a capability assessment and related execution training on what the software platform offers regarding functionality and features.
- We recommend that Aramark designate a leadership team member as the Yellowdog champion to coordinate this effort and develop as a central internal resource for Yellowdog function and expertise. In addition, any Aramark employees that should be regularly interfacing with Yellowdog in their daily jobs should participate in the initial training that sources from the Yellowdog capability assessment.
- We recommend that Aramark request that the Yellowdog supplier provide user-centered training resources to aid vendor personnel in their initial training on the software and to refer to regularly.

Aramark should communicate to all staff, volunteers, and independent contractors that Yellowdog integration is a core consideration in their process improvement redesign and that there is an expectation for all vendor stations throughout the facility to utilize it. It is critical for team members to apply their efforts consistently, with the expectation that they eliminate as many siloed and manual processes as possible. Finally, to support this, we recommend that part of the $2M remodel budget be allocated toward facilitating all stands, kiosks, and vendor stations with a tablet with the appropriate Yellowdog software installed.

Conclusion

Limitations and Areas for Future Research

One of the most significant limitations of our study was insufficient access to the data we requested from our partner organizations related to inventory quantities and the ordering process. This collection included quantitative data detailing actual inventory and sales and any internal documents they maintain that overview their process flow or physical space organization. Aramark recently switched over to an inventory management software system called Yellowdog. However, it appears the organization has not yet fully adopted the software and is not maximizing its functionality and usage. As a result of this underutilization of available software, we did not get the requested data that would have informed a proper analysis of the data flow processes involved in the concessions operations. As a result, we had to summarize some aspects of the process map, such as "Inventory decisions made." Although Aramark initially told us these items would be easy to provide, ultimately, the organization did not have these documents readily available. While this limited some of the analysis we could do, the lack of available data was itself meaningful for our findings.

A second limitation of our study is a lack of research into Aramark's onboarding of new and temporary staff. Due to the seasonal nature of the Minute Maid Park business cycle, Aramark's staff is constantly changing from season to season. Additionally, because of the fast-paced schedule of the baseball season, there appears not to be much time available for in-depth training workshops. However, these are assumptions made by our team based on our observations, and future studies should include what measures the organizations take to onboard and train new employees.

Conclusion

This case study improvement project aimed to assist the Houston Astros and Aramark organizations redesign the Minute Maid Park food and beverage concessions warehouse and associated systems. The project's key outcomes include identifying and mapping the warehouse's current physical layout and systems processes. We identified several key areas where opportunities for improvement exist for both the physical layout of the warehouse and process optimization and made recommendations based on those findings. Our findings, recommendations, and other deliverables give the Houston Astros and Aramark teams better clarity on their current warehouse operations, resources for training employees, and valuable assets in the warehouse redesign process.

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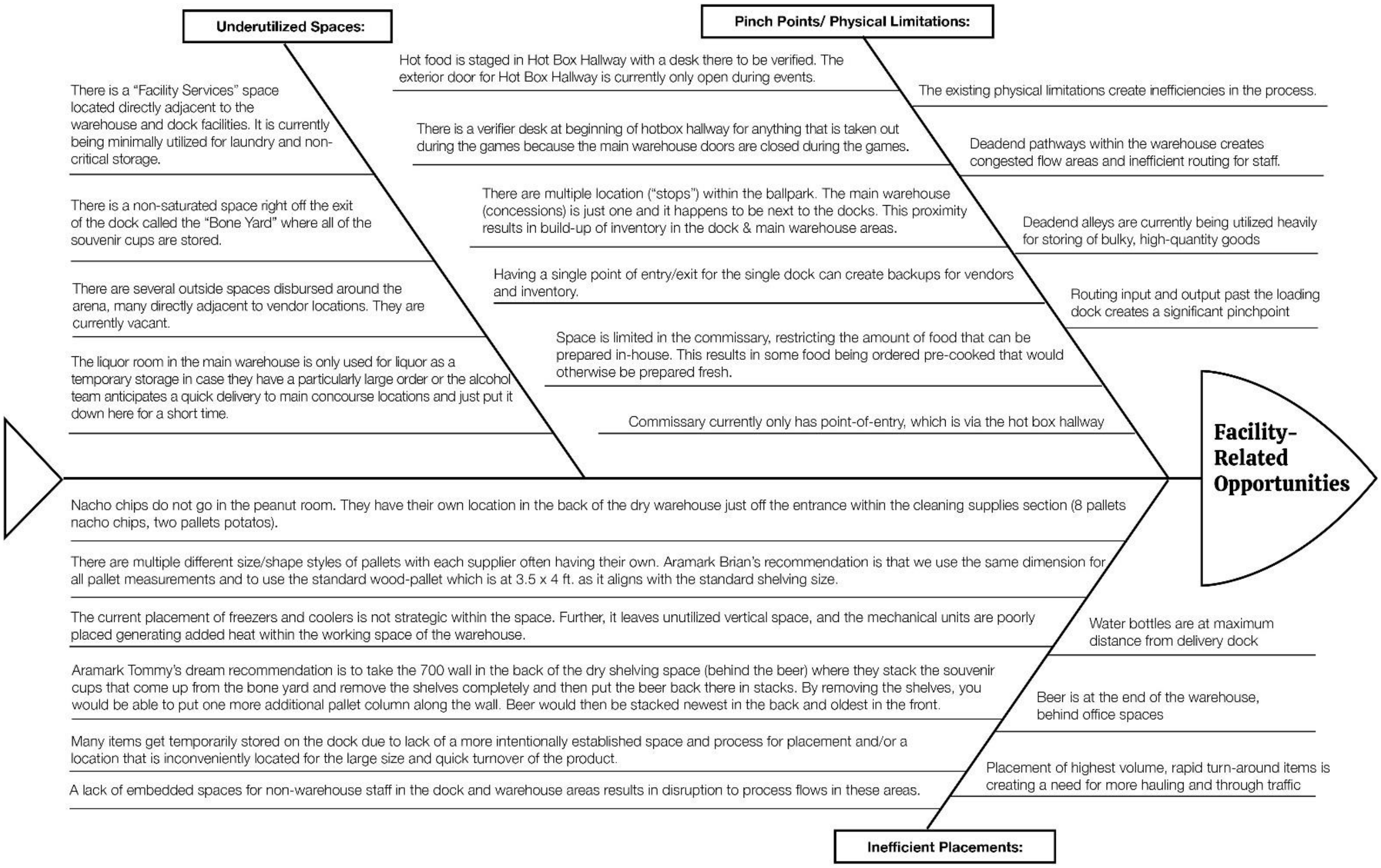
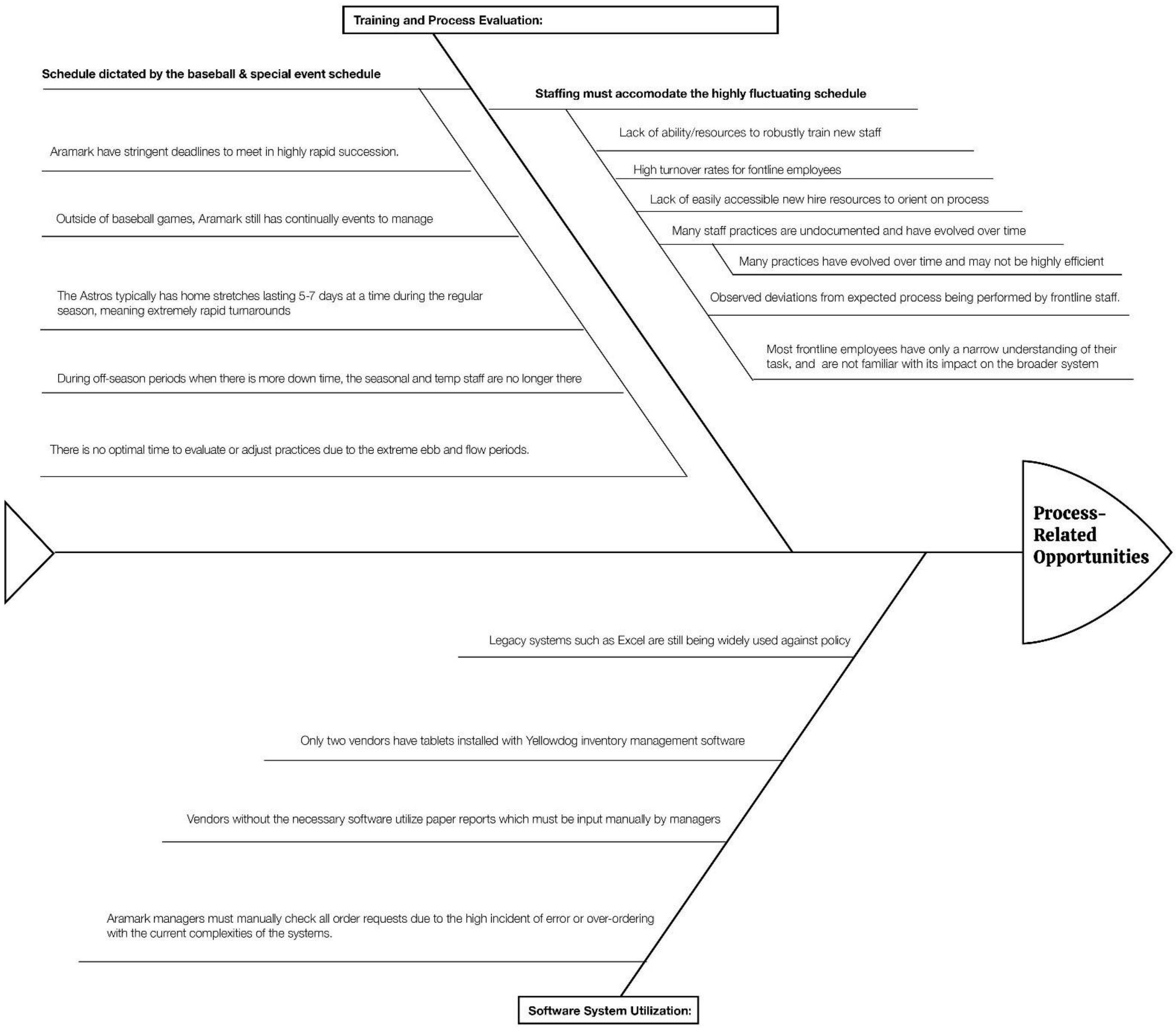
Appendix A – Capstone Matrix Table

Project Questions	Data Source	Data Collection Methods	Data Analysis Procedures
1. What is the full scope of the current concessions warehouse system?	Guided observations of physical warehouse layout and system function. Document collection	Physical site visits to warehouse. They did not provide the documents needed; We recreated and updated documents based on personal observations and pictures taken of facilities and facility maps.	The data allows our research team to visually verify the existing physical layout of the warehouse along with the system function. We can draw evidence from the observations to develop a warehouse and system flowchart as a baseline for Phase 1.
2. What key facility-related factors of the current system present opportunities for improvement?	Observations and informal interviews	Physical site visits to warehouse. Informal interviews with employees regarding their insights to the problem	Analysis of input from employee discussions and personal observation lead to models and strategies for physical warehouse and warehouse systems.
3. What key process-related factors of the current system present opportunities for improvement?	Document review of new architectural plans	Partner organizations will provide these.	We will review the plans within the context of our conceptual framework to combine with data obtained from Project Questions 1 and 2 to make optimizing suggestions for integration of their system.

Appendix B – Ishikawa Diagram of Project Question 2 Relevant Data



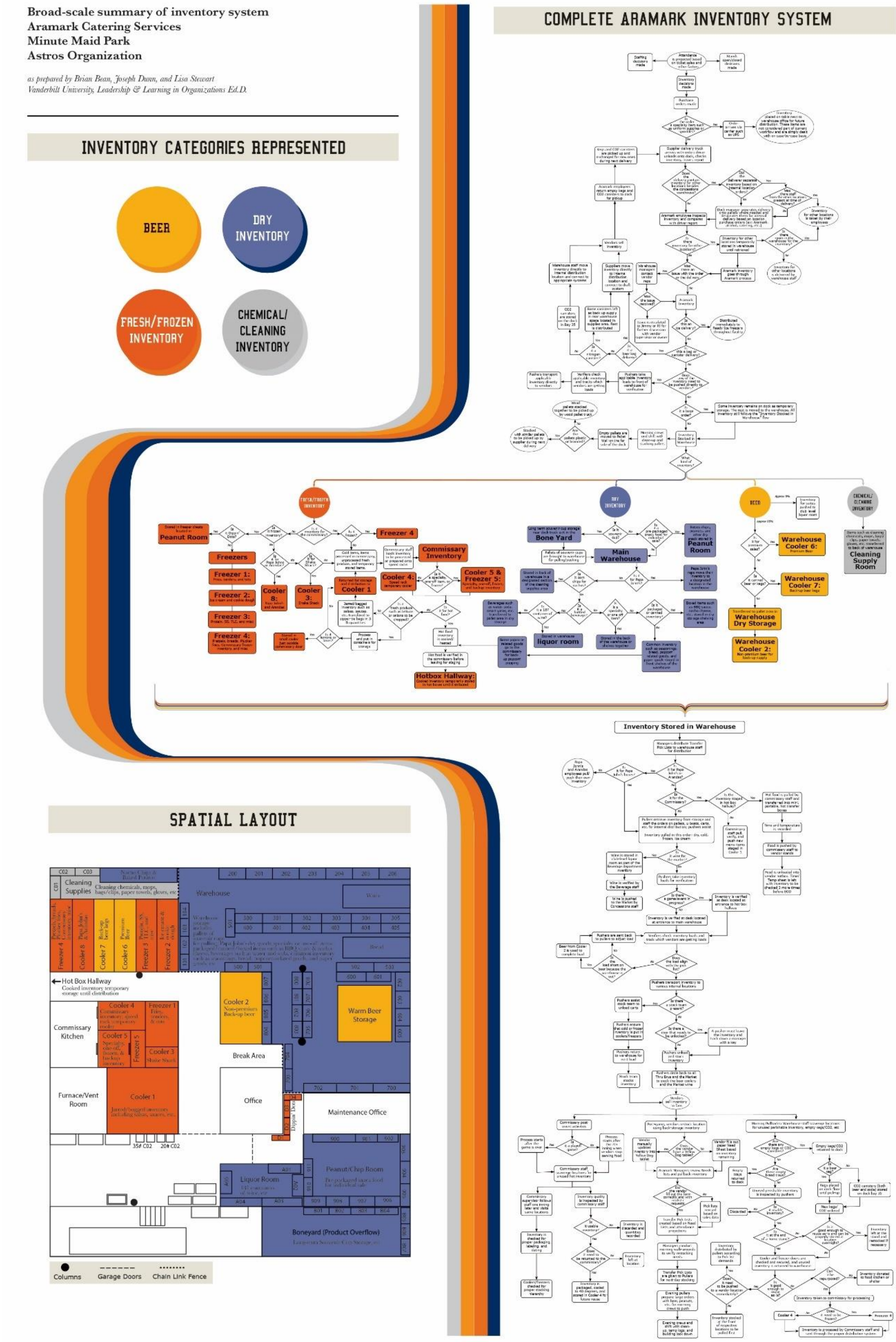
Appendix C – Ishikawa Diagram of Project Question 3 Relevant Data



Appendix D – Codebook Excerpt

Date	Recording Time	Obs. #	Primary Theme	Tech Systems	Inventory Goods	Data Related	Vendor Relations	Process	Activity	Sequence	Timing	Communications	Warehouse Zones	Stadium Layout	Temperature	Labor	Equipment	Physical Constraints	Choke Points	RQ 2 (Facility)	RQ 3 (System)	Observation Note
				Coded Sub-themes																		
10/25/2022	9:01 AM	069	Inventory Management		X			X					X				X			x		69. Limes and lemons
10/25/2022	9:02 AM	070	Inventory Management		X		X														x	70. Papa John's brings
10/25/2022	9:05 AM	071	Facility		X								X							x		71. Nacho chips do no
10/25/2022	9:05 AM	071a	Facility		X								X					X		x		a. In the cleanir
10/25/2022	9:07 AM	072	Facility		X								X							x		72. Fresh bread is stor
10/25/2022	9:09 AM	073	Facility		X								X							x		73. Specialty or one-o
10/25/2022	9:14 AM	074	Facility		X								X								x	74. Specialty items su
10/25/2022	9:14 AM	074a	Inventory Management		X			X					X								x	a. These come u
10/25/2022	9:14 AM	074b	System		X			X													x	b. These items c
10/25/2022	9:22 AM	075	Resources													X		X	X		x	75. In a perfect world,
10/25/2022	9:22 AM	076	System		X		X	X				X								x	x	76. Right now, all the
10/25/2022	9:22 AM	076a	System											X						x		a. 13 total locat
10/25/2022	9:22 AM	076ai	System											X						x		i. 8 kitchens
10/25/2022	9:22 AM	076aii	System											X						x		ii. Catering
10/25/2022	9:22 AM	076aiii	System											X						x		iii. Sweets
10/25/2022	9:22 AM	076aiv	System											X						x		iv. Warehou
10/25/2022	9:22 AM	076av	Facility											X						x		v. 2 beverag
10/25/2022	9:22 AM	076b	Resources											X		X		X	X	x	x	b. Ideally, each
10/25/2022	9:28 AM	077	Inventory Management		X			X				X									x	77. Not every delivery
10/25/2022	9:28 AM	078	Inventory Management		X			X													x	78. Smaller vendor de
10/25/2022	10:12 AM	079	Retardants					X								X	X		X	x	x	79. There is only one k
10/25/2022	10:12 AM	079a	Retardants					X				X				X	X		X	x	x	a. As a result, if
10/25/2022	10:12 AM	079b	Retardants					X								X	X		X	x	x	b. This slows do
10/27/2022	8:39 AM	080	Retardants					X								X			X		x	80. If no one is at the p
10/27/2022	8:39 AM	080a	System					X			X										x	a. The only time

Appendix E – Broadscale Summary of Minute Maid Park Concessions System

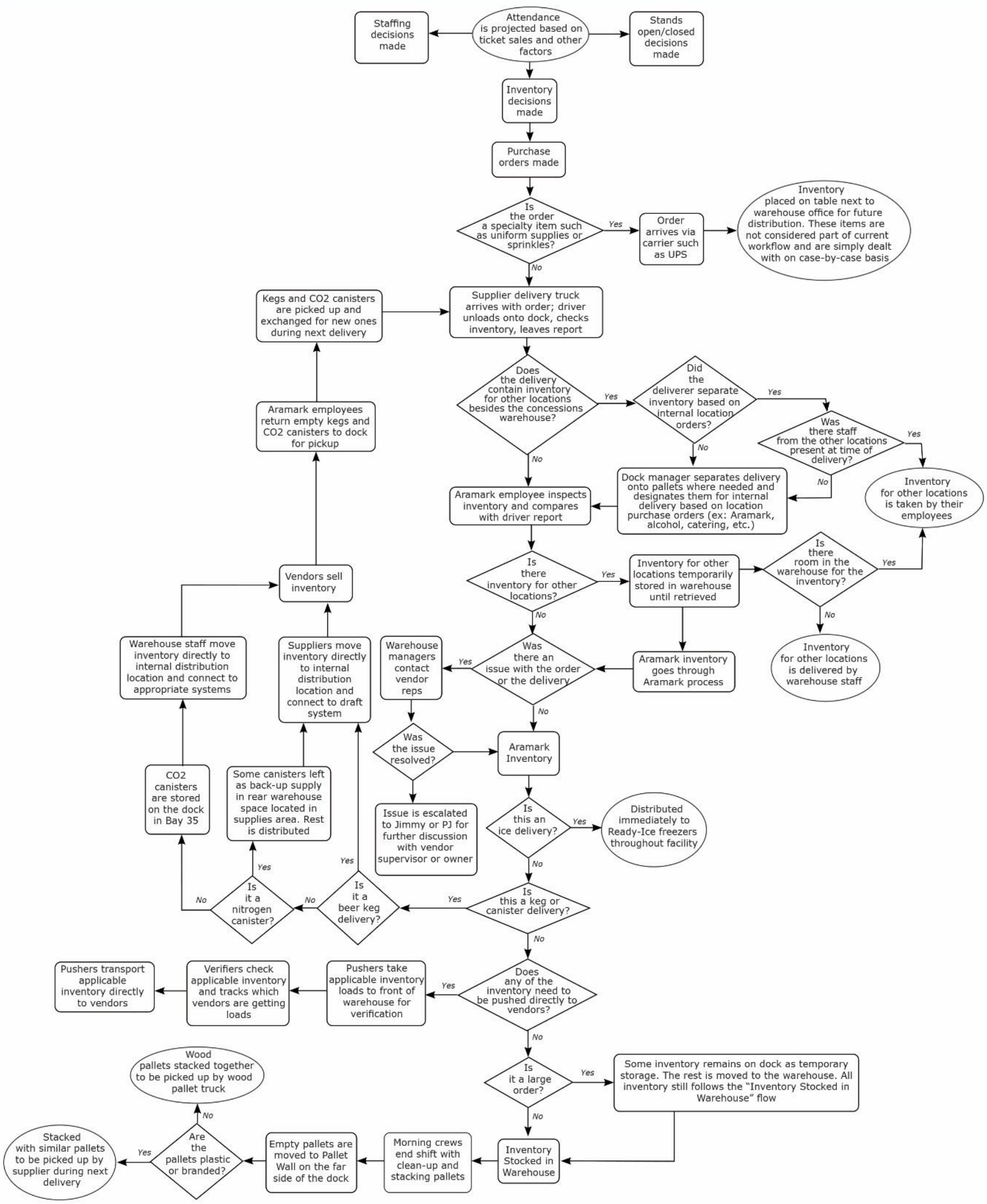


Broad-scale summary of inventory system
Aramark Catering Services
Minute Maid Park
Astros Organization

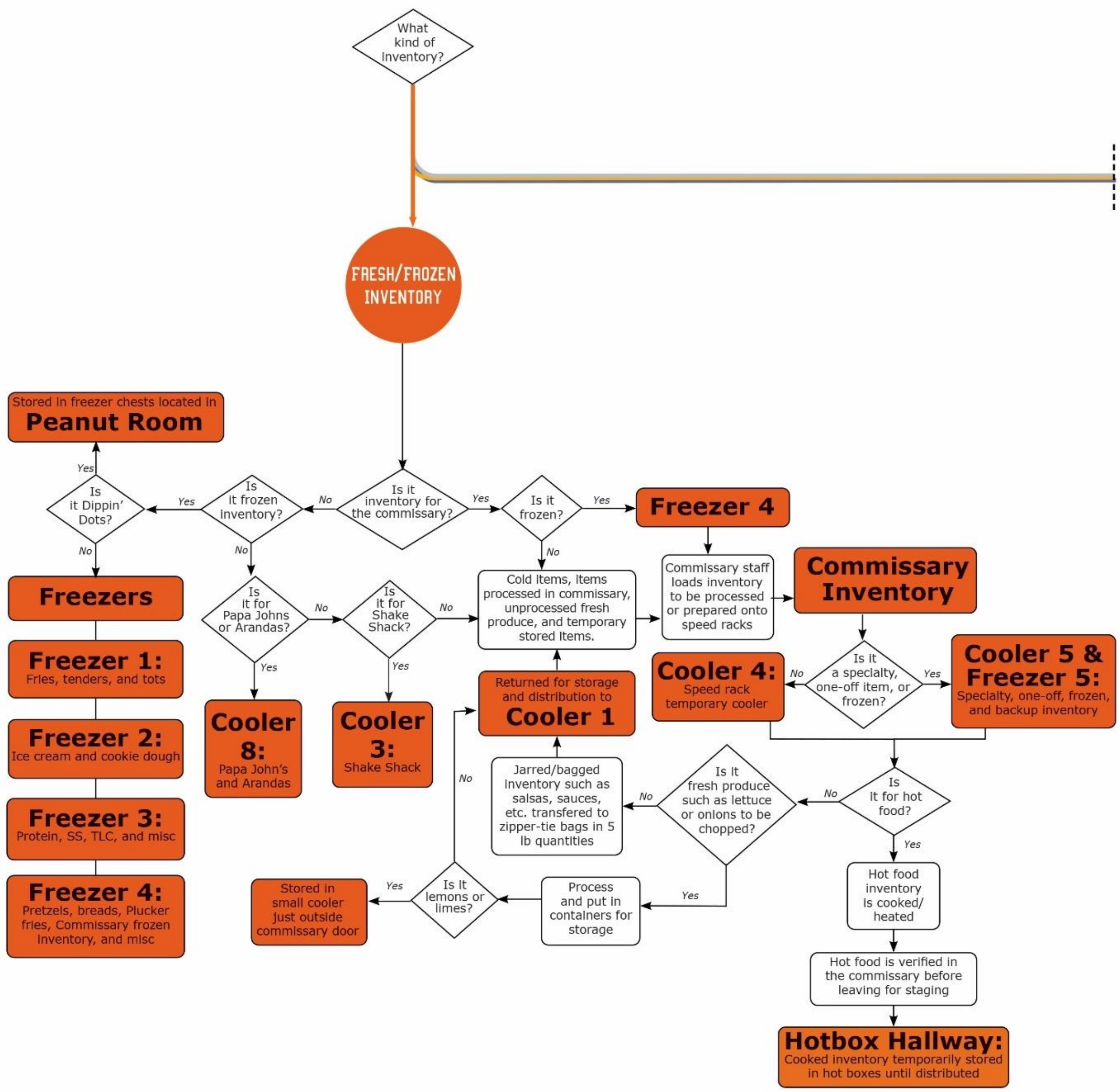
as prepared by Brian Bean, Joseph Dunn, and Lisa Stewart
Vanderbilt University, Leadership & Learning in Organizations Ed.D.

INVENTORY CATEGORIES REPRESENTED

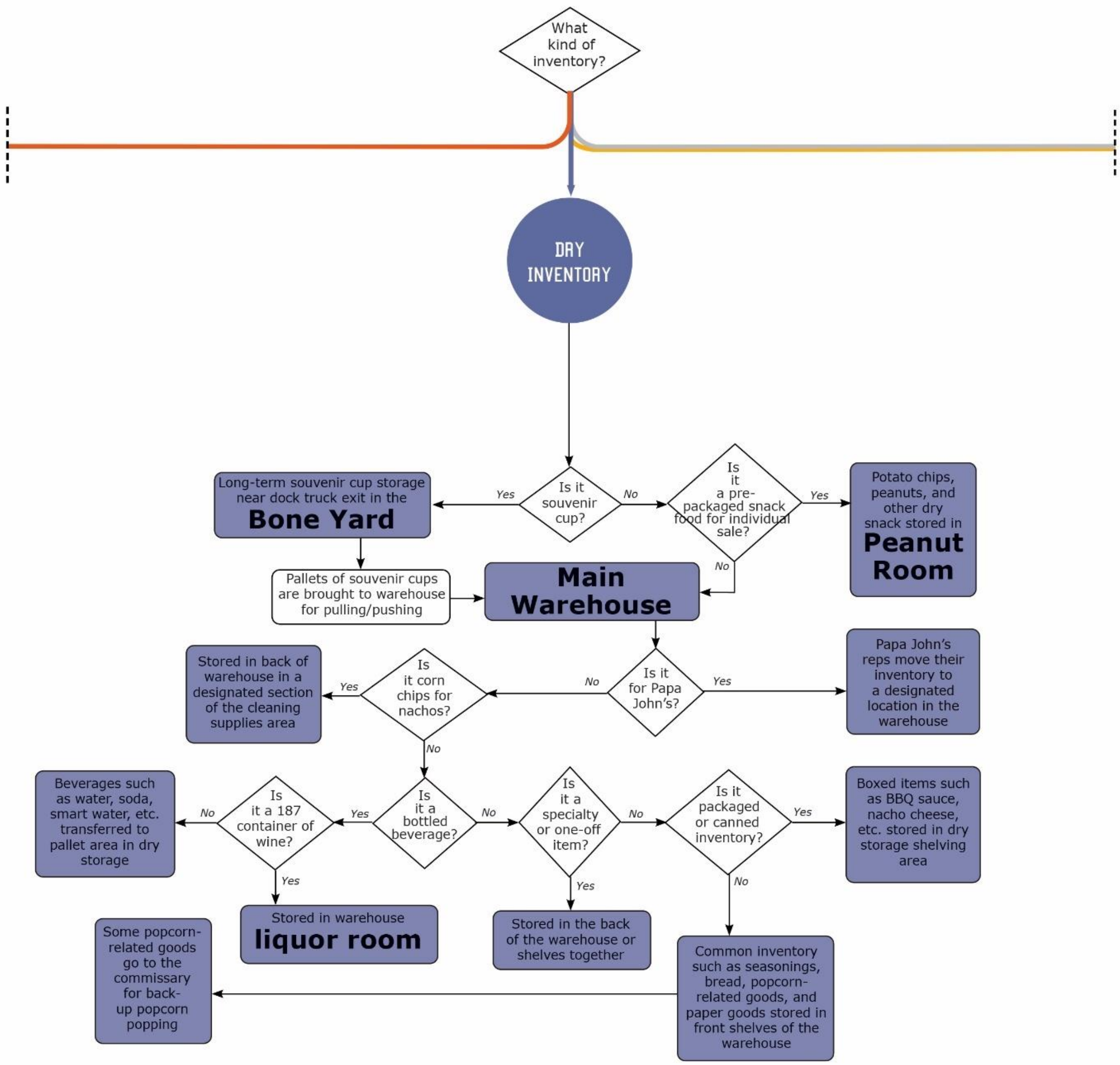
SYSTEM COMPONENT 1: ORDER THROUGH DELIVERY



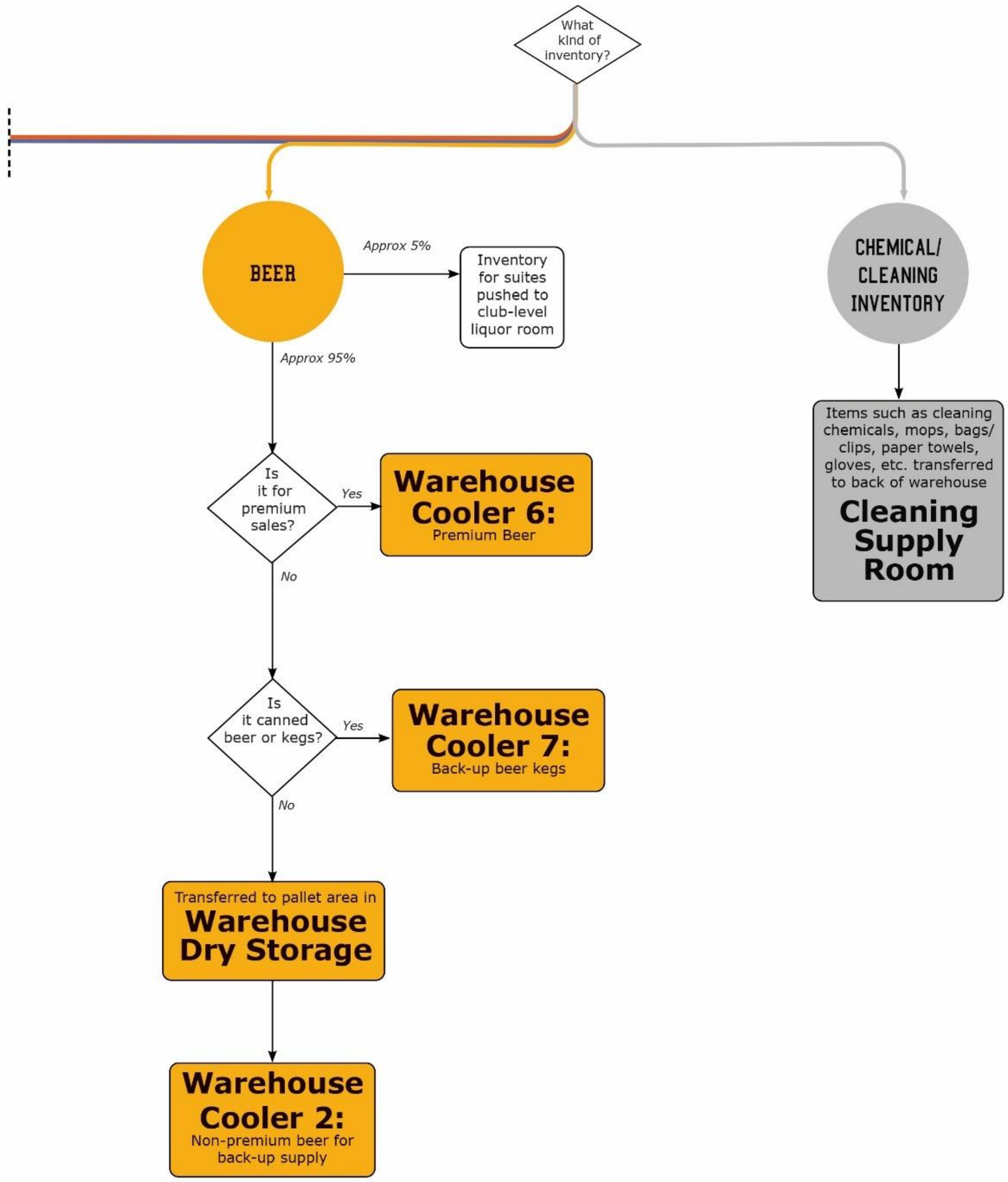
SYSTEM COMPONENT 2:
INVENTORY WAREHOUSE STORAGE



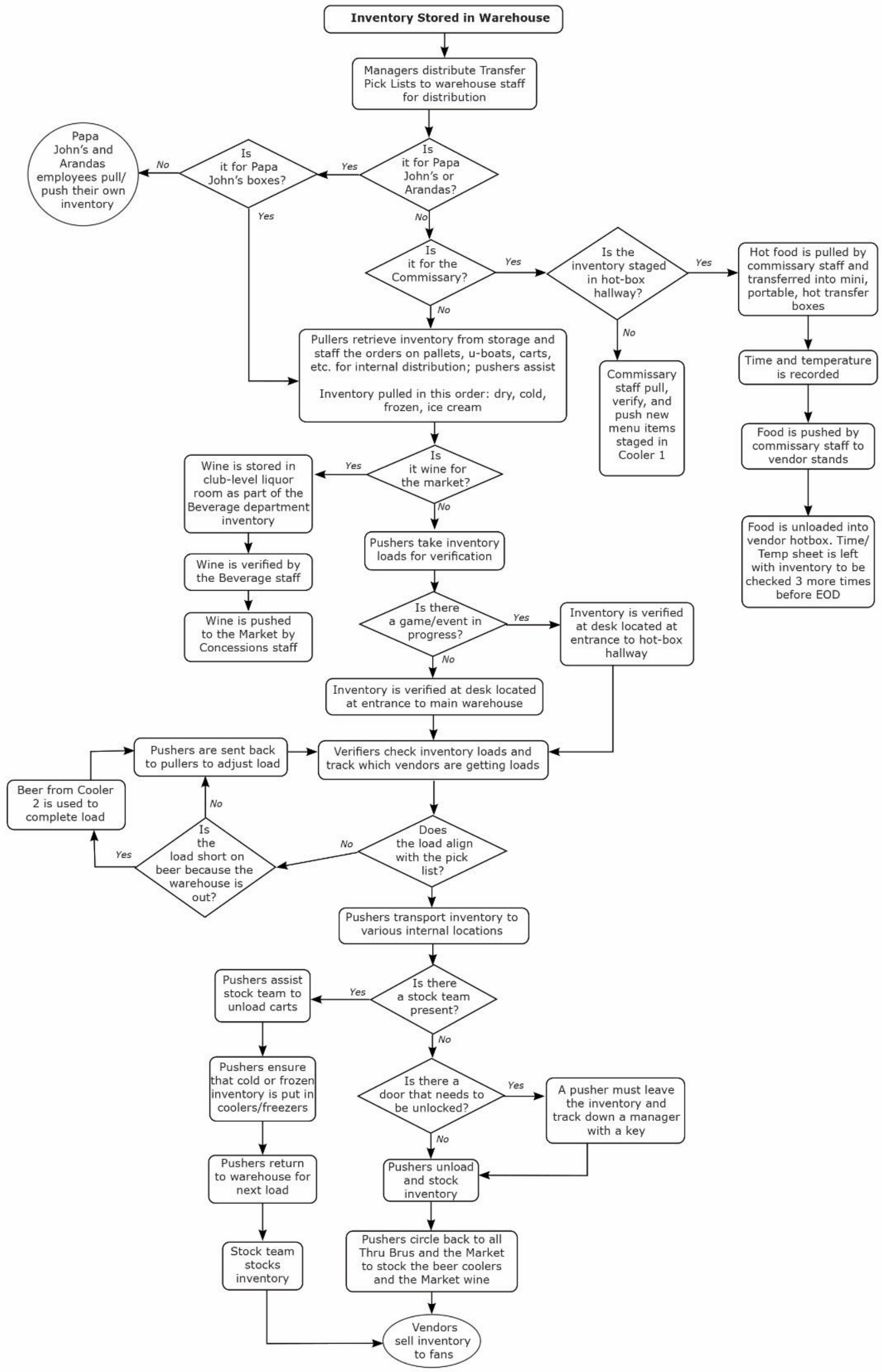
SYSTEM COMPONENT 2: INVENTORY WAREHOUSE STORAGE



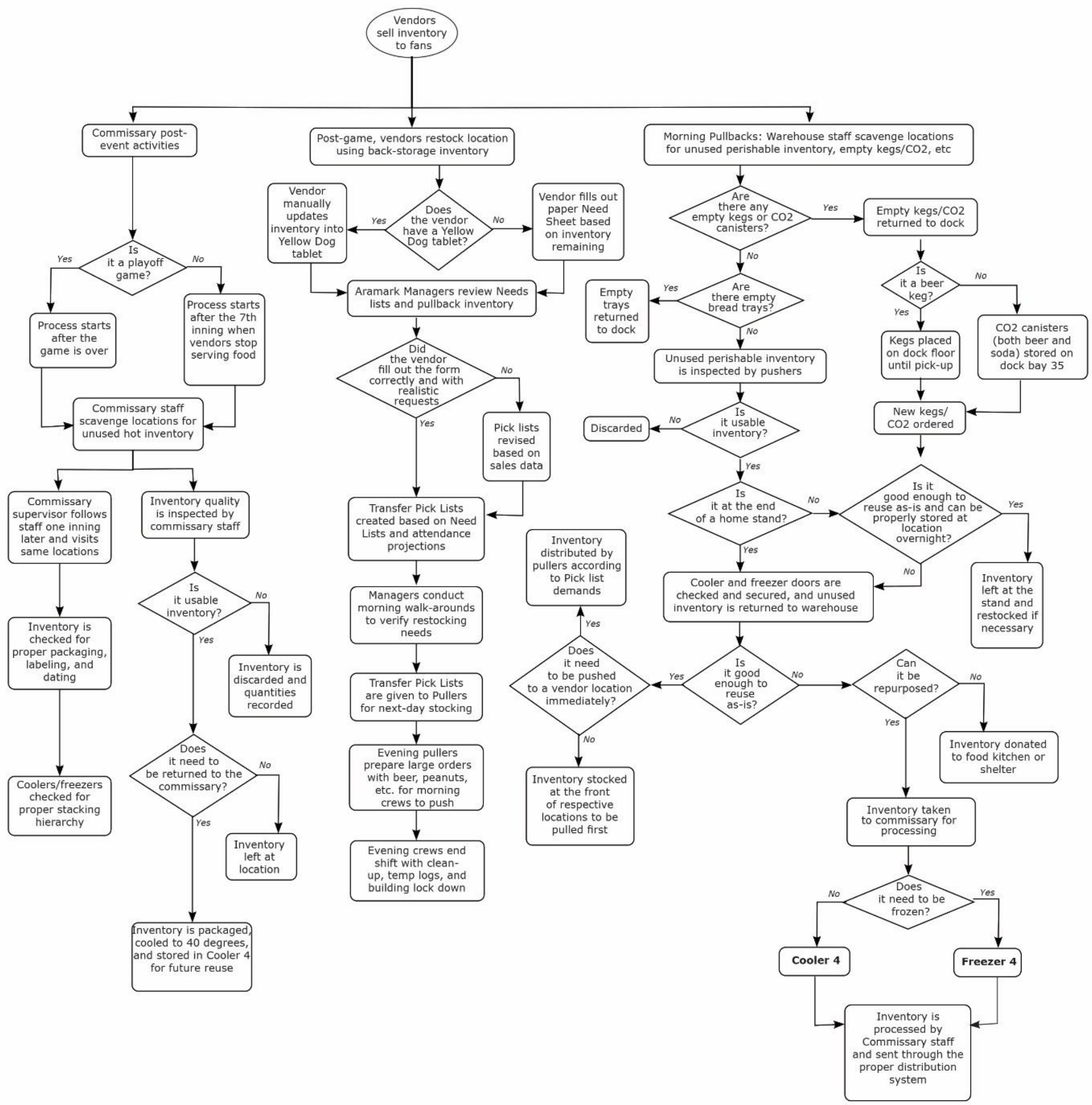
SYSTEM COMPONENT 2:
INVENTORY WAREHOUSE STORAGE



SYSTEM COMPONENT 3: INVENTORY INTERNAL DISTRIBUTION



SYSTEM COMPONENT 4: POST-EVENT ACTIVITIES



SPATIAL LAYOUT