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FRESH FOOD STRATEGY SIMULATION FOR A LARGE CONVENIENCE STORE CHAIN

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ABSTRACT

One of North America's largest convenience store chains launched a strategic initiative to expand fresh food offerings across all locations, requiring significant changes to store layouts, equipment, staffing, and operations. To support data-driven decision-making for these remodels, the client partnered with MOSIMTEC to develop a virtual twin of its most common store layout using AnyLogic simulation software. The simulation model, integrated with Excel and PowerBI, enabled stakeholders to evaluate store configurations, labor needs, equipment impacts, and throughput performance—ultimately guiding smarter investments in their Fresh Food program.

1 INTRODUCTION

The operations and food engineering teams at one of the largest convenience store chains ("Client") in North America were tasked with realizing the vision of introducing fresh food across all stores. This vision was a key part of their strategic shift towards a more food-focused convenience store ("C-Store") experience. It was a response to evolving consumer demands for fresh, high-quality, and convenient food options, particularly among younger generations.

2 CHALLENGE

This meant that the client was looking to expand its food service capabilities in an effort to grow sales and streamline operations. To enable the fresh food vision, the client had started multiple initiatives. One of these programs was called the Fresh Food program which addressed the logistics of getting fresh food to each store, along with remodeling projects to add new kitchen and merchandizing equipment for new food products.

The store remodel program would be updating stores to add new kitchen equipment and make room for new food products. These decisions could involve changes to in-store layout, defining equipment requirements, staffing requirements, finalizing menu item decisions, establishing re-order point decisions, and standardizing fulfillment decisions.

The Fresh Food program offered each C-Store one of three possible remodel configurations, driven by market demand and investment requirements. Each configuration represented incrementally more investment than the previous configuration.

3 SOLUTION

The solution was to develop a virtual twin of the C-Store to make data driven design decisions prior to physically remodeling any stores. The client engaged MOSIMTEC to conduct a simulation study to test the store remodel program. Due to the multiple layouts and overall large number of stores under the client's banner, this simulation focused on the most common store layout. The client's solution to address simulation focused on providing insight into how the most popular layout configuration (call it "Mighty Bite") impacted labor, customer wait times, and in-store foot traffic.

The primary goals of the simulation project were:

- Identifying the performance of the current and future food production systems.
    - Including identifying interdependence between convenience stores ("C-stores") and Fresh Food program
    - Including translating model results into financial metrics
- Determining the labor requirements for the new food production system
- Determining the capacity requirements or constraints to support a significant increase in food sales
- Identify bottlenecks and opportunities to increase food throughput

4 BENEFITS

MOSIMTEC developed an AnyLogic simulation software based model of the client's C-Store. This simulation was configurable and runnable via an Excel front-end. By updating model inputs via an Excel front end interface, users configured the virtual store to represent any store and run customer demand scenarios representing the past, present, or future business conditions. These store inputs included the floor plan, cooking equipment, customer arrivals, and number of staff. Additionally, users could even add other necessary and supporting tasks that routinely engaged crew members such as cleaning, restocking, and administrative tasks.

During the simulation run, customers continuously arrived and purchased products leading crew members to cook food, restock shelves, clean the store, and perform other administrative tasks. Once the simulation run completed, outputs of the simulation model feed into a Microsoft PowerBI dashboard for easy viewing of results and conducting analysis. This dashboard enabled stakeholders to make objective comparisons between potential remodel configurations, sets of cooking equipment, and even individual products. The flexibility of the tool ensured that the model could be used for a number of years in the future supporting store modeling efforts across the network.

Although not intuitive, the simulation helped demonstrate that after the remodel is implemented, additional labor can lead to more profit. More labor may increase operating costs, but the labor to cook more food is offset by revenue. Additionally, customers are expected to be more loyal if their preferred item is always available when they walk into the store.