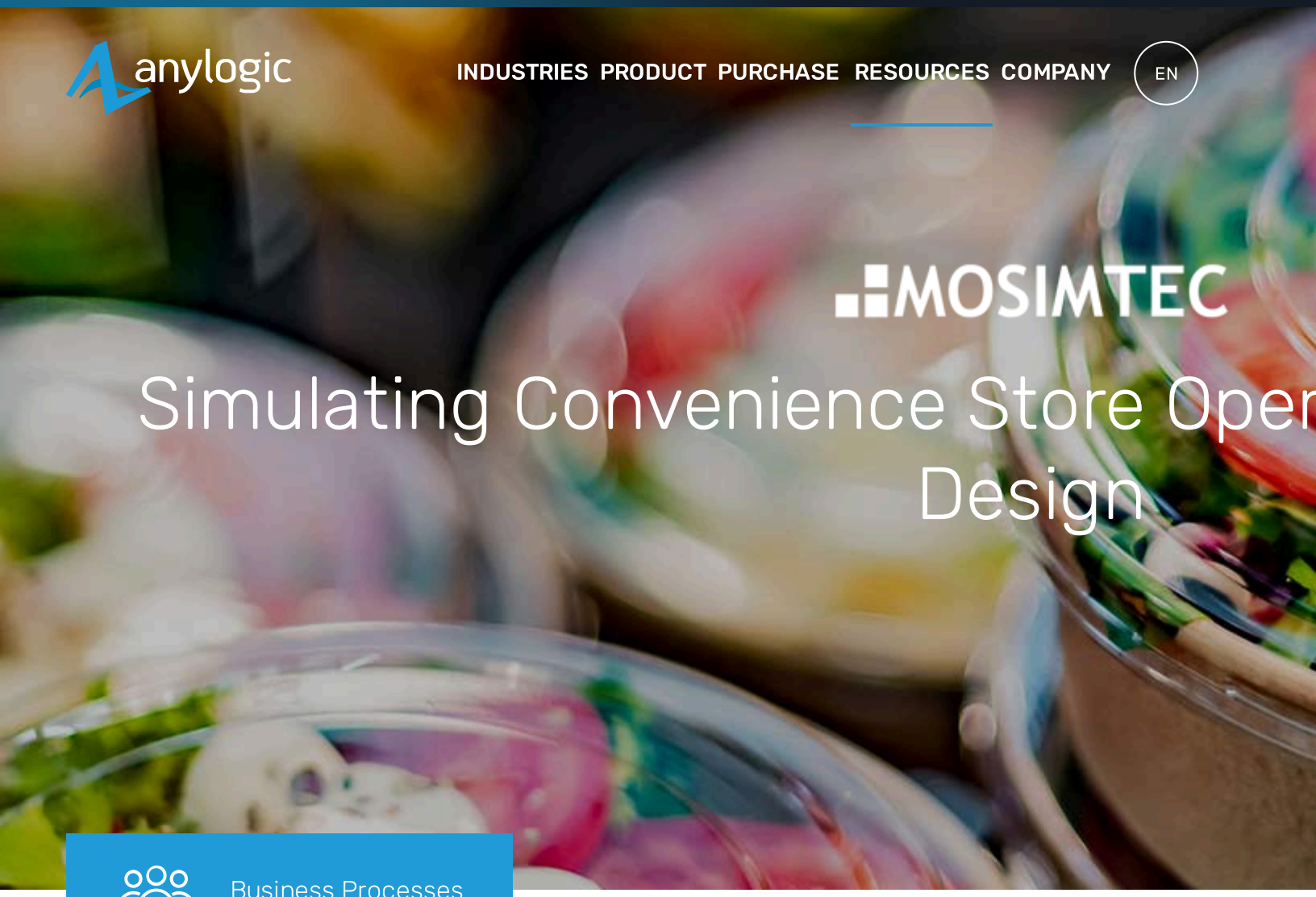


MOSIMTEC

Simulating Convenience Store Oper Design

Business Processes

Problem:

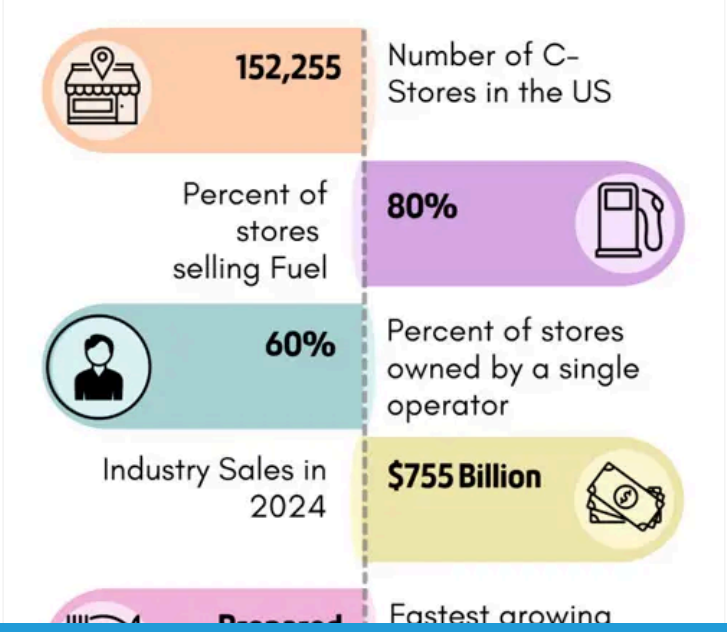
A large convenience store chain wanted to introduce fresh food production, new layouts, self-checkout, and delivery across thousands of stores. However, small changes in one location often disrupted convenience store operations in another.

- ~~Showed when fresh food boosts profit and~~ when it strains staff.
- Clarified where self-checkout helps and where it falls short.
- Helped balance labor, delivery demand, and in-store flow.
- Gave franchisees and leaders a shared, data-backed way to make decisions.
- Reduced risk before scaling changes across the entire network.

Introduction: testing changes at scale

Mosimtec, a consulting firm focused exclusively on modeling and simulation, partnered with one of the **largest convenience store chains in North America** on a major transformation initiative.

The client with over 1,000 stores was looking to rethink



convenience store operations at a day-to-day level. To move this forward, a major North American retailer needed a way to test new ideas, including changes to store layout design, before scaling them across thousands of locations.

Challenge: rethinking convenience store operations

Approximately 80% of the client's convenience stores sell fuel, and for those locations, it accounts for roughly 60–70% of store revenue. While fuel drives volume, it is a **low-margin business**. The real opportunity lies **inside the store**, where higher-margin products can increase profitability and reshape convenience store operations.

Customer behavior is also changing. Traditional convenience items are losing appeal, especially among younger customers. Fresh food offerings provide a higher-margin alternative and a reason for customers to enter the store rather than remain at the fuel pump.

But turning that idea into reality was complex.

The client operated thousands of stores with different layouts, volumes, and regional preferences. Decisions around store layout design that worked in one location often failed to translate to another.

Fresh food production changed how stores ran. New equipment improved quality **but slowed preparation**. Cooking, keeping prepared food warm and available for sale, and managing waste became part of everyday operations. At the same time, a new loyalty app and delivery partnerships introduced demand patterns that

a reliable way to test whether these changes would pay off before scaling them across the network and further altering convenience store operations.

> Read also: How simulation helped a large retailer optimize checkout processes and evaluate self-checkout performance before implementing changes across multiple stores.

Solution: testing new store layout design at scale

Mosimtec built a virtual convenience store in AnyLogic to model customer and employee movement, congestion, and queues across different store layouts. The goal was not to model an idealized store but to capture **real behavior, real constraints, and real trade-offs** that shape convenience store operations.

AnyLogic simulation model of a convenience store layout

This included:

- Store layouts and footprints.
- Product zones and merchandising placement.
- Menu options and food equipment.

This flexibility allowed teams to test different approaches to store layout design side by side, even when locations varied significantly in size, layout, and customer mix.

Realistic customer behavior

Rather than focusing only on foot traffic, the model captured how customers actually used the store:

- When customers arrived throughout the day.
- What they purchased.
- How long they spent in different areas.

Once fresh food and delivery orders were introduced, these details became especially important, as they directly influenced queues, congestion, and staff workload within daily convenience store operations.

Workforce at the center of operations

Labor was treated as a shared resource rather than a fixed schedule. Employees moved between tasks the same way they do in real stores.

The simulation accounted for:

- Task switching and interruptions.
- Food preparation and holding.
- Cleaning, deliveries, and other non-checkout tasks.

Visualizing movement and congestion

The model tracked how customers and employees moved through the store. Congestion was clearly evident around coffee stations, food areas, and checkout zones, directly tying movement patterns to the store layout design.

Teams tested layout changes in the simulation before committing to physical renovations.

This gave the client a practical way to **evaluate decisions** and understand trade-offs before introducing changes across the store network.

Example simulation summary dashboard (click to enlarge)

Results: impact on convenience store operations

The simulation showed that the **fresh food initiative can succeed**, but only with the right operating model in place. Stores running with minimal staffing struggled to support food preparation and delivery without disruption. When staffing levels increased, higher-margin fresh food offset the added labor costs and strengthened overall convenience store operations.

The model also reset expectations around new initiatives:

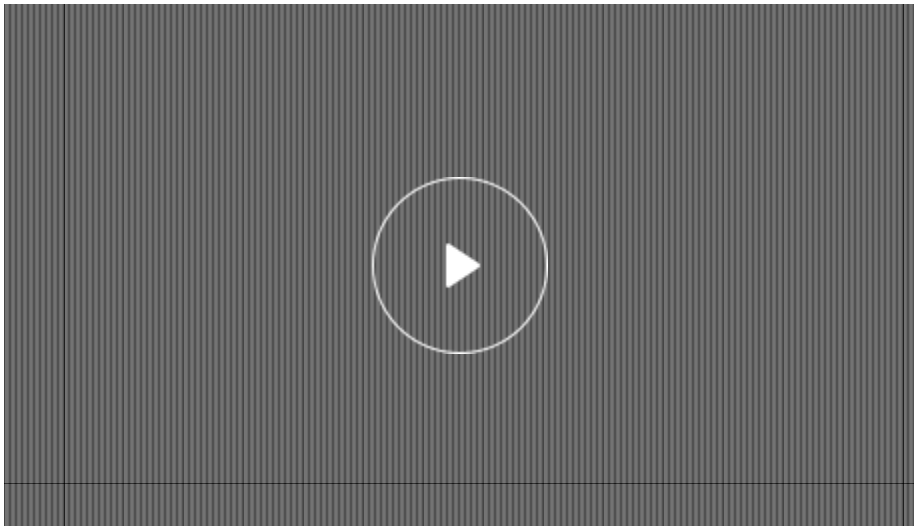
- Self-checkout performed well during certain

to-day challenges reflected in both staffing assumptions and store layout design. This shifted discussions away from opinions and toward evidence.

Instead of debating assumptions, teams tested scenarios and evaluated trade-offs directly. For a transformation affecting thousands of stores, this approach reduced risk and supported more confident, informed decisions.

The case study was presented by Nelson Alfaro Rivas from Mosimtec at the AnyLogic Conference 2025.

The slides are available as a PDF.



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