

# Optimizing Inventory Rebalancing: Strategies for Managing Excess Inventory in a Dynamic Supply Chain



## BUSINESS PROBLEM

In recent years, Nike has focused inventory into regionalized nodes closer to digital consumers to improve speed and service for its direct-to-consumer (DTC) channel. These smaller distribution centers must operate with agility to meet customer demand while maximizing capacity, especially by minimizing excess inventory. This study investigates whether changes to inventory policies and rebalancing strategies, such as enabling transfers between regional centers (inventory rebalancing) and streamlining excess inventory policies, can reduce excess inventory and improve agility, while carefully evaluating the impact on overall supply chain perform

## DATA SOURCES

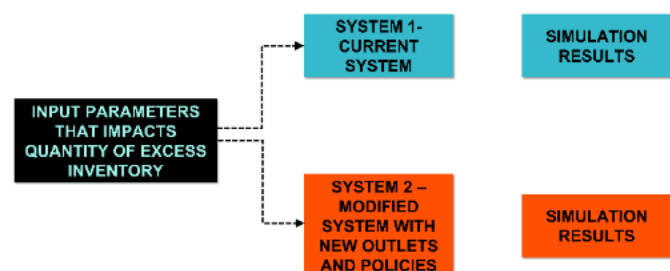
The data used in this study came from the company's internal inventory database. This included SKU-level data on historical sales and MSRP. A second dataset provided associated cost information, such as fulfillment and transportation costs. All data were aggregated and anonymized to avoid disclosing any confidential company information

## Data Types and Format

Microsoft Excel Spreadsheets (via Snowflake Database)

## APPROACH

I developed a simulation model to compare Nike's current inventory system with a proposed system that featured inventory rebalancing and modified excess inventory policies. Using Monte Carlo simulations, I evaluated each system's performance across key metrics like capacity utilization, replenishment volume, and margin.



## IMPACT

The proposed solution uncovered insights that could have operational and strategic impact for Nike. Simulation results showed that implementing inventory rebalancing can reduce replenishment pressure on the main distribution center (MDC) by 75% by relying on transfers from other regional centers. This not only frees up inventory for other non-DTC channels but also provides additional outlets for regional centers to move excess inventory within the network. The availability of these additional channels reduces the pressure of accurate demand forecasting, as overstocking in one location can later be redistributed across the network through rebalancing.

### DRIVERS

The primary drivers of this project were the operational constraints of Nike's smaller regional centers. As demand for faster delivery increased, so did the pressure on these regional centers to operate with greater agility. High levels of excess inventory highlighted inefficiencies in inventory flow and policy limitations. The project aimed to identify scalable solutions to reduce inventory buildup

### BARRIERS

Time constraints limited the ability to fully model the complexities of Nike's supply chain. As a result, simplifying operations into a simulation required assumptions that may not capture all real-world dynamics. These complexities were intentionally scoped out to focus on the most actionable levers within the six-month project timeline.

### ENABLERS

Strong support from my manager and the Applied Analytics team enabled this project during both the scoping and execution phases. Nike's warm and open culture made it easy to reach out across the organization for brainstorming and idea testing. The company's innovative mindset encouraged curiosity and openness, which helped me gather feedback, incorporate new suggestions, and ultimately deliver a more polished result

### ACTIONS



I developed a simulation model comparing the current system to a proposed one with inventory rebalancing and modified policies. I collaborated with team members to define key parameters, sourced data from internal systems, and coded the simulation in Python. I then ran Monte Carlo simulations to evaluate performance across margin, capacity utilization, and replenishment metrics

### INNOVATION

One innovative aspect of the solution was modeling inventory rebalancing between regional centers, an approach not currently implemented at the company but supported in academic literature as an effective method for managing inventory across distributed networks

### IMPROVEMENT

In 1000 simulations of both systems, the proposed solution improved capacity utilization at regional centers by up to 66% in some weeks and reduced replenishment needs from the main distribution center. These efficiency gain did not come at the expense of margin, in fact, margin increased by 2.2 percentage points due to reduced reliance on discounted factory store sales

### BEST PRACTICES

Clearly define the scope and prioritize the most impactful levers, especially when working within time constraints, as modeling the entire supply chain may not be necessary. Design your simulation to be modular and testable for easy debugging. Use real historical data to set realistic parameters. Validate assumptions early with stakeholders, and apply Monte Carlo methods to capture demand variability

### OTHER APPLICATIONS

This approach could be applied to other multi-node distribution networks facing storage constraints, including retail, pharmaceuticals, and e-commerce supply chains.