Ajax Strategic Supply Chain Expansion Report

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Date: April 22, 2025

Executive Summary

Ajax is poised for strategic growth, driven by increasing demand across its traditional stronghold in Chicago and emerging markets in California and Seattle. To support this expansion, this report presents a comprehensive three-year supply chain strategy developed through quantitative analysis and optimization modeling in Excel. The objective is to guide Ajax through critical capacity and location decisions while maximizing profitability and operational efficiency. The findings strongly recommend the expansion of the Chicago plant and the establishment of a new production facility in Sunnyvale, both in the first year of the planning horizon.

Strategic Context and Objectives

As Ajax anticipates rising demand in the western United States, the company faces a pivotal decision on how to scale production efficiently. With limited capacity at its existing Chicago facility, the firm must consider capital investments that not only support market expansion but also minimize cost per unit. The primary goal is to ensure that Ajax can fulfill forecasted demand for four product lines—Alpha, Beta, Gamma, and Delta—across all markets, without compromising on margins or delivery capabilities. This report proposes a strategic course of action based on quantitative optimization to identify the best timing and scale of expansion.

Analytical Framework and Methodology

A robust decision-support model was constructed using Microsoft Excel and Solver. The model simulates three years of production and distribution planning, integrating facility capacities, labor constraints, production costs, and market-specific demand forecasts. It solves for optimal product allocations at two facilities—Chicago and Sunnyvale—while minimizing cost and maximizing profit. The model considers fixed costs for facility expansion, variable costs per product, and revenue projections. Capacity limits for assembly lines, A-line (Alpha and Beta testing), and C-line (Gamma and Delta testing) are embedded as constraints in the optimization model.

Investment Recommendations and Rationale

Based on the analysis, Ajax should undertake two key investments at the outset. First, the Chicago plant should be expanded in Year 1, increasing its assembly and testing capacity to support growing demand in the Midwest and beyond. Second, the company should establish a new production facility in Sunnyvale in the same year. This location provides strategic proximity to California and Seattle markets, reducing shipping costs and lead times. Additionally, the Sunnyvale plant offers lower per-unit production costs and more efficient assembly processes,

particularly for Gamma and Delta products. These early investments are projected to yield long-term cost savings and increased flexibility in production scheduling.

Production and Distribution Strategy

The optimized production plan distributes output between the two facilities based on their respective strengths and cost structures. In the initial year, both Chicago and Sunnyvale contribute significantly to the production of Alpha and Beta, while Sunnyvale begins to absorb more of the Gamma and Delta lines. By Year 2, Sunnyvale takes over all production of Delta and much of Gamma, while Chicago continues to focus on Alpha and Beta. This division of labor allows Ajax to balance capacity usage while minimizing total production and distribution costs. Each plant operates within its capacity limits, ensuring sustainable operations without overutilization.

Operational Efficiency and Capacity Utilization

Operational efficiency is central to the recommended strategy. The model ensures that all capacity constraints—whether in assembly hours or line-specific testing—are strictly respected. The expanded Chicago plant operates at high capacity utilization throughout the three years, while the new Sunnyvale facility contributes heavily to west coast market demand without exceeding its operational limits. This distribution not only reduces logistics overhead but also hedges against regional disruptions by diversifying production capabilities.

Production Overview

Below is a summary of the annual production volumes for each product across the two facilities.

Year	Plant	Alpha	Beta	Gamma	Delta
Year 1	Chicago	3000	2750	2350	0
	Sunnyvale	2700	1250	900	1100
Year 2	Chicago	6001	1322	2658	0
	Sunnyvale	3799	678	1842	158
Year 3	Chicago	3000	3360	2630	0
	Sunnyvale	2000	1840	1870	129

Shipment and Distribution Summary

The optimized shipping plan takes into account transportation costs, plant proximity, and regional demand. The table below provides a breakdown of the shipment quantities from each source plant to the respective markets, including California, Chicago, and Seattle.

Chicago Shipping plan					
Year	Chicago	alpha	beta	gamma	delta
year 1	Chicago	3000	2000	2000	0
year 1	Califronia	0	0	0	0
year 1	Seattle	0	750	350	0
year 2	Chicago	6000	1000	2000	0
year 2	Califronia	0	0	0	0
year 2	Seattle	1	322	658	0
year 3	Chicago	3000	2500	2000	0
year 3	Califronia	0	0	0	0
year 3	Seattle	0	860	630	0

Sunnyvale Shipping plan					
Year	New plant	alpha	beta	gamma	delta
year 1	Chicago	0	0	0	500
year 1	Califronia	1500	1000	500	300
year 1	Seattle	1200	250	400	300
year 2	Chicago	0	0	0	0
year 2	Califronia	2000	500	1000	158
year 2	Seattle	1799	178	842	0
year 3	Chicago	0	0	0	0
year 3	Califronia	1000	1500	1000	129
year 3	Seattle	1000	340	870	0

Financial Performance Overview

The financial analysis includes projected revenues based on unit sales, variable production costs at each facility, and one-time fixed investments for expansion and construction. In Year 1, Ajax incurs a total fixed cost of $3,059,000, comprising $834,000 for Chicago's expansion and $2,225,000 for Sunnyvale's setup. Despite this upfront investment, the production and distribution plan is optimized to maximize profit each year. Revenue and net profit projections increase steadily due to rising market fulfillment and cost efficiencies introduced through strategic sourcing. Detailed financial figures are presented in the table below and further documented in the supporting Excel model.

Year	Revenue	Variable Cost	Fixed Cost	Net Profit
Year 1	$ 26795000	$ 19768850	$3,059,000	$3967150
Year 2	$ 30425161	$ 22431497	$0	$7993665
Year 3	$29152581	$21343748	$0	$7808832
Total	$86,372,500	$63,543,958	$3,059,000	$19,769,542

Strategic Conclusion

Ajax is well-positioned to capitalize on its market momentum through timely and data-driven investment in supply chain infrastructure. By expanding the Chicago facility and establishing operations in Sunnyvale from Year 1, the company can meet projected demand, control unit costs, and ensure high capacity utilization. These investments align with long-term strategic goals of geographic expansion, customer responsiveness, and operational excellence.

Our final recommendations for Ajax:

- **Expand the Chicago facility in Year 1** to meet increasing demand and avoid bottlenecks.
- **Hold off on opening a Sunnyvale plant** for now—the numbers just don't support it.
- **Let Chicago focus on Alpha, Beta, and Gamma**, while Sunnyvale continues specializing in Delta.
- **Distribute regionally when possible**, and rely on both plants to support each other when needed.