



Northco (A)

Projected leftover inventory¹ and working capital requirements from the season just ended (**Exhibit 1**) rendered Paul Michaels's mood consistent with inclement winter weather outside. Contrary to his assertions, leftover inventory had failed to decline, and even risen slightly, since his group, Oliver Capital (OCI), had purchased the Northco Company in 1991.

Northco company had since 1920 manufactured uniforms for some of the most prestigious schools and camps across the nation. Sales of school, camp, and athletic uniforms, fashion merchandise, and outlet sales had generated total revenues of \$3.5 million for 1995. Oliver Capital specialized in leveraged buyouts of privately-held New England based companies. OCI looked to create value by acquiring businesses at a discount to their original value and extracting value from them by better managing seasonal cash flow requirements. OCI investors, generally high net-worth individuals, expected higher-than-normal returns (around 40%) on their investments.

Michaels reflected on his career in "acquisitions" since graduating from Harvard Business School in 1989. Much to the surprise of his classmates and some professors, he had eschewed a career in investment banking, choosing instead to focus on buyouts. During a second-year field-study project at HBS, he had spotted opportunities in working capital funding for seasonal demand products.

Founded by Michaels in 1990, OCI had by 1995 bought, improved, and sold at substantial profit firms in the chemical and printing industries. Northco, however, had remained a challenge. In the four years since he had bought it, the company had shown scant improvement in operational performance despite investments in information systems and advice solicited from well-known consulting firms. Success with inventory management at Northco, Oliver's toe-hold acquisition in the school-uniform industry, would have given Michaels the confidence and investor platform to acquire other school-uniform manufacturers.

School Uniform Industry

The school uniform industry comprised companies that sold school uniforms directly to parents or schools. It did not include department and apparel stores that sold components of school uniforms such as gray slacks or white oxford shirts together with non-school apparel merchandise.

¹ Leftover inventory referred to inventory remaining at the end of the season that had to be carried over to following years.

Professor Ananth Raman and Research Associate Bowon Kim prepared this case as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. Data and names have been disguised. This case was based partially on a course project submitted by Sean Keohane, Drew Smith and Yosufi Tyebkhan MB'A'96.

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The industry was extremely fragmented; although the largest company sold \$25 million annually, most school uniform companies were family-run and generated annual sales on the order of \$1-5 million. In 1995, the school uniform market at the retail level was estimated to be approximately \$450 million and growing.

School uniform companies recommended that parents purchase three uniforms for a school year—"one to wash, one to wear, and one to spare." A typical boy's uniform comprised a blazer or sweater, oxford shirt, tie, blue or gray pants, dark socks, and dress shoes; a typical girl's uniform, a blazer or sweater, blouse, skirt or jumper, dress socks, and shoes. Initial orders by first-year students might be for as much as \$200.

A Basis in Relationships

Relationships with schools and parents were key to school uniform manufacturers. School uniform companies sold at a minimum to two of the headmaster, school uniform committee, or parents. Sales contacts were typically with the headmaster. Decision making rested with headmaster or school uniform committee (which comprised parents and teachers or, in some cases, the school's board of directors). The headmaster usually became the liaison between the uniform committee and supplier(s). Strong personal relationships between salespeople and headmasters and other school officials were thus important to secure contracts. Most schools chose and in some cases entered into a non-binding "contract" with a single supplier. Once a formal relationship had been established between a school and a uniform supplier, the latter sold directly to parents. The only thing that disrupted this relationship was poor service i.e. not delivering the appropriate product when needed.

Sales and Marketing

Sales and marketing varied by company. The sales function comprised, in addition to calling on new accounts, rebooking and servicing existing accounts and arranging fittings². If the company operated a retail store, the salesperson might also work in the retail store during the peak selling season. Although they varied by company, commissions paid for rebooking existing, and landing new accounts ranged in the area of 2.5% of net sales. Some uniform suppliers made commission payments to their school accounts as well, up to as much as 10% of sales generated by a school. For companies that operated a mail order business, seasonal customer service operators needed to take orders during the peak selling period represented an added expense.

Marketing was usually limited to appearances at parochial and independent school conventions, advertising to school yearbooks. Few school uniform companies exploited their mailing lists of affluent parents or carried in their retail stores, or tried to market to their school accounts, products or services other than school uniforms.

The Northco Company

Founded in 1920 as a manufacturer of clothing for school children and workers in the mining and logging industries, the Northco company operated four lines of business: school uniforms (the most important to the company); camp uniforms; athletic kilts; and women's classic clothing. Net sales for the year ended September 30, 1995 was \$3.5 million, earnings before

² Fittings referred to special events organized by Northco's sales department at schools during March and April. Northco managers set up areas at these schools in which to take orders and appropriate measurements from children.

interest, taxes, depreciation, and amortization (EBITDA) \$307,000. The company's uniforms and women's classic clothing were in a single leased facility staffed by a single-shift, non-union workforce.

School uniforms accounted for over 40% of Northco's business. (see **exhibit 2**). The Company possessed a broad and stable customer base selling its school uniforms on an exclusive basis to 91 of the nation's most prestigious private and parochial schools, including The Hockaday School in Texas, the Spence School in New York City and Greenwich Academy in Connecticut. Northco's top two accounts represented approximately 14% of total Northco school sales. Northco manufactured and subcontracted in wool, corduroy, serge, polycottons, polyrayon, and other polyester blends for children in grades kindergarten through twelve, nine categories of boys and girls clothing, including: pants, skirts, shorts, culottes, dresses, blazers, shirts and blouses, jumpers and tunics, and kilts.

Business Cycle Timeline

In order to enable delivery of school uniforms in adequate quantities to students in August or September, the production cycle began in October of the preceding year. "Old accounts" were rebooked from October through December of the previous year (see **Exhibit 3**). As schools were "rebooked" or new schools "booked," demand forecasts were generated and the requisite materials ordered. Northco management adjusted for order minimums and quantity discounts when ordering materials. Cut and sew operations normally began in late February or early March and proceeded steadily until July, at which point Northco generally had to resort to overtime to produce ordered items that were not in inventory.

Students (or their parents) ordered school uniforms by phone, generally between May and July. In an attempt to collect cash earlier, Northco had in recent years organized "fitting sessions" at its schools during March and April to collect orders from children whose parents were willing to commit to an order by paying cash.

However, only around 25% of customer orders were received by the end of the fitting period. The bulk of orders were received late in the season during July, August and September. Many Northco managers, suspecting that insisting on cash payment in advance of delivery deterred some parents from placing orders with the company earlier, argued for the lifting of this restriction, on the basis that measuring all children would give the company a better idea of the size-distribution for the year.

Demand Uncertainty

Northco, like other school uniform manufacturers, found it difficult to forecast demand accurately. High product variety—Northco maintained more than 12,000 SKUs, 5,000 of which were school uniforms—occasioned demand uncertainty. School uniforms, moreover, were subject to fashion trends (tight versus baggy trousers, or short versus long hemlines), and some schools were notorious for requiring custom fabric (e.g., plaids) and for changing their uniforms at the end of the school year, saddling manufacturers with sizable inventories of the previous season's fabric or uniforms. Other schools permitted students to select from among four or five uniform options. "Hand-me-down" programs distorted demand from year to year. Finally, certain basic products such as white blouses could be bought elsewhere e.g. at department stores.

Forecasts were updated periodically as more demand was observed. Updated forecasts, at any time t , were derived as a function of the previous year's demand for the product and the demand for the product up to time t in the current year. The resulting forecast error from this process is captured in **exhibit 4**. (**Appendix 1** provides mathematical details for the forecasting process.)

Northco managers had also observed that "large demand" SKUs (those with high annual demand) required a different forecasting process than "small demand" and "medium demand" SKUs. Consequently, separate regression equations were used for each SKU category i.e. large demand, medium demand and small demand SKUs.

Average forecast error was close to demand forecast at the beginning of the manufacturing season (see Exhibit 4). Not surprisingly, forecast quality improved over time. Marked improvement in forecasts was observed around the time of school fittings. Forecast errors (at both SKU and fabric levels) dropped significantly at this stage and declined steadily until late in the season. Some forecast uncertainty nevertheless persisted late into the season.

Forecasting was much more accurate at higher levels of aggregation; forecasts for fabric demand, for example, being quite accurate at the beginning of the season. Michaels had noticed that ignoring size greatly improved forecast accuracy

Manufacturing

Manufacturing, as for other apparel products, was labor intensive. Sewing a pair of pants, for example, took more than 30 minutes. Quality uniforms, moreover, featured reinforced knees, double-stitching, and provisions for adjusting sleeve and pant length, all of which involved more labor. Because many sewing operations required fairly skilled workers, new workers required considerable training. Unable to find skilled stitchers near its Maine factory at short notice, Northco management had in recent years discovered that it had to employ skilled stitchers throughout the year to have access to their services during the peak production months of July and August. Scaling up production at short notice required the use of overtime, for which Northco paid 1.5 times the regular wage.

Setup times associated with certain manufacturing steps became more onerous when Northco, which usually tried to produce in fairly large batch sizes, was forced during July and August by inventory shortfalls to produce in quantities of one or two units.

Relations with Suppliers and Banks

Lead times of suppliers from which Northco purchased fabric and some garments (prior to a finishing operation such as embroidery) varied from 2 weeks to 3 months and some, particularly larger suppliers, imposed substantial order minimums that forced Northco to buy multiple years' supplies.

Because school uniform manufacturing was a working capital-intensive business, the bank was in effect its most important "supplier." Working capital lines funded sales, marketing, administration, purchasing, and production through the off-peak period. Working capital funding began as soon as the selling season was over (late September, early October) and typically peaked during April, at which point cash obtained during fittings enabled the company to repay part of its loan. Loans from the bank had to be completely paid off by the end of August.

Northco financed its working capital needs with loans secured from a local bank, borrowed at 200 points above prime.³ Under the current line of credit, the bank financed only 30% of the company's inventory, leaving the remaining 70% to be financed by Northco's controlling shareholder, OCI.

³ The bank's lending rate to Northco was thus prime + 2.0%. At the current prime lending rate of 9%, Northco's borrowing rate amounted to 11%.

Banks were generally reluctant to lend working capital to school uniform manufacturers, in part because their accounts were rarely audited externally, with the result that accounting practices at these companies were often questionable. Additionally, banks found it difficult to assess the value of the perishable inventory that the working capital primarily financed.

Northco's previous owners had sold the company to Oliver because of the high cost of borrowing working capital, and because the bank had refused to extend the company's line of credit to Northco's previous owners. Michaels, therefore, was generally very careful with the management of cash receipts and outflows.

Manufacturing and Inventory Planning

Inventory management was key to success in the school uniform business. Purchasing and manufacturing were unique challenges to these companies, particularly in light of poor demand forecasts, the considerable costs associated with leftover inventory and unfilled demand, and the absence of management information systems.

Both high cost of working capital and the uncertainty of being able to sell all excess inventory the following season made leftover inventory expensive. At the same time, uniform manufacturers were severely penalized if even one child's uniform was not delivered on time; a uniform company that was unable to outfit every student on the first day of school risked losing the entire school account. The average account size being \$ 17,000 and average gross profit margin 50%, the loss of even a single school account represented a significant opportunity cost.

Manufacturing setup times and the imposition by some fabric suppliers of minimum order quantities (or, equivalently, quantity discounts) compounded uniform suppliers' inventory management problems. Minimum order quantities in some cases amounted to five times a uniform manufacturer's annual requirement.

The difficulty of matching supply with demand was exacerbated by the uniform companies' generally poor information and planning systems. Most school uniform manufacturers lacked even systems to track warehouse inventory on a day-to-day basis. Nor did any of these companies have systems for tracking demand and regularly updating demand forecasts during the selling season. Planning was consequently based on simple decision rules: many planners (after adjusting for lost accounts and dropped SKUs) simply produced the same quantity of each SKU as the previous year.

Another One, Or Is One "One Too Many"?

As Michaels gazed at the cold gray skies and snow-covered ground, he wondered what changes he would make to help Northco match supply with demand. Surely, he could forecast demand better or improve production planning to minimize supply-demand mismatches. Alternatively, a bigger plant or easy availability of skilled, overtime labor would obviate the need for forecasting and planning. Some Northco managers were also arguing for "cashless fittings" as a means of gathering market intelligence earlier while others in the company were opposed to losing this source of cash.

His mind drifted back to his first-year Technology and Operations Management Class at Harvard Business School. "Excess inventory is a symptom of other problems." He could now hear his professor's voice clearly. "To address the inventory problem, you need to look carefully at capacity, information, setups, defects. . . . They are the root causes of the inventory problem. Focus on the root cause, not the symptom."

Michaels's thoughts were interrupted by the telephone. "Hello," intoned a woman with a distinctly Southern accent; "I am Mrs. Eagle. I would like to sell our family-owned and operated school uniform company in Texas." Were he and his management team, Michaels wondered, prepared to plunge more deeply into the school uniform business, or was it time to exit this difficult business? The decision would reflect the team's mutual confidence in its ability to manage Northco's inventory and working capital.

Exhibit 1 Season Inventory: Northco's School Uniform Unit

Category/Season	1993	1994	1995
Unadjusted beginning inventory	\$767,600	\$618,300	\$684,100
Total purchase	\$389,400	\$863,400	\$798,700
Cost of goods sold	\$538,700	\$681,000	\$744,400
Tent transfers*	\$0	\$116,600	\$12,000
Unadjusted ending inventory	\$618,300	\$684,100	\$726,400

*Some of the unsold school uniforms were transferred to the "Tent Sale" unit, an independent accounting unit, for post-season markdown sales.

Exhibit 2 School Uniform Business at Northco

FYE 9/30 (000s)	1991	1992	1993	1994*	1995
No. of Schools	61	61	60	91	90
Net Sales	\$1,228	\$1,103	\$1,043	\$1,465	\$1,481
Gross Profit	\$514.4	\$565.3	\$556.6	\$783.5	\$792.3

*Growth in 1994 resulted in part from the acquisition of another school uniform manufacturer.

Exhibit 3 Business Cycle Timeline

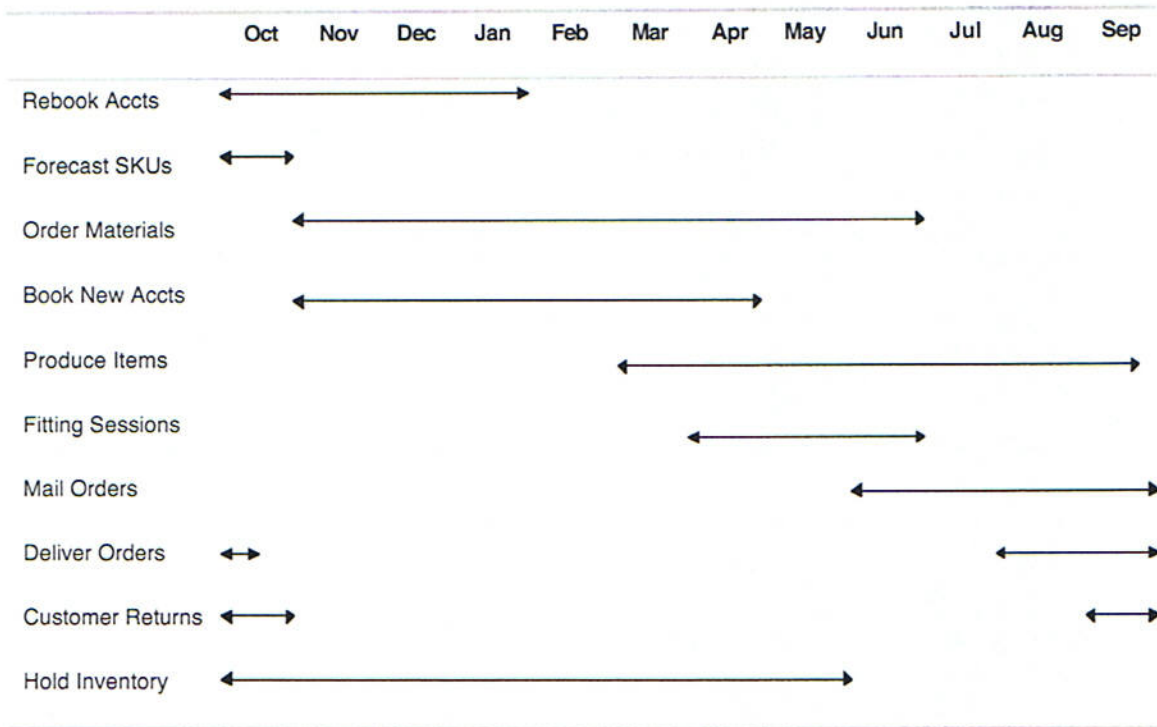
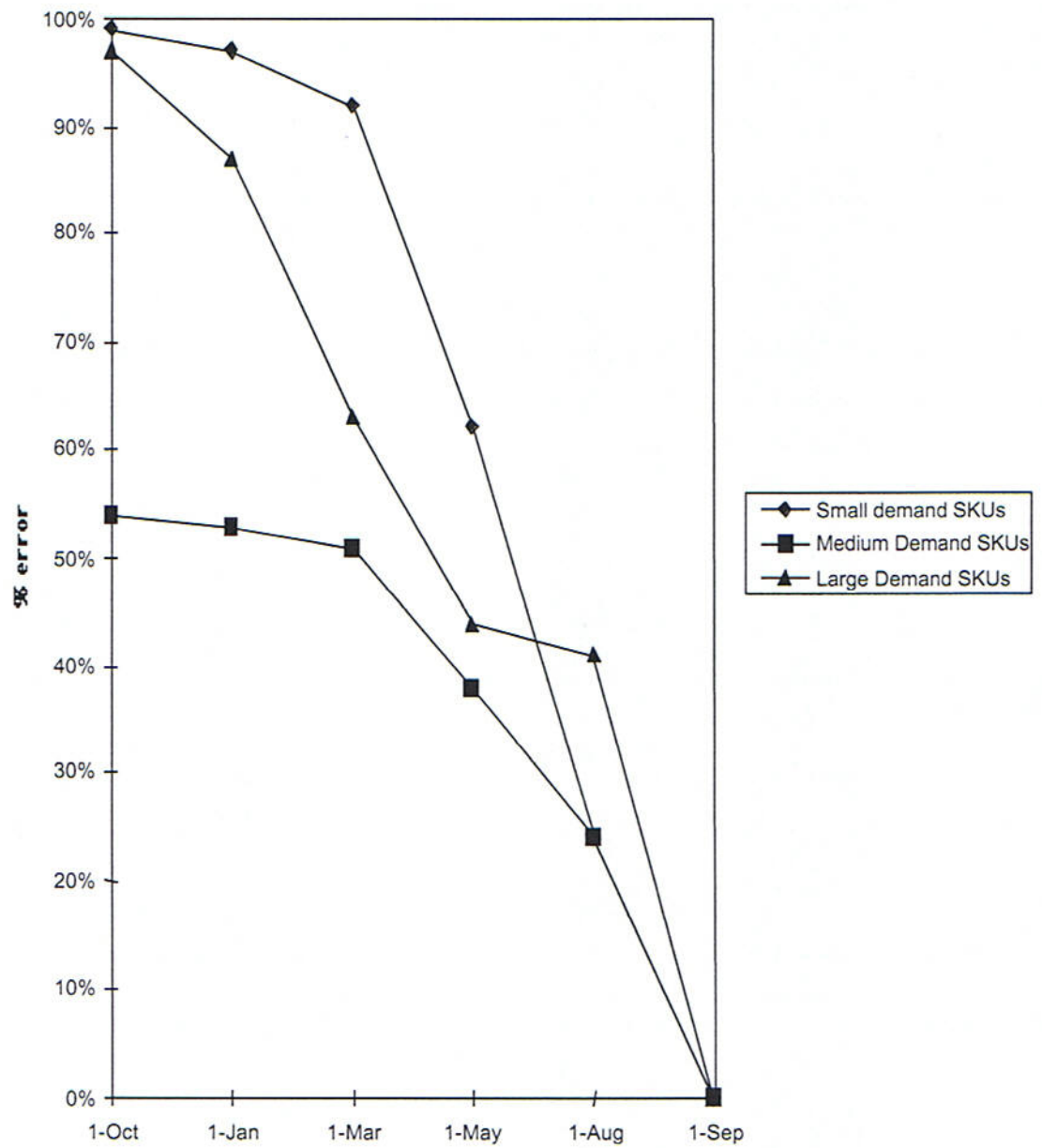


Exhibit 4: Forecast Error (as % forecast)



Appendix 1: The Forecasting Process

Northco's demand forecast for a particular SKU at the beginning of the year was based on the previous year's sales of that SKU. F_{ij} , updated forecasted demand for product j derived after period i demand had been observed, was derived as a weighted average of the previous years' sales for product j ($D_j^{(prev)}$) and the cumulative sales of product j up to the current time period (i) in the current year (D_{ij}) plus a constant.

Since demand for "large demand", "small demand" and "medium demand" SKUs followed different trajectories, Northco managers developed separate equations for each of these product categories. Let, superscript k denotes the product category under consideration.

Mathematically, $F_{ij} = a^k + b_{prev}^k \cdot D_j^{prev} + b^k \cdot D_{ij}$, where a^k , b_{prev}^k and b^k were chosen using historical data.

Appendix 1 a. Regression equation coefficients to forecast demand for "Small Demand SKUs"

Month	Constant (a)	Coefficient ($b_{previous}$)	Coefficient (b_{month})	Coefficient of variation ⁴
October 1	14	0.19	0	0.99
January 1	13	0.15	0.61	0.97
March 1	11	0.12	1.08	0.92
May 1	5	0.05	1.19	0.62
August 1	1	0.03	1.02	0.24
September 1	0	0	1	0.00

⁴ Coefficient of variation is calculated as the ratio of the root mean squared error to the forecast.

Appendix 1 b. Regression equation coefficients to forecast demand for "Medium Demand SKUs"

Month	Constant (a)	Coefficient (b _{previous})	Coefficient (b _{month})	Coefficient of variation
October 1	127	-0.47	0	0.54
January 1	123	-0.47	0.36	0.53
March 1	112	-0.43	0.60	0.51
May 1	58	-0.18	0.88	0.38
August 1	18	0.24	0.89	0.24
September 1	0	0	1	0.00

Appendix 1 c. Regression equation coefficients to forecast demand for "Large Demand SKUs"

Month	Constant (a)	Coefficient (b _{previous})	Coefficient (b _{month})	Coefficient of variation
October 1	276	0.74	0	0.97
January 1	187	0.76	0.99	0.87
March 1	90	0.71	1.19	0.63
May 1	3	0.62	1.01	0.44
August 1	-49	0.60	0.87	0.41
September 1	0	0	1	0.00