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25
YEARS

Determining Supply Chain Variability at General Mills



L to R: Frederick Zhou, Christine England, Teresa Viola, Rajat Bhatia, and Carol German

With roots going back to 1856, founded in 1928 and headquartered in Golden Valley, Minnesota, a Minneapolis suburb, General Mills, Inc. is a multinational manufacturer and marketer of branded consumer foods and other packaged goods sold through retail stores in more than 100 countries.

The company, which reported 2017 revenue of \$15.6 billion, operates approximately 79 food production facilities in a more than a dozen countries, and has approximately 38,000 employees. It manufactures cereals, snacks, yogurt, and other food products under such well-known brands as Gold Medal flour, Annie's Homegrown, Betty Crocker, Yoplait, Colombo, Totino's, Pillsbury, Old El Paso, Häagen-Dazs, Nature Valley, Cheerios, Trix, Cocoa Puffs, Wheaties, and Lucky Charms.

General Mills supplies major retailers and provides services to its core customers for improving display configurations and stocking solutions. The company prides itself on best-in-class customer service and continually seeks to improve its service performance.

But over the past three years, variability has increasingly affected customer service performance and cost, while the cumulative nature of these effects is only partially understood by supply chain stakeholders. In order to better serve its customers, General Mills sought to understand where its supply chain lacks resiliency against variability, and how supply chain robustness can be quantified, monitored and improved in order to make the company more agile.

To deal with this problem, General Mills brought in a student team from the Tauber Institute for Global Operations at the University of Michigan, consisting of Rajat Bhatia and Teresa Viola, both working on Master of Supply Chain Management degrees.

"The General Mills Tauber team was tasked with determining cumulative effects of common variability sources on the supply chain performance," said Viola. "The team focused on a snack product and examined how each source of variability in demand forecasting, manufacturing and logistics affects the fill rate."

The Tauber team began the process of investigating variability in General Mills' supply chain with a series of 30 stakeholder interviews and developed an end-to-end value chain map of the snack's supply chain.

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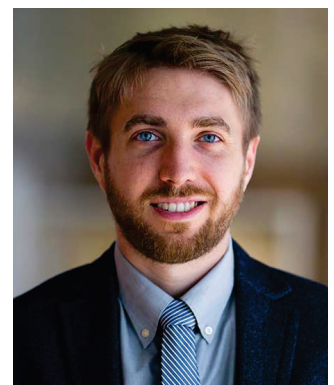
"These interviews allowed the team members to understand General Mills' operations with more depth," said Viola.

The Tauber team also created a variability network illustrating cause and effect relationships in the supply chain, and identified key variability sources that affect customer service performance.

"The original project endeavored to establish and quantify linear or nonlinear relationships between variability sources, and intermediate and final metrics," said Viola. "The team discovered that high inventory levels at the end of the value chain made it difficult to explicitly determine those relationships."



Hyun-Soo Ahn
Ross School of Business



Matthew Plumlee
College of Engineering

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“The project was redesigned to address a cost-benefit analysis between inventory levels and projected fill rate, as well as a current gap in demand signal prediction. The Tauber team realized that our original goal of modeling the value chain would be impractical in the given time frame, and restructured the project to find solutions to what the team determined to be the most costly effects of variability in the supply chain.”

Based on data analysis and interview responses, the Tauber team identified four primary sources of variability: demand forecasting, unplanned merchandising events, manufacturing variability, and supplier performance. The team also quantified the current impacts of these sources on the supply chain, identified key variability tolerances across supply chain functions, and recommended a decision-making methodology to improve customer service and reduce costs.

“The most unique feature of the project was our recommended solution regarding large regional retailers,” said Viola. “Before the team’s work at General Mills, the company aggregated demand signal for all but the largest national retailers. However, there were three regional retailers, each of whom generated significant business, and each of whom was supplied by a single distribution center. When demand errors occur at national retailers, the effect of demand signal error is spread across many distribution centers. This is not the case for the regional retailers in question.

“Data analysis performed by the Tauber team showed that the distribution centers associated with large regional retailers were more vulnerable to order fulfillment failure than comparably sized distribution centers that did not supply a major regional retailer. This led to the Tauber team’s recommendation to isolate the demand

signals for large regional retailers in the same way that General Mills currently does for large national retailers to reduce low fill rates at the more vulnerable distribution centers.”

The Tauber team recommended that General Mills adopt a cost based decision methodology when evaluating inventory levels and forecasted demand. The company has developed a model according to this recommendation for one of its business units, and a pilot run showed huge potential cost savings. The team also recommended disaggregating the demand signal of large regional retailers from the national demand signal. As part of its demand planning, General Mills is to take more concrete action regarding this matter, beginning in the second quarter of 2018.

General Mills Project Team

Student Team

Rajat Bhatia—Master of Supply Chain Management

Teresa Viola—Master of Supply Chain Management

Project Sponsors

Beth Blaylock—Initiative Leader, HMM & SC Strategy

Stephanie Buscher—Supply Chain Analytics Consultant

Christine England—Senior Manager, Supply Chain Technology, Analytics & Process

Carol Heppes German—Program Manager, HMM & SC Strategy

Faculty Advisors

Hyun-Soo Ahn—Ross School of Business
Matthew Plumlee—College of Engineering

After the General Mills snack team adopted the new decision-making methodology, the company anticipates potential savings between \$20 and \$25 million per fiscal year, due to reduced inventory and more accurate forecasting. As the methodology is adopted across different divisions at General Mills, business-wide potential savings may exceed \$210 million a year. In addition, the supply chain analytics team at General Mills will use the Tauber team’s deliverables in determining actionable areas of supply chain strengthening over the next two to three years.

About Tauber Team Projects

The 2017 Tauber Team Projects resulted in \$575 million in savings according to sponsoring company calculations, an average of \$18.5 million per project over three years.

Each two to three person Tauber Team consists of graduate engineering, MBA, and/or MSCM students. Along with receiving high-level corporate support from the sponsoring company, each team is advised by a College of Engineering and a Ross School of Business faculty member and overseen by a Tauber Institute Co-Director. The projects begin on-site in May and continue for 14 weeks. Students present the results of their projects and compete for over \$40,000 in scholarships at the U-M Tauber Institute’s annual *Spotlight!* event, held each September in Ann Arbor, Michigan. *Spotlight!* provides outstanding opportunities for students and corporate partners to establish relationships while exploring innovations in operations and manufacturing.

To learn more about the Tauber Institute for Global Operations, visit tauber.umich.edu or contact us at 734-647-1333.

