

New Logistics Model Improves Forecast Accuracy of Retail and Packaged-Goods Orders

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(PhysOrg.com) -- Whether it's dog food or iPods, tires or televisions, virtually every consumer has endured a frustrating out-of-stock experience. Retailers hate it as much as customers, perhaps more, because they lose money and credibility. Examining this problem at a specific link - suppliers and distribution centers - in the retail and consumer-packaged goods supply chain, a logistics researcher at the University of Arkansas and his colleague discovered that application of a common error-correction model improves the accuracy of forecasting orders.

“The [statistical model](#) we used provides a better understanding of orders in a [supply chain](#) and can improve short-term forecasting,” said Matt Waller, professor of marketing and logistics in the Sam M. Walton College of Business. “It has been used heavily in macroeconomics but not in logistics. Our theoretical analysis suggested such a method should improve short-term order forecasts, so we used it to forecast distribution-center orders and found that it reduced error relative to baseline methods used by the consumer-packaged goods industry.”

Within the retail and consumer-packaged goods industry - which affects American consumers on a daily basis - the inability to accurately forecast supply orders is perhaps the greatest obstacle to establishing and maintaining an appropriate amount of goods on retail shelves. Suppliers annually devote millions of dollars toward human and technological

resources, including sophisticated and expensive software packages, to address the problem and still struggle to find the right balance.

Supplied with 104 weeks of data from a global consumer packaged-goods company, Waller and Brent Williams, assistant professor at Auburn University, tested the performance of the error-correction model in the ready-to-eat cereal, canned soup and yogurt categories and found significant improvements in order-forecasting accuracy. Their findings will improve important supply-chain measurement standards, such as inventory turnover, gross margin return on inventory investment and in-stock levels. Improvements in these areas will lead to greater service and convenience for consumers and increased profits for retailers.

Traditionally, commercial ordering systems used by suppliers have relied on simple retail order history or conventional forecasting models based on retailers' point-of-sale data - but not both - to forecast future orders. However, recent changes in supply-chain processes have made it possible for retailers to share sales history with "upstream" supply-chain partners. These developments, Waller said, have generated interest in determining whether point-of-sale history, in conjunction with order data, can improve the ability of a supplier to more accurately predict retail orders.

The researchers first established theoretical evidence for the existence of a long-run equilibrium between point-of-sale information and retail orders, which implied that variables within this relationship followed an error-correction process. This allowed them to empirically examine whether conventional statistical conditions for using the error-correction model were apparent.

"We found several combinations where point-of-sale and distribution-center orders were co-integrated," Waller said.

However, in a majority of the combinations in which point-of-sale information was non-stationary - meaning statistical properties of sales data changed over time - orders were stationary. Waller and Williams applied the error-correction model under these conditions and again found that it improved short-term order-forecast accuracy. Their analysis demonstrated that the model generally improved forecast accuracy even when some of the statistical conditions for applying it did not hold.

Waller said most commercial software packages can be customized to include the model as an option to suppliers, but the model requires both order history and point-of-sale data.

Presentation of the researchers' manuscript on the study recently won the E. Grosvenor Plowman Award at the national Supply Chain Managers Education Conference in Chicago. A copy of the study is available upon request.

Waller holds the Garrison Endowed Chair in Supply Chain. He recently administered the Walton College executive M.B.A. program in Shanghai, China, where he researched global supply-chain management. He is systems editor of the *Journal of Business Logistics*, the flagship academic journal of the Council of Supply Chain Management Professionals. He is also co-editor of *International Journal of Logistics Management*.

Provided by University of Arkansas ([news](#) : [web](#))

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