

Advance supply signals critical to firms' profitability

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Advance supply signals, such as financial health and production viability, contain rich information on supplier conditions. When and how these signals should be used is critical for improving firms' forecast and profitability.

A recent paper, "Dynamic Supply Risk Management with Signal-Based Forecast, Multi-Sourcing, and Discretionary Selling," provides mathematical tools and management principles on this issue.

The authors, Long Gao (from University of California, Riverside School

of Business Administration), Nan Yang and Renyu Zhang (both from Washington University in St. Louis), and Ting Luo (from The University of Texas at Dallas), study how firms should use signal-based supply [forecast](#) to coordinate the procurement and selling decisions in real time.

They find that the value of signal-based supply forecast depends critically on supply volatility and scarcity. It should be used when supply uncertainty is substantial, supply-demand ratio is moderate, forecast precision is high and supplier heterogeneity is high.

The authors also identify important insights on other risk-mitigation instruments such as multi-sourcing and discretionary selling. For example, multi-sourcing and signal-based forecasts can be strategic complements or substitutes, depending on the supply-demand ratio. Moreover, although discretionary selling exploits demand heterogeneity by satisfying the most lucrative orders only, its value may decrease with more heterogeneous demands.

The paper provides a powerful lens for understanding firms' risk management strategies. For example, following the 2011 earthquake and tsunami in Japan, Toyota mobilized multiple suppliers to make up a shortage of certain parts (such as engine drive belts and mass airflow sensors), restricted the allocation of certain parts and fulfilled only emergency repair orders. As the paper demonstrated, such a holistic strategy is well grounded on the mathematical and management principles the authors developed.

The research has potential implications in a wide range of events - including the ongoing drought in California, the electricity crisis in the early 2000s in California and the strikes earlier this year at the ports of Los Angeles and Long Beach - all of which deal with supply chain disruption issues.

"It should be in the DNA of companies that all relevant elements should be systematically taken into account," Gao said. "When dealing with outside disruptions, companies can't react on an ad hoc basis."

More information: papers.ssrn.com/sol3/papers.cfm?abstract_id=2637705

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