Inventory Cost Reduction with Improved Demand Estimation Using the tBISA Distribution

A Praxis Defense Presented By
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Abstract: Effective inventory management deals with meeting customer demand while keeping the costs associated with carrying the inventories to a minimum. If demand is underestimated, loss of sales may occur and competition will most likely attract those unhappy customers. On the other hand, if demand is overestimated, the surplus in inventory can be financially draining due to the costs associated with holding and storing the excess stock. Opportunity cost also arises with over stocking of goods as the cash tied up in unnecessary inventory could be invested in other more profitable activities. Making optimal inventory decisions depends heavily on accurately predicting future demand, which is often unknown. Stochastic inventory models use the probability distribution of demand as a key input. However, the probability distribution of demand is also usually uncertain. This is especially true when historical sales data, often distorted by frequent stockouts, are used as a proxy for true realization of demand. Typically, when stockouts occur sales are lost and the unmet demand not recorded (censored); and, therefore, sales and demand are not equal. Fox, et al., (2008) proposed a modified Birnbaum-Saunders (tBISA) probability distribution as a general approximation for the distribution of such censored demand, (i.e., the count of transactions). They proposed that in addition to sales data, the time between purchases, also known as interarrival times, can be exploited to better estimate the distribution of demand. The objective of this research is to test whether modeling demand of individual items sold at a convenience store with the tBISA can lead to better demand estimation and, therefore, lead to better inventory planning decisions. We have sales data collected over a 55-week period from a major convenience store chain in the Dallas/Fort-Worth metroplex for the testing.

Bio: Razan Kattoa is a full-time doctoral candidate at the Engineering Management, Information and Systems Department. Her research interests are inventory planning and management. She received her Master's Degree in Information Engineering and Management form Southern Methodist University in 2008, and her Bachelor's Degree in Computer Science from King Abdul Aziz University in 2002.

Everyone invited and welcome!