ABSTRACT

Putting Behavioral Operations to Work: Improving Company Performance by Understanding Human Behavior

The newsvendor problem, in which a vendor must decide how many papers to order today for resale tomorrow without knowing precisely how many customers will arrive, is the most-studied setting in the behavioral operations literature. An elegant mathematical formula gives the profit-maximizing order quantity, yet hundreds of studies document the failure of humans to select this optimal order quantity. If taken literally, this corpus would suggest that human decision-making is strictly detrimental and that inventory managers should be replaced with simple computer software, but this conjecture grossly oversimplifies the situation. In practice, managers often have a sophisticated awareness of their customers, suppliers, partners, and business environment that can improve decision-making, but these complex interactions are eliminated from the simple newsvendor setting as we typically study it. To represent managers' contextual awareness in a laboratory experiment, I endow human participants with an additional clue about upcoming demand. In theory, a perfectly rational participant should update her belief about the demand distribution using Bayes' rule and then use calculus to compute an updated profit - maximizing order quantity. This optimal utilization of superior demand information can increase profits by as much as 20%, which points to the great potential value of human insight. However, when asked to place newsvendor orders in the laboratory, human participants are unable to perform the required mathematics and, despite having superior demand information, actually degrade performance. The primary contribution of my dissertation is establishing a procedure to capture nearly all of the potential gains from human insight. Rather than asking participants to make the challenging economic order-placing decision, I ask them to simply estimate demand. Using regression analysis and calculus, I can translate each point estimate into a human-insight-informed demand distribution and then mechanically compute the well-known profit-maximizing order quantity. With this arrangement, profits approach the theoretical upper bound.