Primer on Behavioral Research (in OM)

Anton Ovchinnikov

Darden School of Business, University of Virginia
What is Behavioral Operations?

As per Croson, Schultz, Siemsen, Yeo (JOM 2012):

There are three criteria that a paper needs to meet in order to be considered **behavioral operations**:

- (a) it needs to at least potentially allow human decision makers to deviate from hyper-rational behavior;
- (b) it needs to examine behavior within an operations context;
- (c) it needs to focus on a micro-level of analysis
Whose behavior?

- Behavior of consumers (on the example of remanufactured products)
  - Ovchinnikov (POM 2011) “Revenue and Cost Management for Remanufactured Products”
  - Ovchinnikov, Blass, Raz (POM 2013) “Economic and Environmental Assessment of Remanufacturing for Product+Service Firms”
  - Agrawal, Atasu, Van Ittersum (working paper) “Remanufacturing, Third-Party Competition, and Consumers' Perceived Value of New Products”
- Behavior of “firms” (managers, decision-makers) (on the example of newsvendor problem)
  - Schweitzer, Cachon (MS 2000) “Decision bias in the newsvendor problem with a known demand distribution: Experimental evidence”
  - Ho, Lim, Cui (MS 2010) “Reference-dependence in multi-location newsvendor models: A structural analysis”
  - Bolton, Ockenfels, Thonemann (MS 2012) “Managers and Students as Newsvendors”
  - Becker-Peth, Katok, Thonemann (MS 2013) “Designing Contracts for Irrational but Predictable Newsvendors”
  - Katok, Moritz, Ovchinnikov, Quiroga (working paper) “How to Complete against a Behavioral Newsvendor”
- Behavior of employees/workers
  - Incentives, teamwork, trust
Elements of a behavioral OM work

• Identification/description of a behavioral phenomenon
  – How is it different from normative models?
  – Alternative explanations: “Pull-to-center” in newsvendor ordering is not just risk aversion, Schweitzer and Cachon (MS 2000)
• How to model the observed behavior?
• Insight: What does it mean for the management of the business/process?
• Validation/measurement: Controlled experiment which shows the improvement in KPIs of the business/process
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<th>Revenue and Cost Management for Remanufactured Products</th>
<th>How to Complete against a Behavioral Newsvendor</th>
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<td><strong>Phenomenon</strong></td>
<td>Trade-off between price and perceived quality of a remanufactured product (motivated by a case study, mini-case in the paper)</td>
<td>Human newsvendors are “predictably irrational”: isolated regularities (pull-to-center, demand chasing, order variability, asymmetric reactions to under/over) + new “competitive” regularities</td>
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<td><strong>How to model?</strong></td>
<td>Heterogeneous consumer population, “switching function” - extension of standard WTP models</td>
<td>Derived best response to a competitor whose order is a random variable G(m,sd)</td>
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<td><strong>Insight</strong></td>
<td>Demand cannibalization is less than in “standard” models</td>
<td>Behavioral newsvendors do not respond to the mean of volatile competitors orders</td>
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<td><strong>Validation / measurement</strong></td>
<td>Calibrated the switching function on survey data, numerical simulation -&gt; up to 2X incremental profit from remanufacturing</td>
<td>Calibrated the best-response on one set of subjects, benchmarked in an out-of-sample experiment -&gt; increase in profit, market share and service level</td>
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Additional thoughts

• “Good to haves”
  – Individual level results/analysis:
    • E.g., not just demand chasing on average, but for some large % of subjects
  – Established theory that the behavioral OM work is trying to prove/disprove/extend
    • E.g., in relation to newsvendor competition: Lippman and McCardle (OR 1997) “The competitive newsboy”
  – Established empirical methodology
    • This can be an opportunity as well, though…
Challenges

• Experiments inherently have uncertain outcomes
• Time-to-paper concern
  – Experimental infrastructure
• Does not always “map” onto established concepts/cannons in research
• Degree of experience and training of OM researchers in experimental methods, data analysis
• Degree of familiarity with the literature in neighboring fields: marketing, economics, psychology
Opportunities

• “Operations” involve people, so understanding their behaviors and tailoring OM results to these behaviors reinforces relevance of OM research
• Controlled experiments to isolate factors, demonstrate value
  – In the lab
  – In the field