Practice-Focused Research

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London Business School

Felipe Caro
UCLA

2014 Supply Chain Thought Leaders Conference, Helsinki
Session Outline

• Some relevant history
• Case study: doing applied research with Zara
• Perspectives from the MSOM Special Issue and POMS Applied Research Challenge

• Suggested discussion topics:
  – What is practice-focused research? Related opportunities not currently addressed?
  – Current best practices and pitfalls for practice-focused research?
  – What initiatives would be useful to promote this type of research?
Management Engineering and the OR Crisis

In World War II, OR originated as management engineering.

In the 1950s and 1960s, OR rapidly expanded in both directions, towards theory and practice.

The expansion has continued, but the middle ground of management engineering has been left behind.


See also Chopra, Lovejoy and Yano, “Fifty Years of Operations Management and the Prospects Ahead” (2004)
Jan Van Mieghem’s History of OM

Mathematics & Computer Science


Engineering (Military, Industrial, Telecom)


from Van Mieghem, J., “The 3 Rs of OM” (2012)

Game Theory

- Econometrics
OM Methods and Goals

Economics

From Wikipedia, the free encyclopedia

This article is about the social science. For other uses, see Economics (disambiguation).

For a topical guide to this subject, see Outline of economics.

Economics is the social science that studies economic activity to gain an understanding of the processes that govern the production, distribution and consumption of goods and services in an exchange economy.[1]
“[…] I have found that so much is learned during the implementation process that this itself constitutes a type of empirical research. During implementation you are forced to verify and refine the details of your model, so you evolve a very precise definition of how a particular operations function works.”

OM Needs Practice-Focused Research

“…OR has been equated by managers to mathematical masturbation and to the absence of any substantive knowledge or understanding of organizations, institutions or their management. […] The field’s introversion drove it into a catatonic state in which it died mercifully, but it has yet to be buried.”

Ackoff (1979, 1987) (1956 president of ORSA)

“Ignoring what made “old style OR” successful will split the profession into two largely independent parts, each struggling desperately for existence”

Rothkopf (1988)

“[…] operations management has had big ideas such as the industrial revolution, mass production, the assembly line, the Toyota Production System, and statistical process control. Yet these ideas have not come from academia.”

Fisher (2007)

“I would like to increase significantly the number of papers that report on innovative implementations of OM research to real problems or that rigorously document existing practice and demonstrate how current modeling approaches succeed or fail in practice. I believe that our field is in desperate need of such work.”

Graves (2009)
Some Benefits of Practice-Focused Research

1. **Engineering function:** Develop practical solutions to important real-world challenges [practitioners]

2. **Seed function:** Identify and characterize important new phenomena, practices and research topics [scholars]

3. **Legitimation function:** Demonstrate practical relevance / importance of our field [practitioners, deans, students]
Hewlett-Packard

Sport Obermeyer


Zara

Case Study: Doing Applied Research with Zara
Doing Applied Research

• Contacting Practitioners
  – Alumni networks & practice conferences
  – One (successful) project brings another project

• Collaboration Terms
  – Camm and Tayur: How to Monetize the Value of OR, Interfaces 2010

• Factors of Success
  – Need a project champion
  – Explaining “strange numbers”
  – Defining metrics and measuring impact
  – Communicational effort to overcome roadblocks
  – User interface and following up

• Getting Published
Measuring Impact

Groups 1-12: Woman and Basic

Groups 13-20: T.R.L., Knitwear and T-Shirts

Woman Blazer Basic Blazer

Woman Trouser Basic Trouser


T.R.L. Trouser T-Shirts
BELGIUM:
Groups 1-12 are priced with the optimization model
Groups 13-20 are priced manually

IRELAND:
Groups 1-12 are priced manually
Groups 13-20 are priced with the optimization model

REST OF WESTERN EUROPE:
All groups are priced manually

Measuring Impact
Measuring Impact

Performance metric:

\[
Y = \frac{\text{% INCOME}}{\text{CLEARANCE SALES REVENUE}} = \frac{1}{\text{INITIAL STOCK VALUED AT SEASON PRICES}}
\]

For each store compute:

\[
\text{Diff.} = Y_{\text{Groups 1-12}} - Y_{\text{Groups 13-20}}
\]

Then take the average across stores in Belgium. Do the same in Ireland and the Rest of Western Europe (RWE).
## Roadblocks: The Forecast

<table>
<thead>
<tr>
<th>Price</th>
<th>Demand</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Forecast</td>
<td>Real</td>
</tr>
<tr>
<td>50</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>50*125=$6,250</td>
<td>50*150=$7,500</td>
</tr>
<tr>
<td>60</td>
<td>100</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>60*100=$6,000</td>
<td>60*130=$7,800</td>
</tr>
</tbody>
</table>

With price=50, forecast error is \((150 - 125)/125 = 20\%\), but unrealized revenue is only \((7,800 - 7,500)/7,500 = 4\%\)
Roadblocks: The Forecast

User Interface

Propuesta precios

Gráfico de importes

BÉLGICA - PREnda EXTERIOR Y PIEl WOMAN
Corte 105 - Categoría 19900

Ingreso total: 22,874
Próxima semana: 6,473
Siguientes semanas: 9,175
Saldero: 7,226
## DSS Rollout

<table>
<thead>
<tr>
<th>CAMPAIGN</th>
<th>WOMEN</th>
<th>MEN</th>
<th>KIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>W08</td>
<td>BELGIUM, IRELAND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S09</td>
<td>BELGIUM, HOLLAND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W09</td>
<td>BELGIUM, HOLLAND, SWITZERLAND, AUSTRIA, POLAND</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S10</td>
<td>BELGIUM, HOLLAND, SWITZERLAND, GERMANY, AUSTRIA, FRANCE, SPAIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>W10</td>
<td>ALL BUT U.S.A., EMIRATES, AND ISRAEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S11</td>
<td>ALL BUT ISRAEL</td>
<td>BELGIUM, HOLLAND</td>
<td>BELGIUM, HOLLAND</td>
</tr>
<tr>
<td>W11</td>
<td>ALL BUT ISRAEL</td>
<td>BELGIUM, HOLLAND, LUXEMBURG, MEXICO, U.S.A.</td>
<td>BELGIUM, HOLLAND</td>
</tr>
<tr>
<td>S12</td>
<td>ALL BUT ISRAEL</td>
<td>BELGIUM, HOLLAND, LUXEMBURG, MEXICO, U.S.A., FRANCE, ITALY, MEXICO, RUSIA, CANADA, CZECH REP., CROATIA, AND FRANCHISES</td>
<td>BELGIUM, HOLLAND, LUXEMBURG, SWITZERLAND, POLAND, CANADA, AND FRANCHISES</td>
</tr>
<tr>
<td>W12</td>
<td>ALL</td>
<td>ALL</td>
<td>ALL</td>
</tr>
<tr>
<td>S13</td>
<td>ALL</td>
<td>ALL</td>
<td>ALL</td>
</tr>
</tbody>
</table>
### Detalle por modelo calculado

<table>
<thead>
<tr>
<th>Grupo 1</th>
<th>Reino Unido</th>
<th>España</th>
<th>Diferencia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ingreso total</strong></td>
<td>77,899</td>
<td>77,929</td>
<td>-0,04%</td>
</tr>
<tr>
<td><strong>Próxima semana</strong></td>
<td>20,894</td>
<td>21,260</td>
<td>-402 (-1,89%)</td>
</tr>
<tr>
<td><strong>Siguientes semanas</strong></td>
<td>45,253</td>
<td>45,227</td>
<td>20 (+0,04%)</td>
</tr>
<tr>
<td><strong>Importe Saldro</strong></td>
<td>11,782</td>
<td>11,436</td>
<td>346 (-3,03%)</td>
</tr>
<tr>
<td><strong>Uds fin rebajas</strong></td>
<td>2,486 (26,18%)</td>
<td>2,413 (25,41%)</td>
<td>73</td>
</tr>
</tbody>
</table>

### Promedio de Ventas

<table>
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<th>Reino Unido</th>
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<th>Diferencia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corte Venta: 26,33%</td>
<td>24,21%</td>
<td>-2,12%</td>
</tr>
<tr>
<td>Corte Stock: 20,80%</td>
<td>34,55%</td>
<td>13,75%</td>
</tr>
</tbody>
</table>

### Seleccion propuesta:

- **País**: BÉLGICA
- **Corte**: Corte 2
- **Grupo**: Ropa de Niño
- **Prenda Exterior**

- Agregue por categorías: Seleccionado
- **Unidades**: Seleccionado
- **Importe**: Seleccionado

### Precio Controlado:

<table>
<thead>
<tr>
<th>Fecha</th>
<th>Precio propuesto</th>
<th>Venta (unidades)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/01/2013</td>
<td>27.99</td>
<td>0</td>
</tr>
<tr>
<td>14/01/2013</td>
<td>27.99</td>
<td>55</td>
</tr>
<tr>
<td>15/01/2013</td>
<td>27.99</td>
<td>1,144</td>
</tr>
</tbody>
</table>

### Evolución de Ventas

<table>
<thead>
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Doing Applied Research

• Contacting Practitioners
  – Alumni networks & practice conferences
  – One (successful) project brings another project

• Collaboration Terms
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• Factors of Success
  – Need a project champion
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  – Communicational effort to overcome roadblocks
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• Getting Published
MSOM Special Issue on Practice-Focused Research

• Proposal solicited by Steve Graves, developed with Alan Scheller-Wolf, reviewed by MSOM board in Fall 2012

• Goal: “motivate, highlight and consolidate high-quality scholarly work that is focused on the practice of Operations Management, contributing to the greater recognition of such work as a rigorous and important academic endeavour within our field”

• Associate Editors: Srinivas Bollapragada, Felipe Caro, Charles Corbett, Erica Plambeck, Marcelo Olivares, Marshall Fisher, Ananth Iyer, Ananth Raman, Nicola Secomandi, Robert Shumsky, Lawrence Snyder, Jay Swaminathan, Geert-Jan van Houtum, Sean Willems, Feryal Erhun

• Timeline:
  – LOI due April 2013, feedback provided July 2013
  – Submission deadline Jan 2014, Target publication June 2015
Scope Definition

• Applications of advanced and/or innovative operations management methodologies to problems in practice, yielding significant and quantifiable benefits and/or related general managerial insights

• Detailed and well-documented descriptions of innovative or prevalent industrial practices not yet described in the academic literature, along with a rigorous quantitative analysis of their rationale and/or relative impact

• Empirical analyses of field data providing original and broadly generalizable insights on the relative effectiveness of different OM practices. Such data could include, for example, operational data, sales data, contract forms and/or customer perceptions and characteristics
Scope Exclusions

• Mathematical models (sophisticated or not) with a potential impact on practice only established through speculation or numerical experiments, even if those numerical experiments involve input parameters estimated with real data.

• Case studies of how a single organization addresses some OM challenges with no clear transposable knowledge or broadly generalizable insights generated.

• Reports of implementation of standard methodologies with no convincing novelty or relevance to other settings.
Scope Definition

- Applications of advanced and/or innovative operations management methodologies to problems in practice, yielding significant and quantifiable benefits and/or related general managerial insights:
  - 15 papers

- Detailed and well-documented descriptions of innovative or prevalent industrial practices not yet described in the academic literature, along with a rigorous quantitative analysis of their rationale and/or relative impact:
  - 1 papers

- Empirical analyses of field data providing original and broadly generalizable insights on the relative effectiveness of different OM practices. Such data could include, for example, operational data, sales data, contract forms and/or customer perceptions and characteristics:
  - 7 papers
Impact Assessment Methodology

<table>
<thead>
<tr>
<th>Method:</th>
<th>Numerical Experiment</th>
<th>Econometric Analysis</th>
<th>Lab Experiment</th>
<th>Pilot Implementation</th>
<th>Controlled Field Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key concern:</td>
<td>Model realism</td>
<td>Correlation versus causation</td>
<td>External validity</td>
<td>Before versus after</td>
<td>Intervention design and execution</td>
</tr>
<tr>
<td>Number of submitted papers:</td>
<td>11</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

“Model validation implies that a model […] has been shown to reproduce closely the independently recorded relation between input, intermediate, and outcome variables. […] At a minimum, however, presentation of a model should be accompanied by an assessment of its goodness of fit to observed data and, ideally, how well the model predicts what was actually recorded (out-of-sample prediction).”

Production and Operations Management Society

Applied Research Challenge
Encourage POMS members (faculty and student members) to conduct rigorous applied research that is innovative and relevant to practice
Positioning

Practice impact ($) vs. Theoretical contribution

- Interfaces
- Edelman
- RM Practice
- POMS Applied Research Challenge
- Wagner Prize
- "Tenure" journals
Practitioner Judge Panel

- Former POMS Martin K. Starr Excellence in POM Practice Award Winners:

  - Corey Billington
    Founding partner, e3 Associates
  - Edwin Keh
    Former COO, Walmart
  - Dino Petrarolo
    Vice President, CCI Inc.
  - Gang Yu
    CEO, Yihaoedian
Academic Panel

- Academics with a track record in applied research (e.g., Interfaces, OR Practice, Edelman)

- Feryal Erhun
  Stanford MS&E

- Nagesh Gavirneni
  Cornell University

- ManMohan Sodhi
  City University London & ISB

- Felipe Caro
  UCLA Anderson
Process

- Practitioners suggest topics
- Paper submissions
- 1st review: academic panel selects finalists
- 2nd review: presentations at POMS 2014
- Practitioner judge panel selects winner
- Extended abstract publication in POM for all finalists
- First prize receives $2,000
Admissibility

- The paper involves a real operation
- The problem is new or not well-solved
- The problem requires some innovative ideas to solve it
- The paper makes a convincing case of its relevance to practice
- The paper could eventually be published in a journal like POM or similar
Submissions

- 13 papers were in competition; not including a few desk rejections

- Three types of work:
  - Model implementation (3)
  - Empirical (5)
  - Informed by practice (5)
Observations

- Model implementations came across as the least “publishable”
- Papers informed by practice were theoretically strong but the impact was unclear
- Empirical work was vastly the common ground between practitioners and academics
Finalists

Torbjørn Netland (Norwegian Univ. of Sci. and Tech.)
Kasra Ferdows (Georgetown U)
Ebly Sanchez (Volvo)

Inventory Showrooms and Customer Migration in Omni-channel Retail: The Effect of Product Information
David Bell (Wharton)
Santiago Gallino (Dartmouth Tuck)
Antonio Moreno (Northwestern Kellogg)

Anant Mishra (George Mason U)
Sidhartha Das (George Mason U)
James Murray (Lockheed Martin)
Suggested Discussion Topics

• What is practice-focused research? Are there related opportunities not currently addressed?

• Current best practices and pitfalls for practice-focused research?

• What initiatives would be useful to promote practice-focused research?