Improving Decision-Making Skills of Nonprofit Professionals

Michael P Johnson, Jr.
George Chichirau, University of Massachusetts Boston
Jason Wright, University of Massachusetts Boston

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IMPROVING DECISION-MAKING SKILLS OF NONPROFIT PROFESSIONALS

Michael P. Johnson, PhD
Department of Public Policy and Public Affairs
University of Massachusetts Boston
michael.johnson@umb.edu
http://works.bepress.com/michael_johnson

George Chichirau* and Jason Wright**
Department of Public Policy and Public Affairs
University of Massachusetts Boston
*george.chichirau001@umb.edu
**jason.wright004@umb.edu

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PROBLEM MOTIVATION
Problem: Community-based organizations express need for analytics expertise

- Gap between need and expertise in use of data and decision analytics for community-based organizations (Johnson, 2015)
- Analytics consulting, capacity-building and organization design focused primarily on needs of for-profit organizations (Hunt and Johnson, 2016; Winston and Albright, 2016)
- Few analytics degree programs specifically focused on nonprofits and CBOs

Primary research question:
What innovations in professional education can maximize capacity of nonprofit professionals for analytics practice?
Levels of analytics

- **Descriptive Analytics**: What has happened?
- **Diagnostic Analytics**: Why did it happen?
- **Predictive Analytics**: What will happen?
- **Prescriptive Analytics**: What to do?

**Skill Levels Required**

**Levels of Business Impact**

*Gartner Research - Modified*
Some kinds of public problems require a special approach to decision modeling

- What measures of ‘resiliency’ are important to the well-being of vulnerable communities?
- How can low-income communities choose redevelopment strategies that balance opportunity and protection?
- What mix of energy development options are affordable to a wide range of populations?
- How can a school district design a lottery system for public schools that balances desires for local access and academic excellence?

Problems that are hard to define (see e.g. Rosenhead and Mingers 2001), that require a deep understanding of local needs, and whose solutions depend on active community participation can be addressed using methods referred to as *community-engaged operations research*
What distinguishes community-engaged OR?

- Emphasis on ‘intervention’ as opposed to observational science or methodological innovations
- Local engagement and impact
- Focus on disadvantaged and underserved populations
- Interest in problem-solving processes as well as outcomes
- Critical approach and concern for ethics
- Use of qualitative and mixed-method analytics (e.g. ‘soft OR’)
- Aim for community empowerment and social change

‘Community operational research’ (Midgley and Ochoa-Arias 2004) places greater emphasis on understanding and empowerment; ‘community-based operations research’ (Johnson 2012) places greater emphasis on analytic methods for policy, planning and operations prescriptions
Common challenges in providing operations research and analytics to nonprofit organizations

1. Limited capacity of community partners to collect and analyze data, and to make productive use of analytically-advanced solutions

2. Skepticism among community partners that outside experts really understand their problems

3. Need for analysts to move from client-consultant relationship to peer-to-peer relationship to support collaborative problem-solving

4. Tension between a specific problem to be solved, and underlying community needs that may not align with funders’ immediate priorities

5. Acceptance by analysts trained in OR/analytics that qualitative as well as quantitative data and solution methods may be necessary
Opportunity: Analytics capacity-building for nonprofit organizations

INFORMS inaugurates Pro Bono Analytics service to provide free analytics consulting to nonprofit organizations (http://connect.informs.org/probonoanalytics/home)

Tech Networks of Boston roundtable series provides presentations and tutorials on nonprofit analytics, evaluation and information technology to Boston-area nonprofit professionals (https://techboston.com/past-roundtable-events/)

Recent publications in community operational research (Johnson, Midgley and Chichirau, 2017) and community-based operations research (Johnson, 2012) describe new opportunities for data and decision analytics to engage communities and organizations that serve and represent them
LITERATURE REVIEW
There is a lack of consensus on key definitions and problem domains

- There isn’t one literature on non-profit analytics, there are many: capacity building is highly interdisciplinary and the vocabulary varies as a consequence (e.g. analytics vs business intelligence vs business analytics vs knowledge mobilization etc.).

- Analytical approaches depend on the area of focus of the non-profit: professionals working in healthcare tend to work differently from those in education.

- There are many case studies on organizational capacity, but very few theory-building exercises. “Despite 20 years of investment in organizational capacity building, rigorous empirical evidence of capacity-building programs’ effectiveness is limited.” (Minzner et al., 2014)
Analytics may be taught differently depending on the trainees’ roles in their organizations

- **There seem to be 3 main families of curricula**: one for the back-office employees (the engineers); a second one for managers, who are presumed to have some technical expertise; and a third one for those not previously exposed to quantitative courses.

- **Principles that guide curriculum development** in analytics for non-profit capacity building should depend on a) technical background and training of prospective students and b) application and domain area of expertise of organizations (Rathi et al., 2016).
What knowledge base are we building?

<table>
<thead>
<tr>
<th>Management &amp; Organizational Practices Knowledge</th>
<th>Resource Knowledge</th>
<th>Community Knowledge</th>
<th>Sectoral Knowledge</th>
<th>Situated Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Management Knowledge</td>
<td>Knowledge about Financial Resources and Sources of Funding</td>
<td>Knowledge about Clients and Customers</td>
<td>Domain-Specific Knowledge</td>
<td>Bureaucratic Directives Knowledge</td>
</tr>
<tr>
<td>Internal Governance Knowledge</td>
<td>Knowledge about Tools and Technologies</td>
<td>Knowledge about Volunteers</td>
<td>Knowledge about Professional and Industry Standards</td>
<td>Regulatory Knowledge</td>
</tr>
<tr>
<td>Knowledge about Process and Practices</td>
<td>Knowledge about Intellectual Resources</td>
<td>Knowledge about Donors</td>
<td>Knowledge of Best Practices</td>
<td>Political Knowledge</td>
</tr>
<tr>
<td>Knowledge about Products and Services</td>
<td>Knowledge about Human Resources</td>
<td>Knowledge about Experts</td>
<td>Knowledge about Governing Bodies</td>
<td>Geographical Knowledge</td>
</tr>
<tr>
<td>Knowledge about the Organization's History</td>
<td>Knowledge of Other Resources</td>
<td>Knowledge of Other Community Partners and Stakeholders</td>
<td>Knowledge of Partners, Competitors and Other Organizations</td>
<td>Economic Knowledge</td>
</tr>
<tr>
<td></td>
<td>Cultural Knowledge</td>
<td></td>
<td>Knowledge of Inter-organizational Networks and Networking</td>
<td>Recorded Knowledge</td>
</tr>
</tbody>
</table>

Conceptual categorization of intra-organizational knowledge: Rathi et al., 2016, p. 31
What should a capacity-building program look like?

A capacity-building program must be

- Comprehensive
- Customized
- Competence-based
- Timely
- Peer-connected
- Assessment-based
- Readiness-based
- Contextualized.

(Backer in De Vita & Fleming 2003, p. 34)

Technical education and technical assistance are key challenges

- If this domain suffers, there is little hope of implementing state-of-the-art practices (De Vita & Fleming 2003)

Curriculum design for analytics is still a contested area

- Some researchers find theoretical justification for their own design, but admit to the lack of empirical data on actual results (Molluzzo and Lawler, 2015)
There are ample research opportunities in analytics-oriented nonprofit capacity-building

- **There is so far little data on which types of capacity building are most impactful** (e.g., individual technical assistance vs. financial assistance) (Minzner et al. 2014, p. 563)

- **There is also no standardized measure of what “capacity” means**
  Some emphasis on the importance of a list of indicators including the client data system and staff professional development (Despard 2017)

- **Further investigations are needed on how network effects impact knowledge mobilization efforts** (Gainforth et al., 2014)
THE TRAINING EVENT
Event description

• Participants choose from three cases and nine tables
• Facilitator introduced cases and relevant analysis strategies
• Each table discussed their case through the lens of five questions:
  • What is the problem?
  • What do the data tell us?
  • How can we solve the problem?
  • What should we do?
  • What did we learn?
• Each table recorded responses to these questions on poster board
• Each participant shared one Post-It note representing most-important impression about own case, or general insights, inspired by the following:
  • What would I need to know that I don’t already know to solve problems like this case?
  • How could I collaborate to make best use of data, analytics and decision science?
Case studies

Community development
A community development corporation does housing development, community organizing and job training in a struggling small city. It has held an all-day focus group session to learn about values and ideas from its stakeholders. It hopes to use these data to identify objectives, program opportunities and metrics to guide its community revitalization efforts.

Homeless children services
The Sunshine Horizon Foundation, a charitable arm of a for-profit company, provides safe spaces in homeless shelters for children and their caretakers. These “Sunshine Spaces” require agencies to provide spaces within shelters, and programs to provide skilled staff. The Foundation also wants to decide if it should expand into other cities.

Credit union demand
The Northside Credit Union is popular in its North End neighborhood of Boston, and also draws customers from around the city. NCU has had trouble setting the correct staffing levels to match customer arrival patterns. The manager knows there is a problem but doesn’t have the training to find a better staffing solution. To start, he needs to develop accurate forecasts of daily customer arrivals.
Case study #1: Community Development

Excerpt from focus group summary:

The UMass PI leads the session. He starts by asking the group to throw out ideas about the overall mission and ultimate objectives of the work that is done in the organization.

Economic stability of the community – education, jobs, investment in the neighborhood (long term tenants and homeowners versus short-term tenants)

Neighborhood ownership – sense of community, trust, pride, desire to live in the neighborhood, acceptance of low-quality living conditions in exchange for affordability, willingness to improve property

Ability to afford housing (family economic well-being)

Ability to demand good quality housing.

Strength of housing market – ability to ask more for rent.

Improving tenant self-concept - feeling deserving of a good quality life – good housing, schools, safety, desire to learn and improve one’s skills/think outside the box, ability or willingness to go outside of one’s comfort zone and raise the bar, ability to overcome feeling “beat down”, classism, racism, feeling overwhelmed (even stakeholders) by the amount of work that needs to be done.

Sample focus group photos:

Questions:

1. How can we use these data to determine what values and objectives are most important to the organization?
2. How can we use these data to identify specific action alternatives, if any?
3. How can we use these data to identify performance metrics, if any?
Case study #2: Homeless children services

Questions:
1. Where would we get actual data to populate the Decision Alternatives matrix?
2. Does it matter how important we think the various criteria are? How could we incorporate this notion into the decision problem?
3. How can we use the Decision Alternatives matrix data to choose which partners, if any, the Sunshine Horizon Foundation should work with?

Similar data are available for agencies and cities.
Case study #3: Credit union demand

Questions:

1. Some of these data are numeric, others are text. How can we use these data with spreadsheet-type analysis tools?
2. What approach would you use to forecast customer data in the future?
3. What additional data do you think could improve the quality of your forecasts?
FINDINGS
Table Characteristics

- At least 1/3 of participants at each table had a management role at their organization
- 3 out of 9 tables included participants involved in data management at their organization
- All tables had employees of non-profit organizations
  - Only one table had < 75% non-profit employees
- Table 8 (case 3) had lowest percentage of both non-profit employees (33.3%) and participants with a role moving from data to decisions (33.3%)
- Table 5 (case 3) had the lowest percentage of management (33.33%) and the highest percentage of data management staff (50%)
Participant characteristics

- 49 total participants
- 69% of participants work in the city of Boston
- 55% work in organizational management (e.g., associate director, program manager); 12% work in evaluation; 10% work in data management
- Nearly all currently (82%) or expect to (10%) play a role in moving data to decisions in their organizations
- Nearly all (88%) work for nonprofit organizations (excluding higher education)
Case Characteristics

• Each case had at least 50% management staff (62%, 50%, and 58%, respectively)

• A higher percentage of participants analyzing case 3 were data management staff (16.67% compared to 4.8% for case 1 and 4.2% for case 2).

• Case three had the lowest representation of both non-profit employees (72% of case three participants) and participants with a role in moving from data to decisions (61% of case three participants)
Detail of responses varied across tables and cases

Case #1, Table #3

Case #2, Table #9

Case #1, Table #10

Case #3, Table #2
Common themes: Case #1

• Problem: economic instability
• Data Tell Us: Tables 6 & 10 note low ownership and inequality; Table 3 notes tension and opportunity for collective action
• Solutions: community events and collaboration
• Action Items: community input and collaboration between existing stakeholders
• Lessons: highlighted the need to include the community
**Common themes: Case #2**

- Least cohesive across tables
  - Less similar responses may reflect a higher level of difficulty for this case or differences in processing across the tables involved
    - Table 4 was the only table involved in case two with data management staff
- Tables 4 and 9 highlighted community input as the problem, whereas table 7 noted the need for consistent data
- Tables 7 and 8 said the data tell us about trends over time, whereas table 9 noted a tension between what the data say and what one’s heart says
- All three tables mentioned the need to weight criteria as a solution to the problem
Common themes: Case #3

- Problem: matching staff levels to customer flows
- Data Tell Us: moments of highest traffic
- Solutions: highlight trends and optimize staffing
- Action items: gather more data
- Lessons: each table different
Participant impressions: General comments

- Values analysis and creating a map is a fantastic way to demonstrate data and decisions
- Become sufficiently critical of your own assumptions
- Helpful to learn from others and from different skills
- Variation in case studies nice to have but perhaps some are more applicable to nonprofit needs
- Analysis not done in vacuum, need to get different perspectives
Participant Impressions: Case #1

Question 1 – What is the problem?
- Is what an org “knows” actually supported by data? Or current data?

Question 2 - What do the data tell us?
- Case one attendee list of meeting shows who weren’t included: residents

Question 3 - How can we solve the problem?
- Engaging community as a partner
- No one stands alone: include community to build community
- Create a community advisory board
- Identifying a value/vision first-economic stability
- No single “right” problem or solution

Question 4 - What should we do?
- Building on community capital
- Actually involve the community, collaborate with other local/regional agencies
- Community dashboard: As a community, decide on a few community owned metrics and report out(monthly) with next action steps and lessons learned along the way
- Lack of complete data on specific neighborhood; importance of needs assessment to have a better understanding

Question 5 - What did we learn?
- Building a community advisory forum composed entirely of community members who are a part of the organizations decision making and offer their community knowledge as capital
- When doing a value map, its hard to decide what the big categories are
Participant Impressions: Case #2

Question 1 – What is the problem?
- How does one rank or weight different decision making criteria?
- What would successful expansion look like? Why do we want to expand?

Question 2 - What do the data tell us?
- Compare prior development process of previous sites to weight importance of various criteria
- How does time impact the relevancy of our criteria?

Question 3 - How can we solve the problem?
- Consider base level expectations for criteria and weight their impact

Question 4 - What should we do?
- Quantitative analysis should support on-site observations rather than simple prescriptions
- Criteria weights should reflect the mission of the organization
- Don’t be dazzled by artificially high data resolution: simple categories may be more helpful than “precise” numbers

Question 5 - What did we learn?
- Pre-analysis of the most important criteria can simplify the data collection and evaluation process
- Create indicators to measure success/barriers
- The numbers say one thing but your hear says another
- Proper descriptive and diagnostic analytics can help you find the elements of success for predictive/prescriptive analytics
Participant Impressions: Case #3

Question 3 - How can we solve the problem?
- Examine each factor as it deviates from baseline (overall average)
- Use averages formulas in excel to predict arrival amounts and human behavioral patterns by day of week and day of month.
- You can use more or less sophisticated ways (graphs, summary tables, more complicated stats) to solve the staffing problem. It depends on the amount of data you have/organization site/etc.
- For problems with clear quantitative data, comprehensive looks from different analysis types is enough. However, the solution still take judgement

Question 4 - What should we do?
- Once we implement our best fit solution, we need to develop a metric to actually track whether the intervention was successful

Question 5 - What did we learn?
- A lot of data does not always solve the problems...have to collect the right data!
- Focus on main problems to solve first then pinpoint most useful data before adding additional variables
- Need association between demand and customer demographics and preferences, for example older versus younger customers may prefer to deal with a person rather than a machine
- Important to know the values of the bank as well as the data
- We need to know more about the staffing (How managed? In what functions?) and the types of customer visits (teller? Atm? For loans, consultation, and more?)
Post-event feedback indicates desire for nonprofit-specific capacity-building

- Most participants said an event like this would be beneficial to their organization
- Few respondents seek training in specialized software or consultant help
- Strongest support for short courses on analytics and Excel tutorials
DISCUSSION
Case study event impressions

- Participants did not generally approach problems according to analytics ‘blueprint’
- Despite professional experience in data analysis and data management, comments conveyed a deep connection with community engagement and value-focused practice
- Case #2, intended to embody principles of multi-criteria decision models, generated, counter to expectations, the most diverse set of participant reactions
- Critical approach, in problem identification, formulation, solution and implementation, is very important to nonprofit professionals
What kinds of analytics skills might be relevant to nonprofit professionals?

- Descriptive analytics: What do we know about our organizations, programs, clients, communities?
  - Quantitative and qualitative data collection and analysis
- Predictive analytics: What is likely to be the result of new initiatives, organization redesign, revenue generation?
  - Forecasting, simulation
- Prescriptive analytics: What should we do given what we know, what we control, and what we care about?
  - Problem structuring, decision analysis, optimization
Relevant analytics skills for nonprofit professionals are diverse and may come from multiple sources

- **Example skills:**
  - Statistics
  - Qualitative data analysis
  - Program evaluation
  - Community-based operations research
  - Geographic information systems
  - Information systems design

- **Example sources:**
  - Academic research: on-site capacity-building; before- and after-evaluation
  - Education: Webinars; short courses; degree and certificate programs
  - Consulting and capacity-building: Pro Bono Analytics; university project courses; funded on-demand expertise; university-community collaborations
Future opportunities

Research:
  • Replicate the workshop format, with better-designed cases, more clearly-focused guidance for analysis, and more detailed participant data
  • Apply formal methods for analysis of qualitative data and content analysis
  • Quantify level of technical and conceptual difficulty of cases
  • Answer a wider range of research questions

Practice:
  • Develop organization-specific training modules (e.g. weekend workshop)
  • Develop curriculum for short course (e.g. year-long certificate program)

Future research question:
What is special about nonprofit professionals’ need for analytics skills, and how can professional education increase practitioner capacity in analytics?
References


