How Organizational Structure can Foster Equity: Lessons from the Life Sciences

Laurel Smith-Doerr
How does the structure of a STEM company impact how well it does in achieving equitable opportunity for its staff and management?

- Universities and most modern companies are bureaucracies (Weber 1922)
  - Structures of hierarchical authority and resource distribution, formal policies
Research Context: Life sciences

• US life scientists: since 1990s about half of PhDs are women
• Research-intensive workplaces: universities, large pharmaceutical companies, biotech start-ups, government science agencies
• National sample based on NIGMS records
Network Organizations v. Hierarchies

- **Network Organizations:**
  - Indefinite and sequential interaction structure, norms govern relations, partners pool resources, expectations foster collaboration but are not rule bound, flows of non-redundant “freer” info (Powell 1990).
  - Life sciences example: biotechnology firms dedicated to human therapeutics
  - Question for women in science—do old boy networks flourish in the absence of rules?

- **Hierarchies:**
  - Employment in formal authority structure patterns interaction, rules govern relations, resources (including info) distributed according to rank, mass production of reliable products of a given quality.
  - Life sciences examples: multinational pharmaceutical corporations, universities
  - Question for women in science—does bureaucratic procedure combat discrimination, or hide biased informal organization?


Massachusetts biotechnology firm founders by gender and immigrant status: Monti, Smith-Doerr and McQuaid (2010).
# Likelihood of scientists moving into supervisory positions, Network v. Hierarchical settings

<table>
<thead>
<tr>
<th></th>
<th>Change in Odds of Supervising in Network firms</th>
<th>Change in Odds of Supervising in Hierarchies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td><em>No difference</em></td>
<td><em>No difference</em></td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td><em>7.9 times more likely</em></td>
<td><em>60% decrease in odds</em></td>
</tr>
</tbody>
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Source: Smith-Doerr (2004, *Women’s Work*), based on logistic regression analysis controlling for years since PhD, prestige of PhD program; N=2,062
Figure 1: Predicted Probabilities of Patenting, by Sex and Sector

NOTE: Numbers in boxes refer to the difference in probabilities between men and women (M-F) and the F/M predicted probability ratio (multiplied by 100).

Note: All other variables are held at mean.
Why greater equity in biotech firms?

Clues from interviews (Smith-Doerr 2004, N=47).

• **1. Flexibility in collaboration**
  – About a woman scientist friend: “left a tenured position at [an elite university] to go to [a biotechnology firm]…said the university department under [Chairman] was an autocracy…could do science there [at firm]—working with who they wanted to rather than dealing with [Chairman].”

• **2. Transparency**
  – “From my experience at [academic setting] I could tell you many a true story about political infighting…[at biotech firm] we are not compartmentalized—and get to work with many good scientists both here and outside the firm. And we choose who to work with based on non-financial considerations, like how good they are in their field.”

• **3. Collective rewards**
  – “While I was on maternity leave here [biotech firm] I could keep in touch with my colleagues who kept it moving forward…when I was a postdoc at [prestigious academic institute], people collaborated somewhat, on the fringes of their work, but still had their main turf which they guarded carefully.”
A Comparison of US data to Massachusetts and New England biotech founders

Percent of US life scientists who are foreign-born: 15%
Percent of MA biotech firms with 1+ immigrant founder: 40%
Percent of US life scientists who are women: 30%
Percent of MA biotech firms with at least one woman founder: 20%

US data from CPST (2002); MA data from Monti, Smith-Doerr & McQuaid (2007)
Can lessons from biotech network organizations translate to larger organizations... even bureaucracies?

- Kalev (2009): *Cracking the glass cages*
  
  In large for-profit business organizations, found greater equity for women and people of color in less hierarchical, cross-functional collaborative teams.
UMass ADVANCE: Collaboration and Equity

- Focus on collaboration in: inclusive communities, research, and shared decision-making
- $R^3$ Model—resources, relationships, and recognition
Building Relationships for collaboration: Faculty Mentoring for Equity at UMass Amherst

Research literature and existing knowledge: mutual mentoring

- UMass ADVANCE research identifies gender gap in mentoring, including for research collaboration (Misra et al. 2017)
- Programs with Resources (Mutual mentoring grants), Relationships (Peer Mentoring Workshop), and Recognition (ADVANCE College Mentoring Awards)
- Working with Provost’s office on faculty mentoring plans for all new hires
Key take-away points

• Organizational structures that are less hierarchical and more collaborative not only foster gender and race equity, but also innovation and productivity

• Organizational characteristics that foster equity:
  – Giving women and BIPOC workers flexibility and autonomy in project collaborations
  – Providing transparency in resource distribution decisions, and in allocating credit
  – Establishing collective rewards for groups, teams and units rather than just individuals
Thank you! Comments welcome: lsmithdoerr@soc.umass.edu
https://www.umass.edu/advance/
Check out our ADVANCE tools on collaboration!
Dependent variable—leadership role in life sciences

<table>
<thead>
<tr>
<th>Academic Position</th>
<th>Industry Position</th>
<th>Supervisory Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student in another discipline, RA</td>
<td>Assistant, technician</td>
<td>0</td>
</tr>
<tr>
<td>Postdoctoral fellow</td>
<td>Scientist</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Team director</td>
<td>1</td>
</tr>
<tr>
<td>Assistant professor</td>
<td>Department / section head</td>
<td>1</td>
</tr>
<tr>
<td>Associate professor</td>
<td>Upper research administration</td>
<td>1</td>
</tr>
<tr>
<td>Full professor</td>
<td>Board of directors, CEO</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Smith-Doerr (2004, Soc Perspectives)