A Mirror of Social Development: Industry decisions regarding new technologies

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(background image: SEM Image of Tin Oxide Nanowires, Suresh Donthu, Northwestern University)
Summary

• Lack of attention to potential governance and regulatory concerns within the industry

• Organizational management of risks presented by new technologies

• Impact of the institutional environment on governance processes

• What are firms perspectives and actions regarding...
  – environmental / occupational health & safety
  – regulations
  – public perceptions
Outline

• Summary
• Background
• Related Work
• Research Questions
• Methods
• Preliminary Survey Findings
• Summary
Background

- Nanoscale Science & Engineering Center established at UMass Amherst in Spring 2006

- Interest in organizational management of risk and the impact of the institutional environment
Related Work

- **Organization Theory**
- **Industry Surveys**
  - National Center for Manufacturing Sciences (2006)
  - Small Times Magazine & UMass Lowell (2006)
  - NOS (2002)
  - AAAS (2007)
  - ICON (2006)
- **Qualitative Interviews**
Industry & Institutional Environment

Extra Institutional Environment
- Technological Advances
- Demographics
- Social Movements
- New Entrants
- Global Interdependence
- Management Logics

Institutional Environment
- Regulatory
- Rule Making
- Capital Markets
- Education System
- Employment Relationship
- Governance Structure

Industry — competitive dynamics

Firm
- (R&D decisions)

(Lewin, et al 1999)
Research Questions

• How do firms perceive of and respond to issues of ...
  – environmental / occupational health & safety
  – regulations
  – public perceptions

  in the context of Micro / Nanotechnology (MNT) research and development
Methods

• Survey Instrument
• Sample Frame
• Data Collection
Survey Instrument

Four main sections, ~40 questions total

- Screening questions (UML 2006)
- Acquiring patented technology (AAAS 2007)
- Environmental Health & Safety
- Influence of institutional environment
Sample Frame

Massachusetts-based firms engaged in research, manufacture or use of micro and/or nanoscale materials or processes

Listed in Nanobank with article author, patent assignee, and grantee organization identified as a “firm”

AND

Listed in Dun & Bradstreet Million Dollar Database (U.S. businesses with $5 million+ sales or 65+ total employees, plus branches with 500+ employees this site)
Sample Frame

• N ~ 240
• Biggest worry is non-response
  - UML (2006)  response rate = 33%
  - NCMS (2006) 10%
  - AAAS (2007) 27%
  - NOS (2002) 62.4%
  - ICON (2006) 33%
Data Collection

• Pre-survey letter
• Multi-method (web and telephone survey)
• Extensive email and telephone follow up
• Incentive
Data Collection

• Survey data will be linked to secondary data
  - Nanobank (cross firm / industry collaborations and field structure)
  - D&B (effects on firm performance)
Preliminary Results—Overview

Involvement in Micro / Nano Activities

- Involved in micro / nano activities: 54%
- Not involved in micro / nano activities: 46%

<table>
<thead>
<tr>
<th>Involved in Micro / Nano Activities</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>engaged in research directed at micro/nanoscale processes or materials including research conducted in house or contracted externally</td>
<td>0.85</td>
</tr>
<tr>
<td>engaged in the design or manufacture of equipment or instrumentation that manipulates, measures or produces micro/nanoscale materials</td>
<td>0.23</td>
</tr>
<tr>
<td>engaged in the manufacture of micro/nanoscale materials or processes</td>
<td>0.31</td>
</tr>
<tr>
<td>planning to engage in micro/nanotechnology R&amp;D or manufacturing in the future</td>
<td>0.23</td>
</tr>
<tr>
<td>using micro/nanoscale materials or processes supplied by another firm</td>
<td>0.46</td>
</tr>
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</table>
Preliminary Results

Environmental / occupational health & safety

• Most firms' R&D decisions were not affected by EHS concerns

• A small number of firms have an EHS policy that covers nanotechnology

• MNT have an impact on workplace injuries in a small number of firms

• One firm provided extra compensation to workers using potentially hazardous MNT materials
Preliminary Results

Federal / State Regulation

• Actual or anticipated regulation

• Only one firm's R&D decisions were affected by regulation

• One firm is engaged in lobbying to influence regulation of MNT

• Two firms said the EPA and DEP have considerable influence in regulating MNT activity
Preliminary Results
Public Perceptions and Public Relations

• Of the 10 firms responding to questions about R&D decisions, only one said that public perceptions of their company influenced the decision to conduct R&D internally or externally

• One firm has conducted general public education as a result of concern over public perceptions

• One firm has cooperated with local colleges and universities as a result of concern over public perceptions
Preliminary Results

Who or what external factor has the most influence over firms' R&D decisions?

- Other firms, academic researchers and research institutes
  - Shared lab space and equipment
  - R&D collaboration with a university research center or individual university researcher
  - When asked which organizations have considerable influence in regulating mnt activity at their firm, 3 firms said suppliers or manufacturing consumers
Summary

• Pilot study had a very good response rate; goal to reach this rate with remaining

• environmental/occupational health and safety, public perceptions, and federal and state regulations are not strong influences on R&D decisions

• EHS and regulation seem to be slightly more important than public and consumer perspectives
Questions?

For more information about this study...

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