

# **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

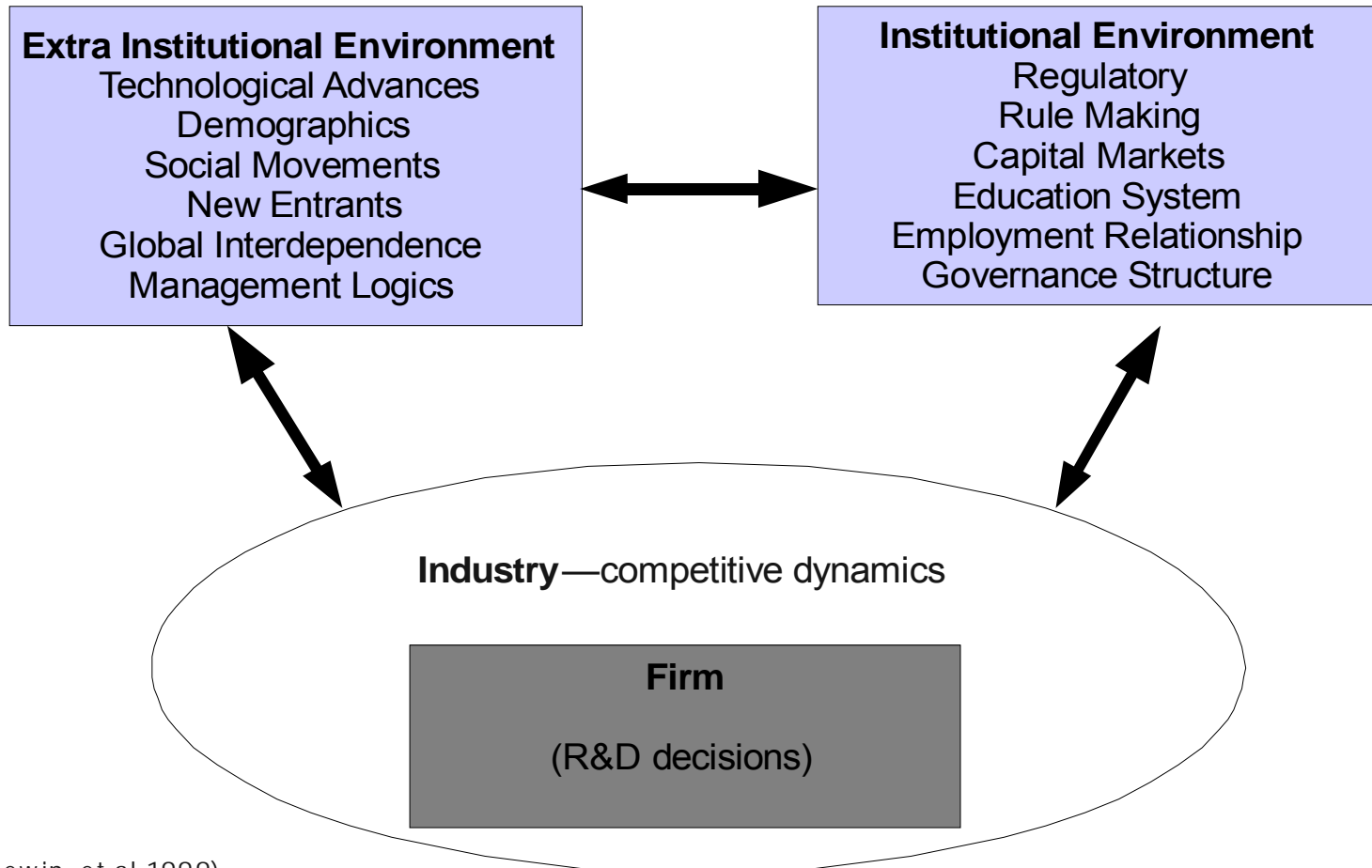
# Background

- 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



(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  $\approx$  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

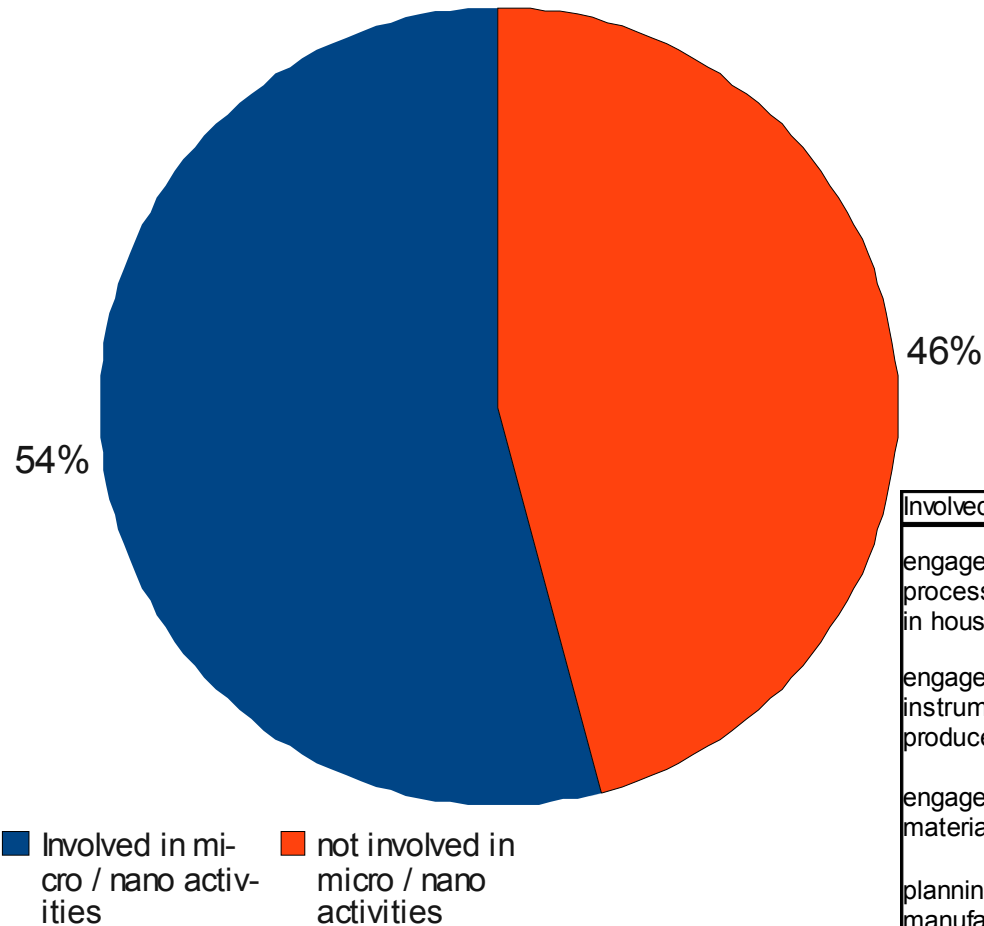
- Pre-survey letter
- Multi-method (web and telephone survey)
- Extensive email and telephone follow up
- Incentive

# 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	
engaged in research directed at micro/nanoscale processes or materials including research conducted in house or contracted externally	0.85
engaged in the design or manufacture of equipment or instrumentation that manipulates, measures or produces micro/nanoscale materials	0.23
engaged in the manufacture of micro/nanoscale materials or processes	0.31
planning to engage in micro/nanotechnology R&D or manufacturing in the future	0.23
using micro/nanoscale materials or processes supplied by another firm	0.46

# 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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