

Identifying the Role of California in the Nanotechnology Economy

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1960s
Space

Image: time.life.com



1980s
Fiber Optics

Image: Wired.com



2010s
Nanotechnology?

Image: Science Photo Library

Proximity Matters.

A map of the United States with a black rectangular text box in the center. The text box contains the text "Geographic clustering plays a significant role in industrial and economic expansion." in yellow. The map shows several clusters of colored dots: a pink cluster in the Pacific Northwest, a green cluster in the San Francisco Bay Area, a yellow cluster in the Los Angeles area, a yellow cluster in the Texas region, and a yellow cluster in the Florida region. There are also a few green dots in the upper Midwest.

Geographic clustering plays a significant role in industrial and economic expansion.

Historical Influence.



**California was one of the leading
Innovators of Information Technology**
*The study will determine if the same
pattern is happening with
Nanotechnology*

Research Goals

1

Use the **Value Chain** research approach to analyze California's Nanotechnology firms and **determine California's nanotechnology capacity.**

2

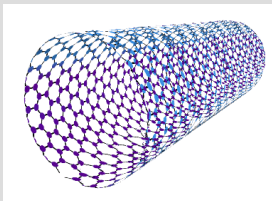
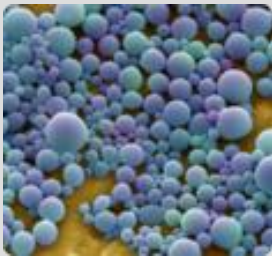
Find Nanotechnology **degree programs** offered by universities, community colleges and other professional training institutions.



Value Chain: Relevance

Past
*Vertical
Integration*

Company X

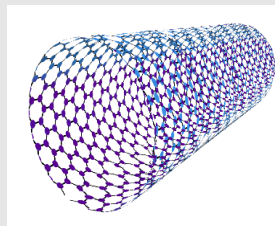


Present
Outsourcing

Company X



Firm A



Firm B



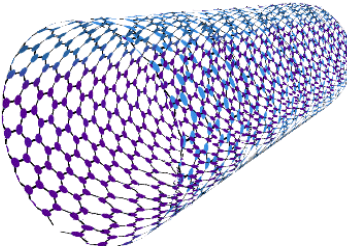
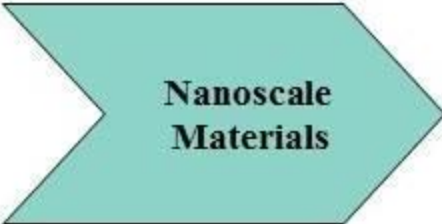
The value chain is used to identify different stages of the manufacturing process, and how companies are linked.

In the past, one firm would attempt to own all stages of the manufacturing process.

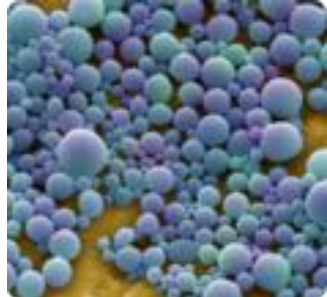
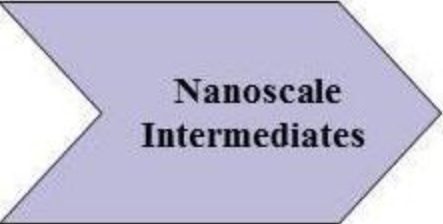
(vertical integration)

Companies are now outsourcing earlier stages of production to more specialized companies to control cost and improve efficiency

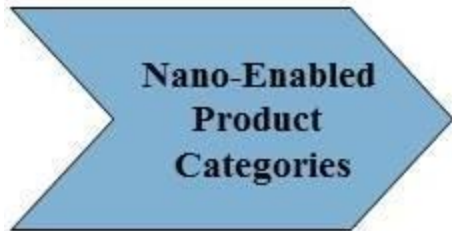
Value Chain: Example



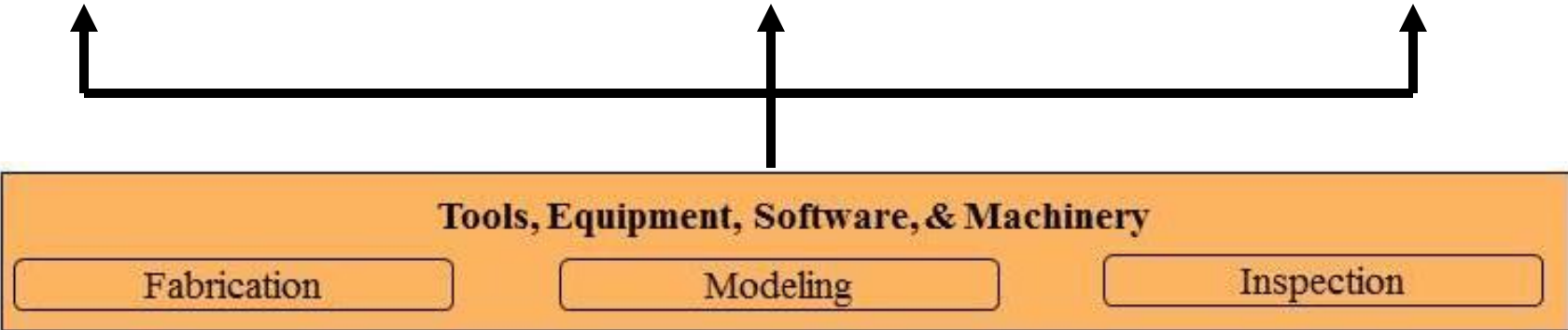
Company X makes
Carbon Nanotubes



Company Y makes
coating out of
Carbon Nanotubes



Company Z makes
high-performance golf
balls from nano-coating



Research Methods

1

Created a **database of company profiles** that contains information about:

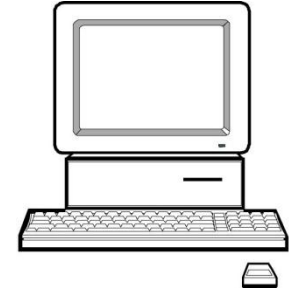
- Company Location
- Products they make
- Value-chain stage
- Number of employees

2

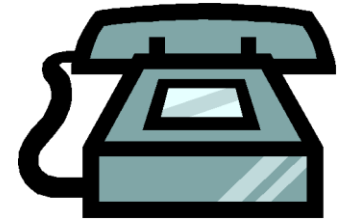
Created a **database of higher educational institution profiles** that contains information about:

- School Location
- Nano Degrees offered
- Type of institution

Data Collection Methods



Web Searches



Phone Interviews

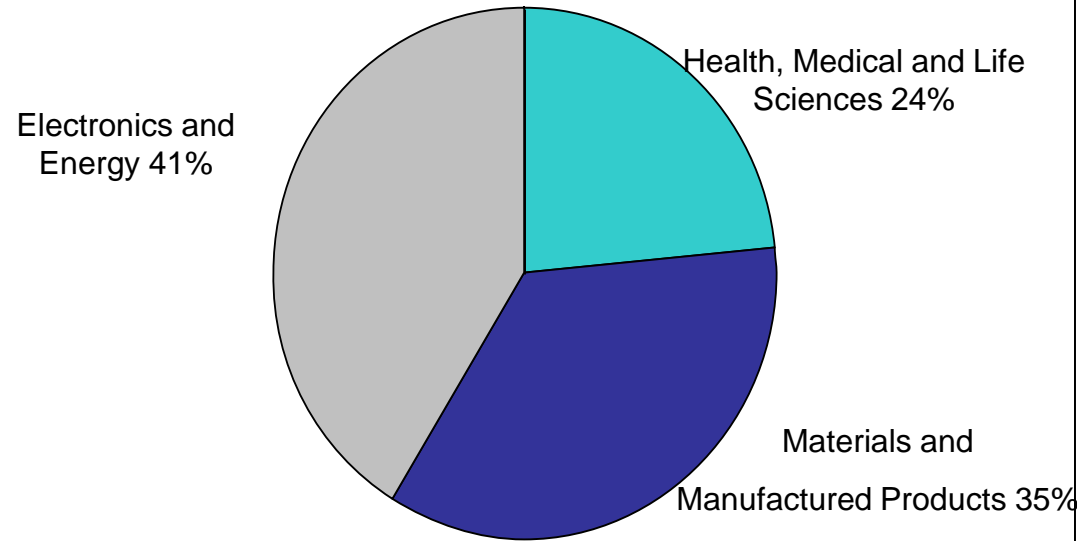


E-mail questionnaires

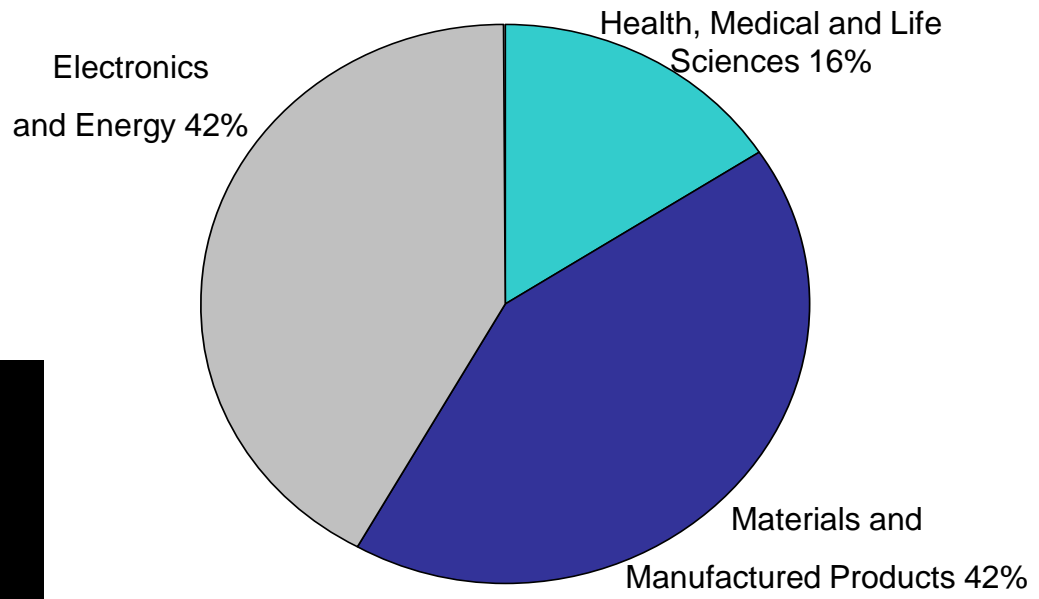
Sector Distribution

- 3 main industry sector groups:
 - Electronics & Energy
 - Health, Medical & Life Sciences
 - Materials & Manufacturing
- Lower employment in health, medical & life sciences
- California's nanotech firms are found mostly in the Electronics & Energy and Materials & Manufactured Products sector groups

Firms by Industry Sector Group (n=650)



Employees by Industry Sector Group (n=116,603)



No one industry sector is dominant with regard to both numbers of firms and employees.

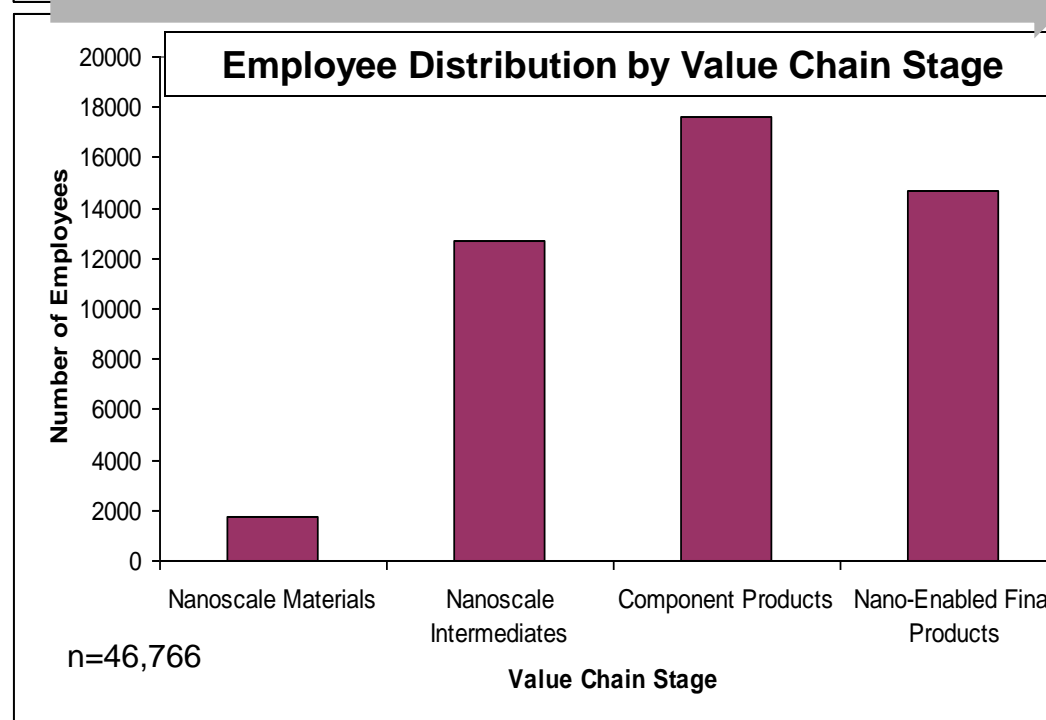
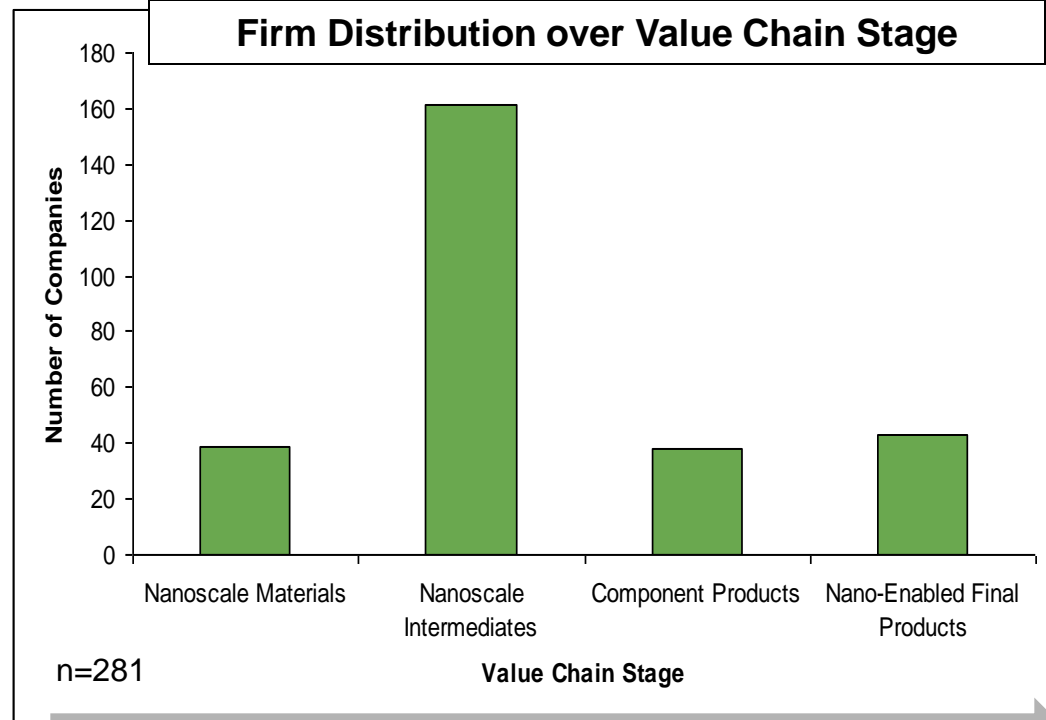
Value Chain Analysis

More firms are at the middle of the value chain

- Small firms
- Specialized Products

More employment toward the higher end of the value chain

- Larger Firms
- More sophisticated products require additional design and development

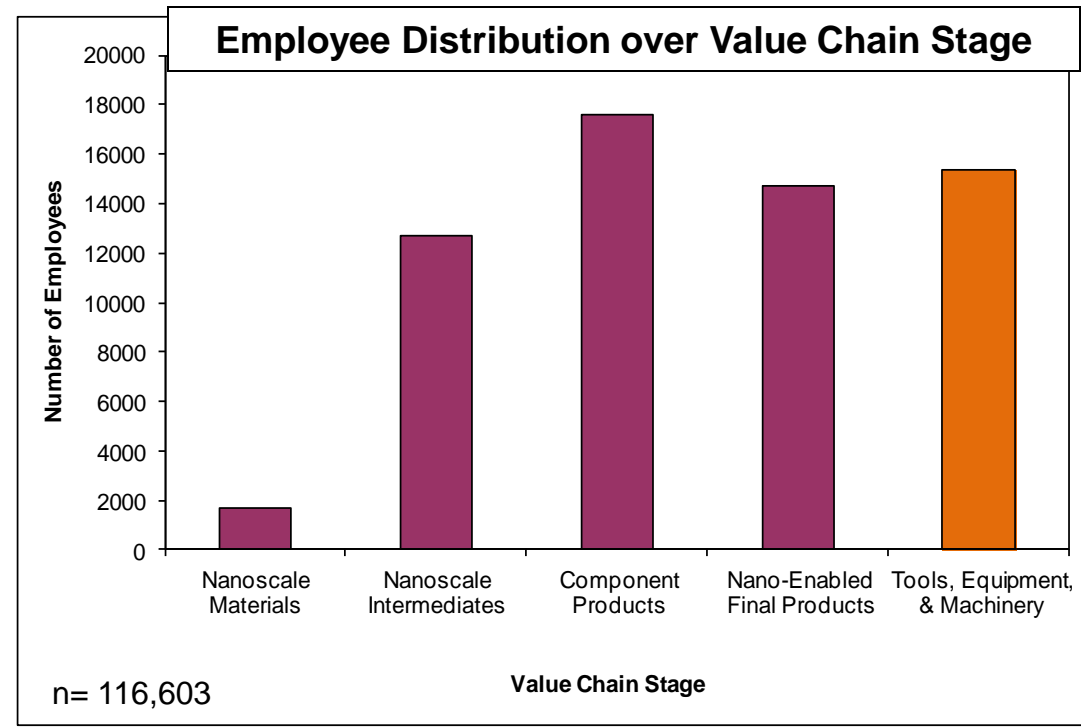
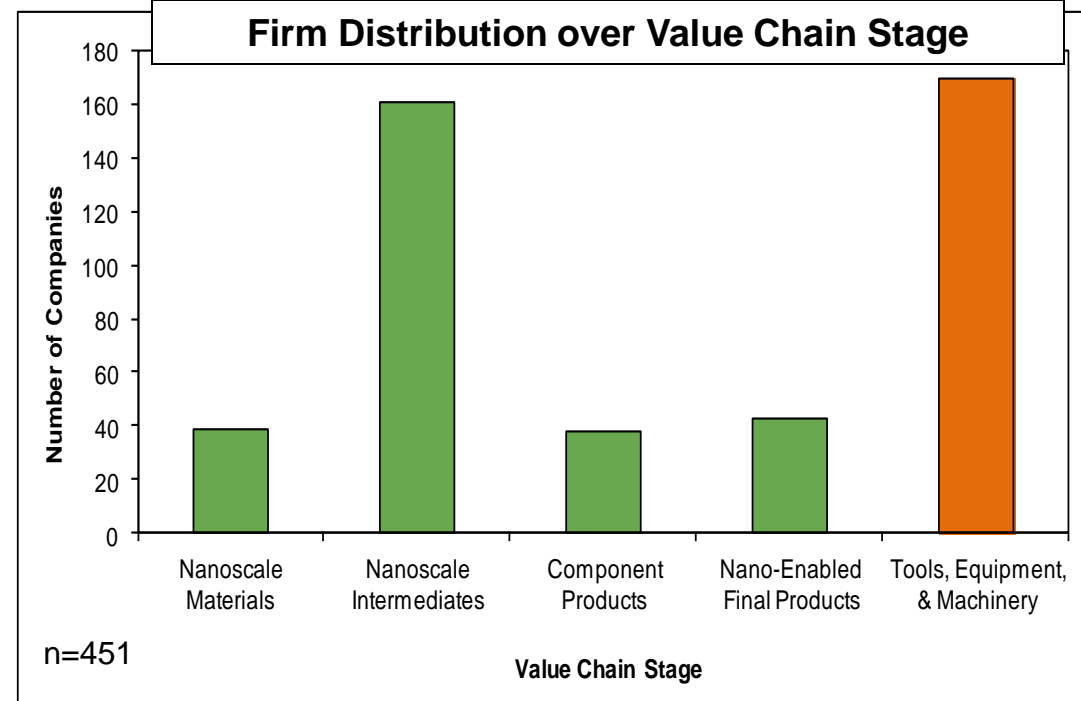


Jobs are concentrated in the relatively small number of companies at the higher end of the value chain.

Value Chain Analysis

(with supporting firms)

California's firms contribute significantly to the **supporting stages** of the nanotech value chain.



Proximity of California's Nano Firms

Company Locations



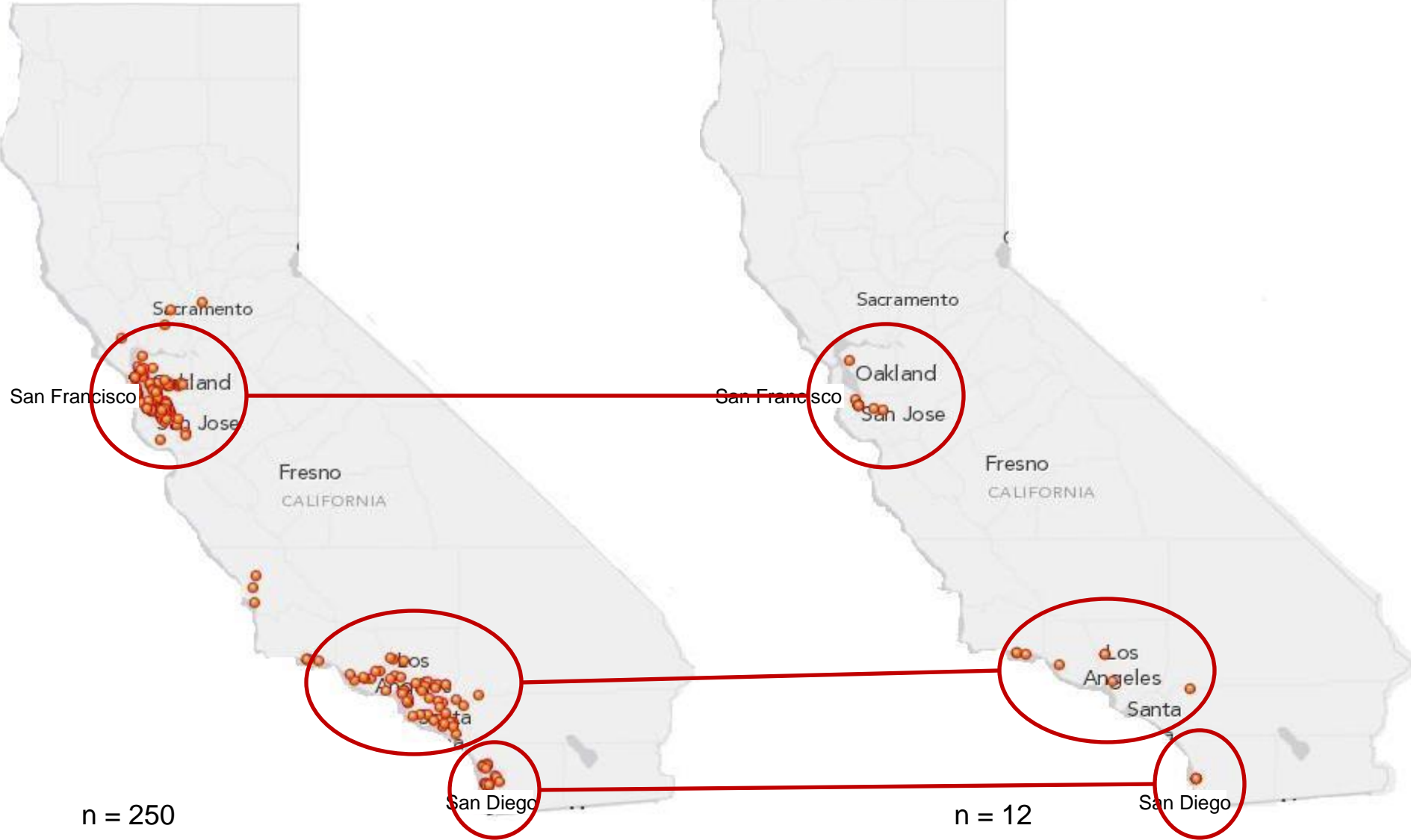
Large numbers of firms are grouped in three main geographic areas:
(San Diego, Los Angeles and the Bay Area)

Why could this be?

Company and University Proximity

Company Locations

University Locations





Future Plans

California IN THE NanoEconomy

Search[HOME](#)[OVERVIEW](#)[EDUCATION & WORKFORCE](#)[VALUE CHAIN](#)[COMPANIES](#)[PUBLIC POLICY](#)[COMPETITIVENESS INDICATORS](#)[MAPS](#)[RESOURCES](#)[My account](#) | [Log out](#)

Welcome to California in the NanoEconomy

Project Supported By:

Figure 1: California in the Nano Economy website home page

Conclusion

1

We have yet to see one industry sector significantly take lead over the others in California's nanotechnology enterprise.

2

California's firms are highly involved in the middle stages of the value chain, whereas there is greater employment near the end stages.

3

The few firms that lie at the higher stages of the value chain have the most employees.

Implications

- There isn't a specific industry sector that is taking the lead in California. However, this also means that the success of California's nanotechnology isn't entirely dependent on the success of one major industry sector.
- Employment can be maximized by increasing the number of firms at the end stages of the value chain.
- California has several regions with university/business clusters, which could grow into a nanotechnology boom in the state. This provides an opening for state law makers to encourage this growth.

Questions for future Research

- How closely do companies and universities work together?
- How localized or globalized are the value chains for specific products?
- How innovative are the California nanotechnology products?

Acknowledgements



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Thank you all for such a fun and meaningful summer experience!

List of Schools that offer degrees or Research in Nanotechnology

UC Santa Barbara

UC San Diego

UC Berkeley

UCLA

California Institute of Nanotechnology

Stanford University

Foothill Community College

San Jose & Evergreen CC District

College of the Canyons

Ventura College

Santa Barbara City College

(Funding still Pending)



Total number of firms in our database: 650

Total number of firms that we have
employment data for: 482

Average Employment per firm: 242

Total number of employees in California: 116,603