North Carolina in the Global Economy:

A new look at global competition, local jobs, and the role of research universities

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Presentation Outline

• Introduction: CGGC and the North Carolina in the Global Economy Project
• Revitalizing traditional industries: Challenges for NC’s Textile Industry
• Understanding new industries: Framing the Engineering Outsourcing debate
• Universities and the Role of Research: Student Projects on NC in the Global Economy
• Implications for U.S. Competitiveness and the Role of Universities
Recent Projects & Events

Building Business Ties Between North Carolina and Baja California, Mexico
Learn more about a proposed trip to Tijuana in October 2006, sponsored by Duke and UNC.

U.S. Engineering Education Reports
Duke undergrads compare engineering education reforms at top U.S. engineering schools.

VIU Global Value Chains Training
A joint research and training program, linking VIU’s work on Italian industrial districts and the CGGC’s work on global value chains.

Mexico and China Compared: The Textile and Apparel Value Chain
First Forum on “Opportunities in the Economic and Trade Relationship Between China and Mexico in a Latin American Context”.

COMPLETE PROJECT PORTFOLIO >>

Upcoming Events
~ NCACPA Small Business Forum
June 22, 2006 | more

~SASE 2006: Constituting Globalisation: Actors, Arenas and Outcomes
June 30 - July 2, 2006 | more

COMPLETE NEWS & EVENTS >>

The Center on Globalization, Governance & Competitiveness (CGGC) at Duke is dedicated to carrying out innovative and interdisciplinary research that has an impact on corporations, social institutions, and public policy. CGGC is currently working on numerous collaborative projects. We encourage you to explore the various jobs, industries, countries, and research that are an integral part of the Center's work.

View video introduction to CGGC by Director Gary Gereffi
North Carolina, with its unique mix of industries, from information technology, biotech, and banking, to the traditional sectors of textiles & apparel, furniture, tobacco, and hog farming, is a microcosm of trends observed elsewhere in the United States. This website presents and analyzes up-to-date information about how industrial restructuring in an era of globalization is impacting North Carolina's key industries.

View video introduction by Prof. Gary Gereffi

Recent News

- Gov. Easley Announces 264 Jobs In Asheville
- Many uses for tobacco grants
- FDA gives green light to Merck cervical cancer drug

more headlines...

Research Papers

Inter-Industry Trends
OVERVIEW

Introduction

North Carolina has a strong corporate support infrastructure and a talented workforce, trained by well-equipped academic institutions. Many biotechnology companies have brought enough facilities and niche competitors into the state to the point where it is now possible to have a product pass from inception to manufacturing to distribution, all within North Carolina. Much more than just an isolated industry, biotechnology is particularly useful when applied in conjunction with other tools such as agriculture or forensics. North Carolina is well situated for such inter-disciplinary development, as provided by projects such as the Research Triangle Park (RTP).

Home to Key Companies

In 2002, fewer than 1,500 biotechnology companies existed in the United States, with North Carolina being home to some 10% (152) of these biotechnology firms. The state is ranked among the five largest biotechnology industry centers in North America, with firms engaging in research and development, product development, clinical trials, pharmaceutical manufacturing and sales, bio-manufacturing, and health care applications. Many of the world’s largest biotechnology and pharmaceutical facilities are located in North Carolina, including facilities belonging to industry leaders GlaxoSmithKline and Merck & Co. The state is also home to: Bayer, with the world’s largest plasma-based factory; Wyeth, with the largest vaccine facility; Baxter, with the largest intravenous solutions facility; and Biogen Idec, with the largest manufacturing biologics facility. North Carolina’s reputation as home to a significant and growing biotechnology industry is therefore well deserved.

Source: North Carolina in the Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
# North Carolina’s Economic Profile

## Table 1: National Ranking of North Carolina Industries by Employment, 1995 and 2005

<table>
<thead>
<tr>
<th>Industry</th>
<th>NC Rank</th>
<th>% of US Employment in NC</th>
<th>NC Employment</th>
<th>% of US Employment in NC</th>
<th>NC Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>1</td>
<td>44.5%</td>
<td>18,462</td>
<td>1</td>
<td>43.7%</td>
</tr>
<tr>
<td>Textiles and Apparel</td>
<td>1</td>
<td>16.6%</td>
<td>252,696</td>
<td>2</td>
<td>14.5%</td>
</tr>
<tr>
<td>Furniture</td>
<td>1</td>
<td>12.8%</td>
<td>80,103</td>
<td>2</td>
<td>10.3%</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>7</td>
<td>7.5%</td>
<td>16,991</td>
<td>6</td>
<td>7.5%</td>
</tr>
<tr>
<td>Hog Farming</td>
<td>6</td>
<td>4.8%</td>
<td>12,991</td>
<td>7</td>
<td>5.2%</td>
</tr>
<tr>
<td>Banking and Finance</td>
<td>12</td>
<td>2.3%</td>
<td>68,510</td>
<td>9</td>
<td>2.6%</td>
</tr>
<tr>
<td>Information Technology</td>
<td>15</td>
<td>2.7%</td>
<td>104,100</td>
<td>15</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

* 2005 represents the period from the third quarter 2004 through the second quarter 2005.

Revitalizing Traditional Industries: Competitive Challenges for North Carolina’s Textile & Furniture Industries
Revitalizing Traditional Industries

• Traditional, manufacturing-based industries in the United States have been hit hard in recent years.
  – Many point to globalization as the culprit, blaming changes in the global economy for sending American jobs overseas.

• …yet this is NOT A COMPLETE PICTURE. Globalization presents both opportunities and challenges for traditional industry.

• We will examine one traditional industry in which North Carolina has been strong: textiles/apparel.
North Carolina’s Textiles/Apparel Industry


Source: NC-Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
North Carolina’s Employment Shifts: Textiles for Apparel


- Textiles have traditionally concentrated in four key regions:
  - Piedmont Triad Region
  - Greater Charlotte region
  - Southeast Region (Scotland/Robeson Cos.)
  - Eastern Region (Greater Greenville)

Source: NC-Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
Innovative Solutions: High-Tech Textiles

• North Carolina firms and universities are working together to develop *high-tech textiles*, a new breed of technology-intensive textile products.
  – These products use new, innovative materials and processes to create products with a wide array of uses...
    • Medical devices
    • Automotive industry
    • Construction materials
    • High-performance sporting equipment
  – Raleigh’s North Carolina State University has taken the lead on this, and major firms like Freudenberg (German) and Nano-Tex (USA) are playing active roles.

• This sector tends to have fewer jobs, but jobs have higher pay and have greater productivity.
Strategic Solutions: Replacing Low Tech with High Tech

- Private capital is being used to transform an old textile center into a new, innovative biotechnology hub.
  - Kannapolis, North Carolina (20 miles north of Charlotte) was the site of one of North Carolina’s most high-profile plant closures ever in fall 2003: 5,000 workers from the Pillow-Tex plant at the center of town.
  - In December 2004, Dole Foods owner David Murdock bought the plant, and in September 2005, announced that the site would be turned into the centerpiece of the North Carolina Research Campus, a 350-acre site that will host advanced laboratory space and serve as home to more than 100 biotechnology companies, as well as residential and retail space in downtown Kannapolis.

Source: Carolina Newswire, 13 September 2005
Key International Competitors:

• China
• India
• Mexico
• Italy
• Canada
International Competition: The Rise of China

• China is a growing force in global exports, and a rising power in both the textile and furniture industries.
  
  – In 2004, China had $593 billion in exports to the world, around 6.7% of the world total – and had more than tripled since 1999 (WTO International Trade Statistics 2000, 2005)
  
  – In furniture, China’s furniture exports reached $7.3 billion in 2003 – now ranking second, behind only Italy. (CSIL 2004)

• China is looking to leverage its huge potential economies of scale and its advantages in labor costs to build a long-term advantage in the industry, inventing new forms of industrial organization, such as “supply chain cities.”
China’s Supply Chain Cities in Apparel

Made in China, Shipped Worldwide

The factory towns on the coast of China manufacture clothing to keep America’s closets full, making everything to wear from head to toe.

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Factory Towns</th>
<th>Factory Orders, 2003</th>
<th>Production</th>
<th>Total Sales</th>
<th>U.S. Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men's Wear</td>
<td>Zhucheng, Shandong</td>
<td>100 million pieces</td>
<td>$600 million</td>
<td>$100 million</td>
<td></td>
</tr>
<tr>
<td>Casual Wear</td>
<td>Haiyu, Changzhou</td>
<td>160 million pieces</td>
<td>$260 million</td>
<td>$58 million</td>
<td></td>
</tr>
<tr>
<td>Down-filled Products</td>
<td>Xintang, Hangzhou, Xiaoshan</td>
<td>26 million pieces</td>
<td>$470 million</td>
<td>$290 million</td>
<td></td>
</tr>
<tr>
<td>Ties</td>
<td>Shengzhou, Zhejiang</td>
<td>300 million pieces</td>
<td>$1.21 billion</td>
<td>$384 million</td>
<td></td>
</tr>
<tr>
<td>Socks</td>
<td>Datang, Zhejiang</td>
<td>9 billion pairs</td>
<td>$1.57 billion</td>
<td>$240 million</td>
<td></td>
</tr>
<tr>
<td>Underwear</td>
<td>Jinjiang, Shengdu</td>
<td>969 million pieces</td>
<td>$360 million</td>
<td>$290 million</td>
<td></td>
</tr>
<tr>
<td>Wedding dresses, evening gowns</td>
<td>Chaozhou, Guangdong</td>
<td>510 million pieces</td>
<td>$950 million*</td>
<td>$640 million†</td>
<td></td>
</tr>
<tr>
<td>Jeans</td>
<td>Xintang, Zhejiang</td>
<td>225 million pieces</td>
<td>$1.04 billion</td>
<td>$480 million</td>
<td></td>
</tr>
</tbody>
</table>

*Includes all textiles made in the city.
†Wedding dress and evening gown exports only.

Sources: China National Textile Council, Shuju Underwear Association, Datang Town Government

Italy vs. China: The Hope of Design?

• Italy versus China (Manzano versus Anji)

• Italy is seeking new ways to build advantage, including utilizing a traditional strength: design.
  – Venice is seeking to marry manufacturing and design, bringing together Italian artists, businessmen, and furniture makers in an effort to help rethink the role of design.
  – Design is a higher link in the value chain than manufacturing – thus bringing higher value-added…..
Framing the Engineering Outsourcing Debate

A joint Engineering Management and Sociology Research Study

Faculty Advisors: Gary Gereffi, Vivek Wadhwa
Project Leader: Ben Rissing
Student Researchers: Ramakrishnan Balasubramanian, Patrick Chen, SooMi Cheong, Arron Fan, Kiran Kalakuntla Bansi Kotecha, Nishanth Lingamneni, Shingayi Sikipa, Todd Stevens, Qi Weng, Chun Wu

www.memp.duke.edu/outsourcing
Poorly Grounded Engineering Statistics

• “Last year more than 600,000 engineers graduated from institutions of higher education in China. In India, the figure was 350,000. In America, it was 70,000”.

• “Last year China’s schools graduated more than 600,000 engineers and India’s schools produced 350,000, compared with 70,000 in America”
  – The U.S. Department of Education
# Commonly Cited Comparative Engineering Graduation Statistics

<table>
<thead>
<tr>
<th>Country</th>
<th>Reported Graduates</th>
<th>What is Included in these Numbers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>70,000</td>
<td>Four-year engineering bachelors degrees.</td>
</tr>
<tr>
<td>China</td>
<td>600,000</td>
<td>Three- and four-year engineering degrees under a broad definition of &quot;engineer.&quot; Additionally, computer science and information technology three- and four-year degrees are included.</td>
</tr>
<tr>
<td>India</td>
<td>350,000</td>
<td>Three- and four-year engineering, computer science and information technology degrees.</td>
</tr>
</tbody>
</table>

# Engineering Outsourcing: How Many Engineers?

## Table 2: Four-Year Bachelors in Engineering, Computer Science and Information Technology Awarded from 1999-2004 in the United States, China and India

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>139,000</td>
<td></td>
</tr>
<tr>
<td>China (MoE CERN)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>376,415</td>
<td></td>
</tr>
<tr>
<td>China (MoE Yearbook)</td>
<td>* 195,354</td>
<td>212,905</td>
<td>219,563</td>
<td>252,024</td>
<td>351,537</td>
<td>442,463</td>
</tr>
</tbody>
</table>

**Notes:** Gray highlighted data may constitute an overestimate. In addition, data provided by the Chinese Ministry of Education may include additional engineering and technology degrees outside traditional engineering fields, CS majors and IT specializations (example: auto mechanics).


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*Gereffi, Wadhwa and Rissing.*
MNC R&D Centers in China & India: How are engineers being used?

- What kinds of work are Chinese, Indian, and American engineers actually doing?
  - **Answer:** Not just product adaptation, but cutting-edge research & commercialization

- **China:** More than 700 MNC R&D Centers
  - GE’s *China Technology Center:* Advanced research in energy storage, environmental management
  - *Microsoft Research Asia:* Cutting-edge graphics & multimedia research

- **India:** More than 150 of Fortune 500 firms have R&D centers
  - Oracle’s *India Development Centre:* Globally-oriented research on database and application development tools
Universities and the Role of Research: 
Duke Student Projects
• Founded in 1989
• Duke’s largest certificate program, with more than 2,000 alumni and more than 500 current students
• Takes a unique approach to undergraduate business education: both liberal-arts based and highly interdisciplinary.
• Focuses on three main curricular areas:
  – Global Economy
  – Technology & Society
  – Entrepreneurship, Leadership, Values & Ethics
M&M Program Participants, 1989-2006

Number

Year


Graduates  Program Registrants
M&M Capstone Course


• Student teams researching several projects with direct relevance to North Carolina and to industry.
  – **Project 1**: Focus on U.S. industry that is affected by globalization and outsourcing/insourcing trends
  – **Project 2**: Focus on one of North Carolina’s key industries (furniture, textiles/apparel, automotive, IT, etc.) medical goods & services and its key global challenges

• Students consult books, new databases, industry leaders, and policymakers, and are encouraged to conduct field research.
North Carolina Textile Complex

Source: Frederick, Stacey, College of Textiles, North Carolina State University.
North Carolina Textile/Apparel Supply Chain

Source: Frederick, Stacey, College of Textiles, North Carolina State University.
Piedmont Triad Regional Cluster

• Guilford, Forsyth, Alamance, Davidson, Randolph
• 328 (24%)
• 24,600+ employees
• $12 billion in sales
• Diversification: Yarn, hosiery, screen printing, fabric, finishing, cut/sew
• Glen Raven, Guilford, Unifi, Sara Lee, Gold Toe, VF Corp, Kayser Roth, ITG (sample of companies)
“Fishbone” Diagram: Global Competitiveness in the NC Textile Complex

Source: Frederick, Stacey, College of Textiles, North Carolina State University.
Conclusion:

Implications for U.S. Competitiveness and the Role of Universities
Globalization provides both challenges and opportunities to industries and regions.

- Globalization has changed the scale of development, forcing areas to compete on a state and regional level rather than purely on a national level.

- *Traditional industries* are being forced to innovate and adapt their business strategies to a changing global economy.

- *Knowledge-intensive industries* are realizing their lead is not secure, and they must account for growing international competition.
Universities must play a central role in responding to these challenges.

• In responding to these new challenges, universities play a unique role, one that our work at Duke is seeking to fulfill:
  – Researchers should assess best practices in international competitiveness, develop new models for studying global and local economies, and build bridges with industry and government through groundbreaking research (CGGC).
  – Professors should bring these new ideas to the classroom and involve students in research, providing student opportunities for real-world applied learning while benefiting local economies (M&M)

• This represents a new and important role for research universities in an era of globalization.
Thank you for your attention!