North Carolina in the Global Economy

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

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World View, an International Program for Educators
2006 Community College Symposium on “The Global Economy”
November 15, 2006 – The Friday Center, UNC-Chapel Hill
Presentation Outline

• Introduction: CGGC and North Carolina in the Global Economy project
• Revitalizing traditional industries: NC’s textile & apparel value chain
• The global knowledge economy: Framing the engineering outsourcing debate
• New roles for higher education: Research and training in the global economy
• Implications for U.S. competitiveness
• An Internet tool – NC-Global Economy website
Recent Projects & Events

Building Business Ties Between North Carolina and Baia 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

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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...

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Research Papers

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Inter-Industry Trends

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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></th>
<th></th>
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<th></th>
<th></th>
<th></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.

Source: NC-Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
Revitalizing Traditional Industries: Competitive Challenges for North Carolina’s Textile Industry
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

• Kannapolis: seeking to use private capital to transform an traditional textile center into an innovative biotech hub.

  – Fall 2003: Pillow-Tex, a key plant in downtown Kannapolis, closes, laying off 5,000 workers.
  – December 2004: Dole Foods owner David Murdock buys the plant.
  – September 2005: Murdock announces that the site would be turned into the centerpiece of the North Carolina Research Campus, a 350-acre site that may include:
    • Advanced laboratory space
    • Offices and labs of more than 100 biotechnology companies
    • Education and training center for biotechnology jobs
    • Residential and retail space in downtown Kannapolis.

Source: Carolina Newswire, 13 September 2005
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.”
Graph 2: Composition of China’s Exports to the U.S. Market, 1985-2003

Source: World Trade Analyzer.
# 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>Factory orders, 2003</th>
<th>PRODUCTION</th>
<th>TOTAL SALES</th>
<th>U.S. EXPORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MEN’S WEAR</strong></td>
<td>100 MILLION PIECES</td>
<td>$600 MILLION</td>
<td>$100 MILLION</td>
</tr>
<tr>
<td>Zhucheng</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CASUAL WEAR</strong></td>
<td>160 MILLION PIECES</td>
<td>$260 MILLION</td>
<td>$58 MILLION</td>
</tr>
<tr>
<td>Haiyu, Changshu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DOWN-FILLED PRODUCTS</strong></td>
<td>26 MILLION PIECES</td>
<td>$470 MILLION</td>
<td>$290 MILLION</td>
</tr>
<tr>
<td>Xintang, Hangzhou, Xiaoshan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TIES</strong></td>
<td>300 MILLION PIECES</td>
<td>$1.21 BILLION</td>
<td>$384 MILLION</td>
</tr>
<tr>
<td>Shangzhou</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SOCKS</strong></td>
<td>9 billion PAIRS</td>
<td>$1.57 BILLION</td>
<td>$240 MILLION</td>
</tr>
<tr>
<td>Datang, Zhiji</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UNDERWEAR</strong></td>
<td>969 million PIECES</td>
<td>$360 MILLION</td>
<td>$290 MILLION</td>
</tr>
<tr>
<td>Jinjiang, Shenhua</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WEDDING DRESSES, EVENING GOWNS</strong></td>
<td>510 million PIECES</td>
<td>$950 MILLION*</td>
<td>$640 MILLION†</td>
</tr>
<tr>
<td>Chaoshou</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>JEANS</strong></td>
<td>225 million PIECES</td>
<td>$1.04 BILLION</td>
<td>$480 MILLION</td>
</tr>
<tr>
<td>Xintang, Zengcheng</td>
<td></td>
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</tbody>
</table>

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

Sources: China National Textile Council, Shenhua 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 India¹

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>United States¹</strong></td>
<td>101,249</td>
<td>108,750</td>
<td>114,241</td>
<td>121,263</td>
<td>134,406</td>
<td>137,437</td>
</tr>
<tr>
<td><strong>India²</strong></td>
<td></td>
<td></td>
<td>82,107</td>
<td>109,376</td>
<td>129,000</td>
<td>139,000</td>
</tr>
<tr>
<td><strong>China (MoE CERN)³</strong></td>
<td></td>
<td></td>
<td>293,125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>**China (MoE Yearbook)⁴ **</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).


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
The Role of Higher Education:

Research and Training in the Global Economy
Student Research on North Carolina in the Global Economy


• 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: VF Corporation

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

BioWork and Workforce Development
New Models for Workforce Development: BioWork

- BioWork consists of 128-hour introductory certificate course training entry-level technicians in bio/pharma and chemical manufacturing.
  - Largest program of its kind in North America
  - Enrollment more than tripled from 2002 to 2005

Table 3: Statistics for BioWork, 2002-03 to 2005-06

<table>
<thead>
<tr>
<th></th>
<th>2002-03</th>
<th>2005-06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment</td>
<td>274</td>
<td>903</td>
</tr>
<tr>
<td>Community Colleges</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Offering BioWork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC Counties Served</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

Industry Participation in BioWork

• The model is flexible, and design relies on dialogue with industry. A selection of firms participating in the development of BioWork:
  – Diosynth
  – Bayer
  – Wyeth-Lederle
  – Ajinomoto
  – NovoNordisk Pharmaceuticals
  – Biogen
  – GlaxoSmithKline
  – Novozymes

• Example: In Wilson County, a host of firms (including Merck) have been involved with program design, working with Wilson Tech to modify curricula in line with local industry needs, including chemical-based production processes for pharma. In return, these firms have agreed to reserve interviews for relevant job openings for the school’s BioWork graduates.
Conclusion:

Implications for U.S. Competitiveness and the Role of Higher Education Institutions
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.
Educational institutions play a central role in responding to these challenges.

• In responding to these new challenges, higher educational institutions have two unique roles to play:
  
  – **Research**: Professors and researchers should assess and develop new models for studying global and local economies and build bridges with industry and government. They must bring these models to the classroom and involve students in applied research that can benefit local economies. (CGGC and NCGE)

  – **Workforce development**: Community colleges should assess and reform training programs with an eye to new dynamics of global and local competitiveness, working cooperatively with industry and government to produce an agile, well-trained workforce.

• **These represent new and important missions for educational institutions in an era of globalization.**
Thank you for your attention!