

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 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 ugrads 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 IN THE GLOBAL ECONOMY

SPRING
2006
2006
2006
2006



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 Web site 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

North Carolina's Economic Profile

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

	% of US			% of US		
	NC Rank	Employment in NC	NC Employment	NC Rank	Employment in NC	NC Employment
Tobacco	1	44.5%	18,462	1	43.7%	13,374
Textiles and Apparel	1	16.6%	252,696	2	14.5%	97,466
Furniture	1	12.8%	80,103	2	10.3%	58,198
Biotechnology	7	7.5%	16,991	6	7.5%	20,478
Hog Farming	6	4.8%	12,991	7	5.2%	15,104
Banking and Finance	12	2.3%	68,510	9	2.6%	98,003
Information Technology	15	2.7%	104,100	15	2.6%	105,915

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

Revitalizing Traditional Industries:

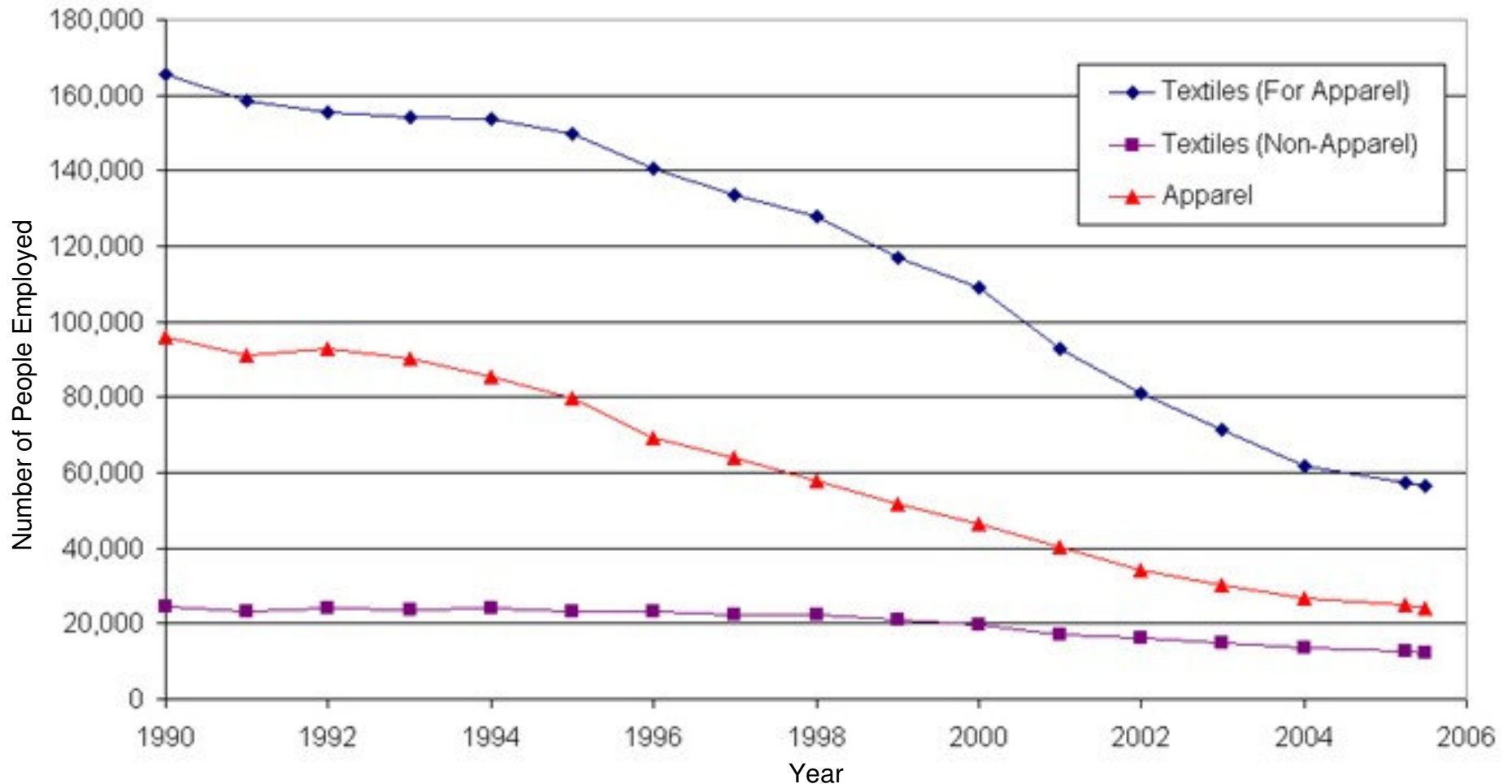
Competitive Challenges for North
Carolina's Textile Industry

Revitalizing Traditional Industries

- Traditional, manufacturing-based industries in the United States have been hit hard in recent years.
 - From May 1996 to May 2006, the US lost nearly 3 million manufacturing jobs (BLS, *Current Employment Statistics Survey*)
 - 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

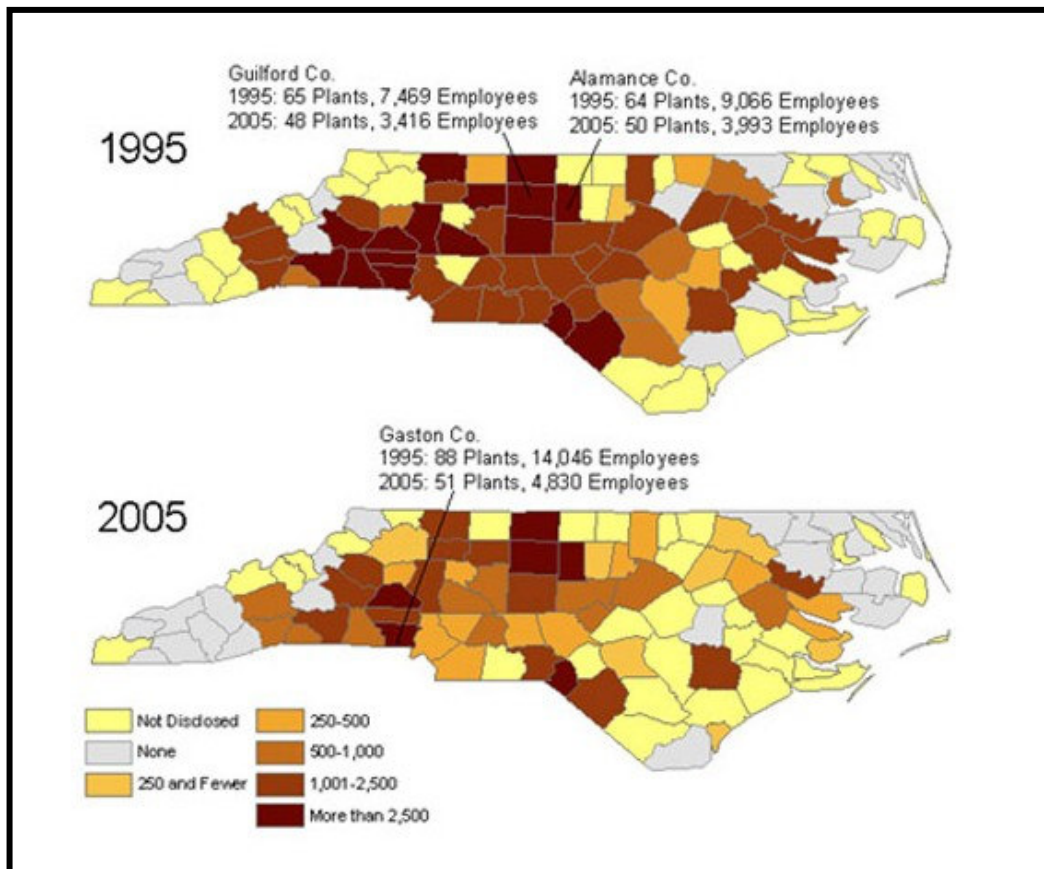
Graph 1: North Carolina Employment in the Textile & Apparel Industries, 1990-2006



Source: NC-Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)

North Carolina's Employment Shifts: Textiles for Apparel

Map 1: Employment in the Textile for Apparel Industry,
1995 & 2005



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

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.

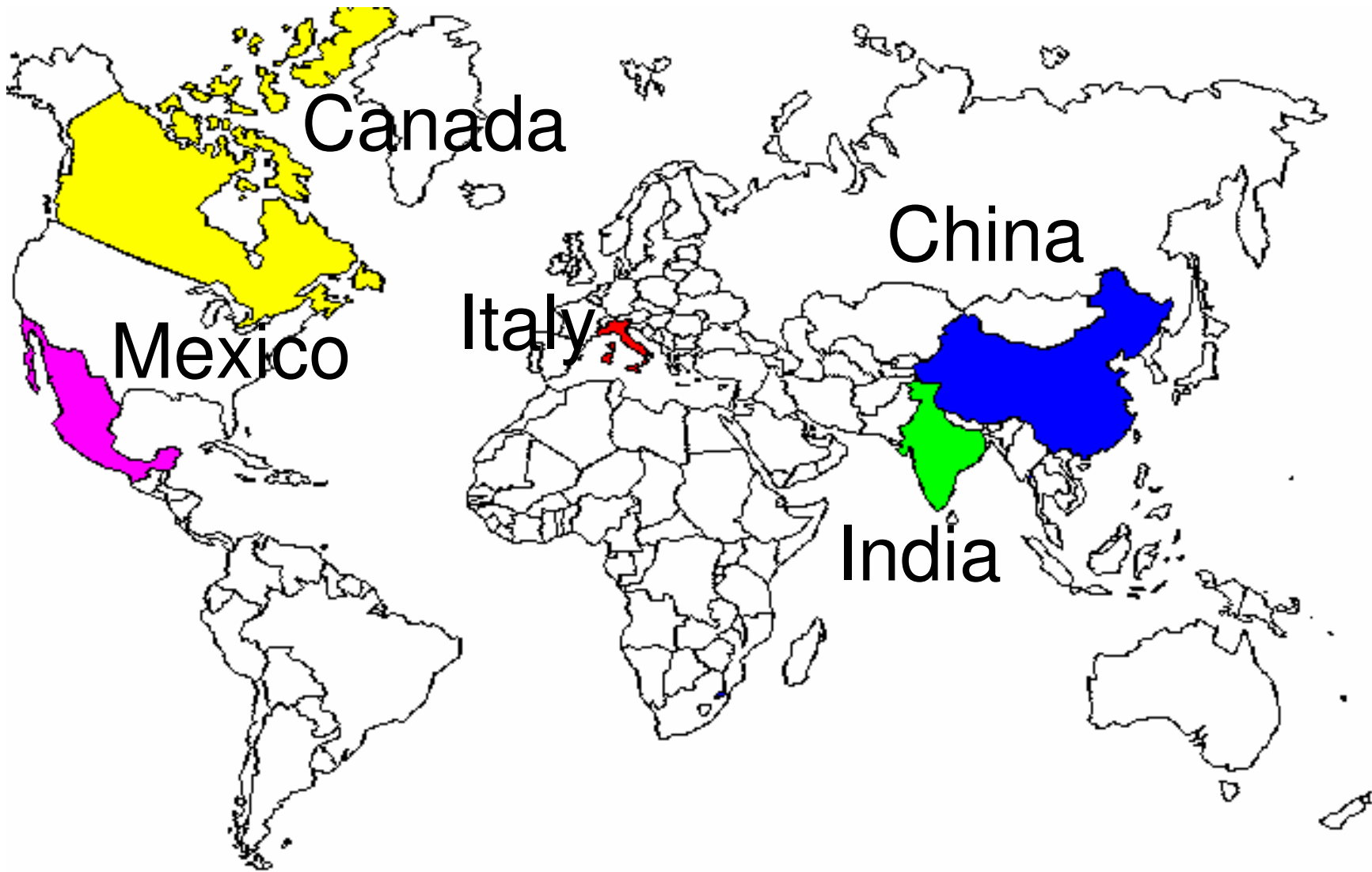
Strategic Solutions: Replacing Low Tech with High Tech

- 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

(<http://carolinanewswire.com/news/News.cgi?database=topstories.db&command=viewone&id=3338&op=t>)

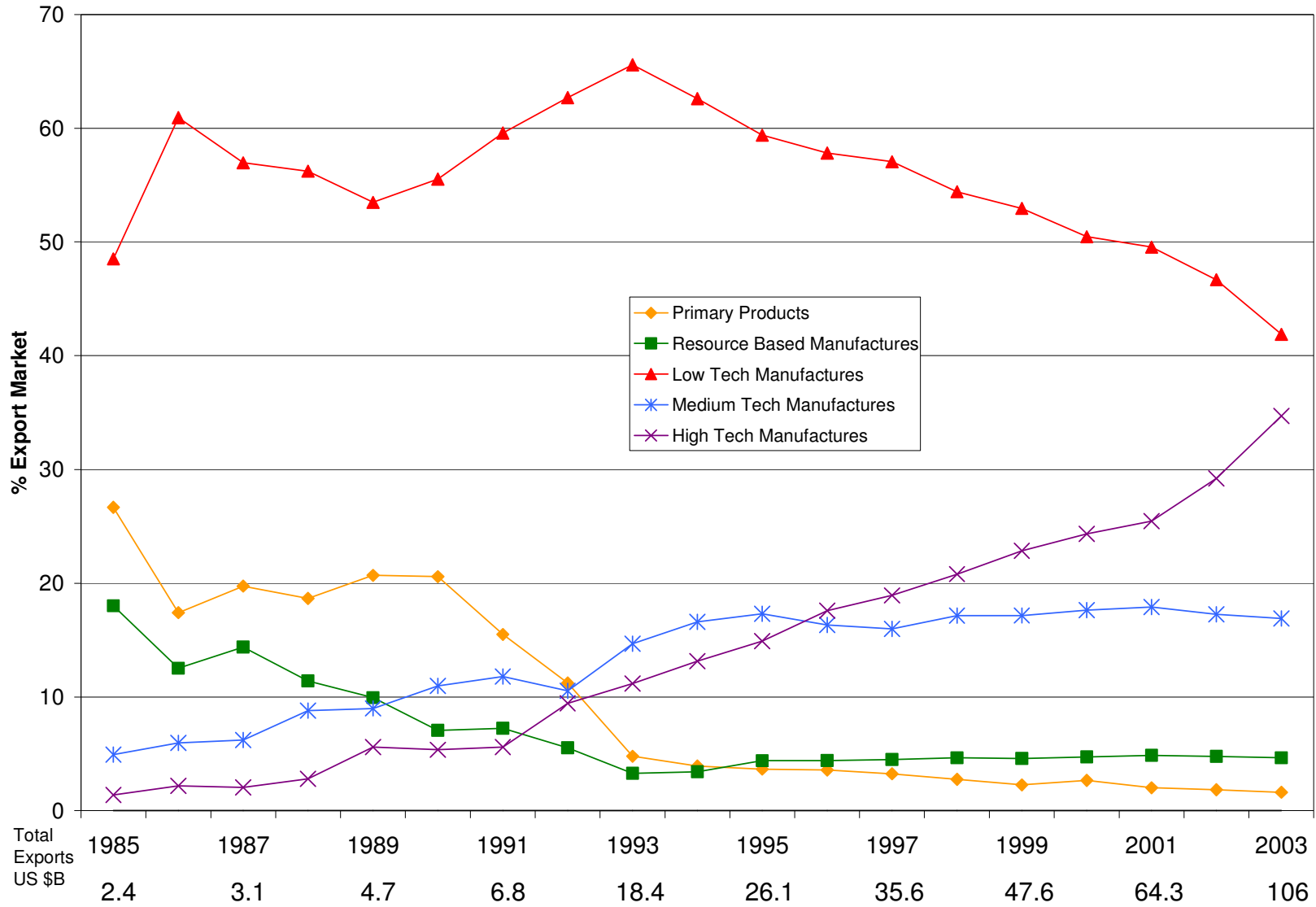
Key International Competitors



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

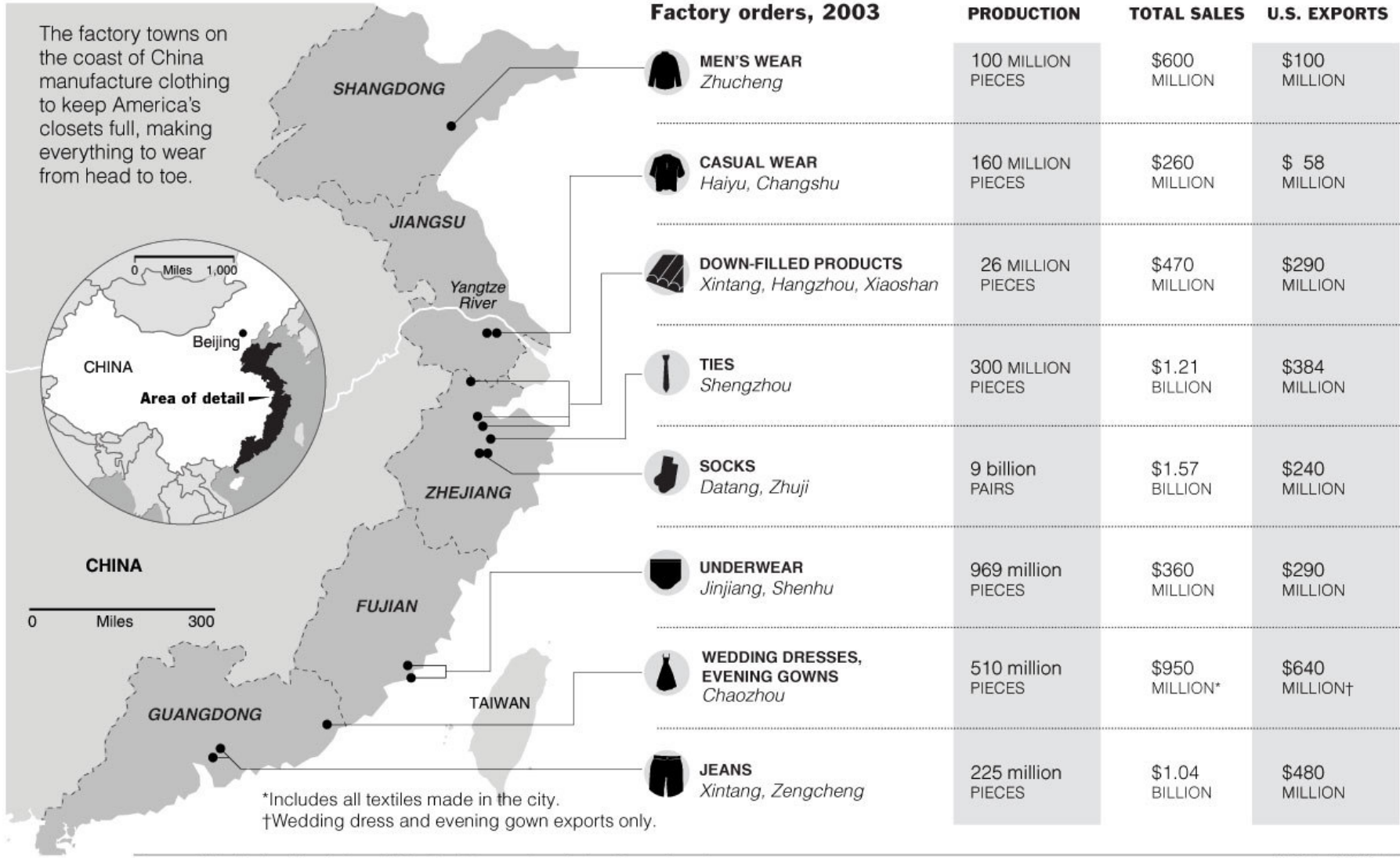


Source: World Trade Analyzer.

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.



Sources: China National Textile Council; Shenhu Underwear Association; Datang Town Government

Source: David Barboza, "In roaring China, sweaters are west of socks city," *New York Times*, Dec. 24, 2004.

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”.
 - The National Academies (2005)
- “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

Country	Reported Graduates	What is Included in these Numbers:
United States	70,000	Four-year engineering bachelors degrees.
China	600,000	Three- and four-year engineering degrees under a broad definition of "engineer." Additionally, computer science and information technology three- and four-year degrees are included.
India	350,000	Three- and four-year engineering, computer science and information technology degrees.

Source: Gary Gereffi, Vivek Wadhwa and Ben Rissing, "Framing the Engineering Outsourcing Debate: Comparing the Quantity and Quality of Engineering Graduates in the United States, India and China," Paper presented at SASE 2006 Conference.

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

	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
United States ¹	101,249	108,750	114,241	121,263	134,406	137,437
India ²			82,107	109,376	129,000	139,000
China (MoE CERN) ³					293,125	376,415
China (MoE Yearbook) ⁴ *	195,354	212,905	219,563	252,024	351,537	442,463

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)

1. United States Department of Education (DoE) National Center for Educational Statistics (NCES), (Assorted years). Current Tables 249 and 253.
2. National Association of Software and Service Companies (NASSCOM), (Assorted years). NASSCOM Strategic Review: The IT Industry in India.
3. China Education and Research Network (April 2005). The Ministry of Education announced in the last two years of ordinary professional enrollment data. <http://www.edu.cn/20050430/3136324.shtml>
4. Chinese Ministry of Education (MoE) (Assorted years). Chinese Statistical Yearbook. Number of Students in Regular HEIs by Field of Study.

Source: Gereffi, Wadhwa and Rissing (2006).

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



**Rockwell
Automation**

Microsoft



ORACLE

AMD



The Role of Higher Education:

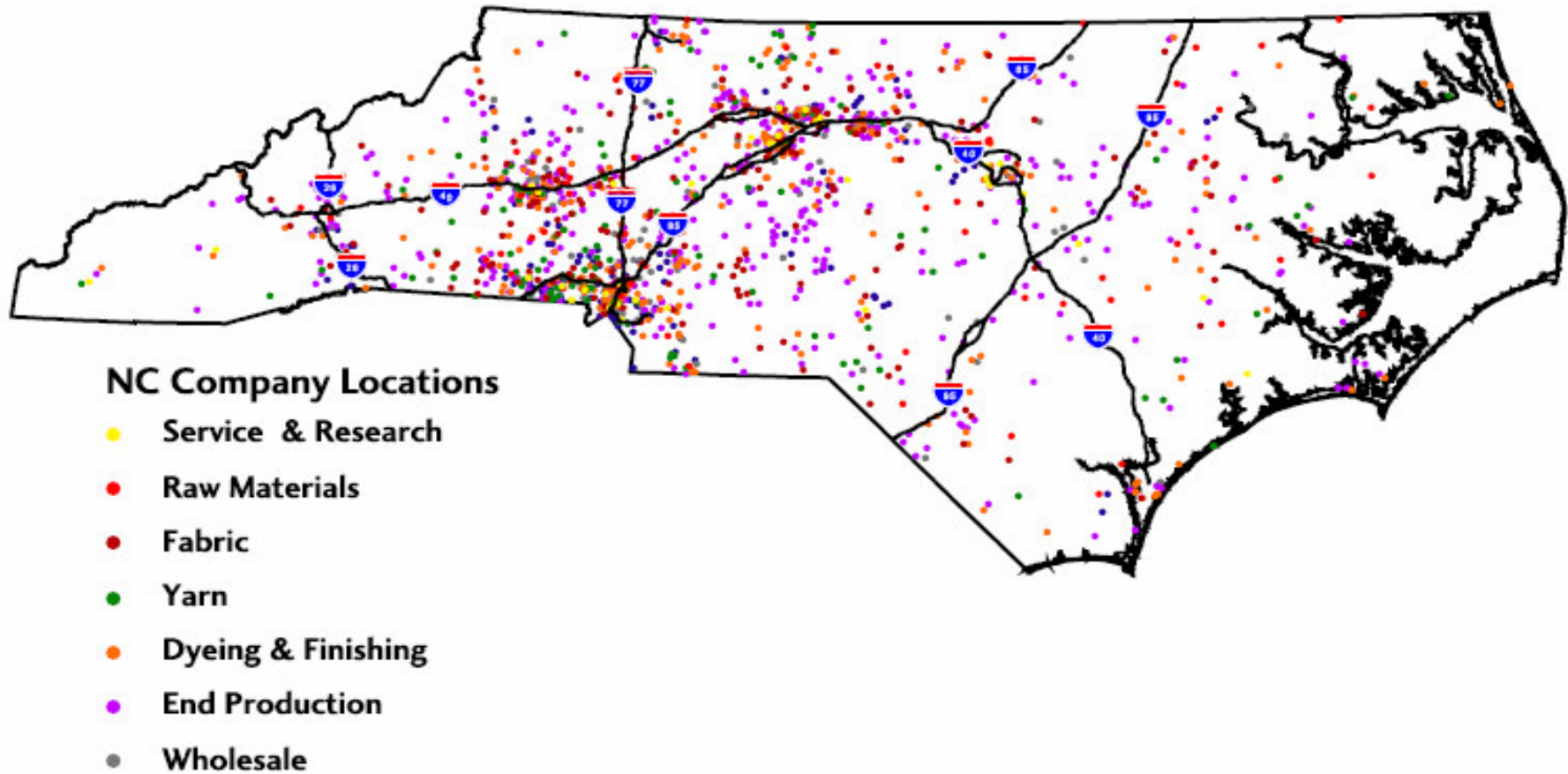
Research and Training in the
Global Economy

Student Research on North Carolina in the Global Economy

Fall 2006 – MMS 190.02: “Technology, Jobs & Offshore Production:
Global and U.S. Trends & Impact on North Carolina”

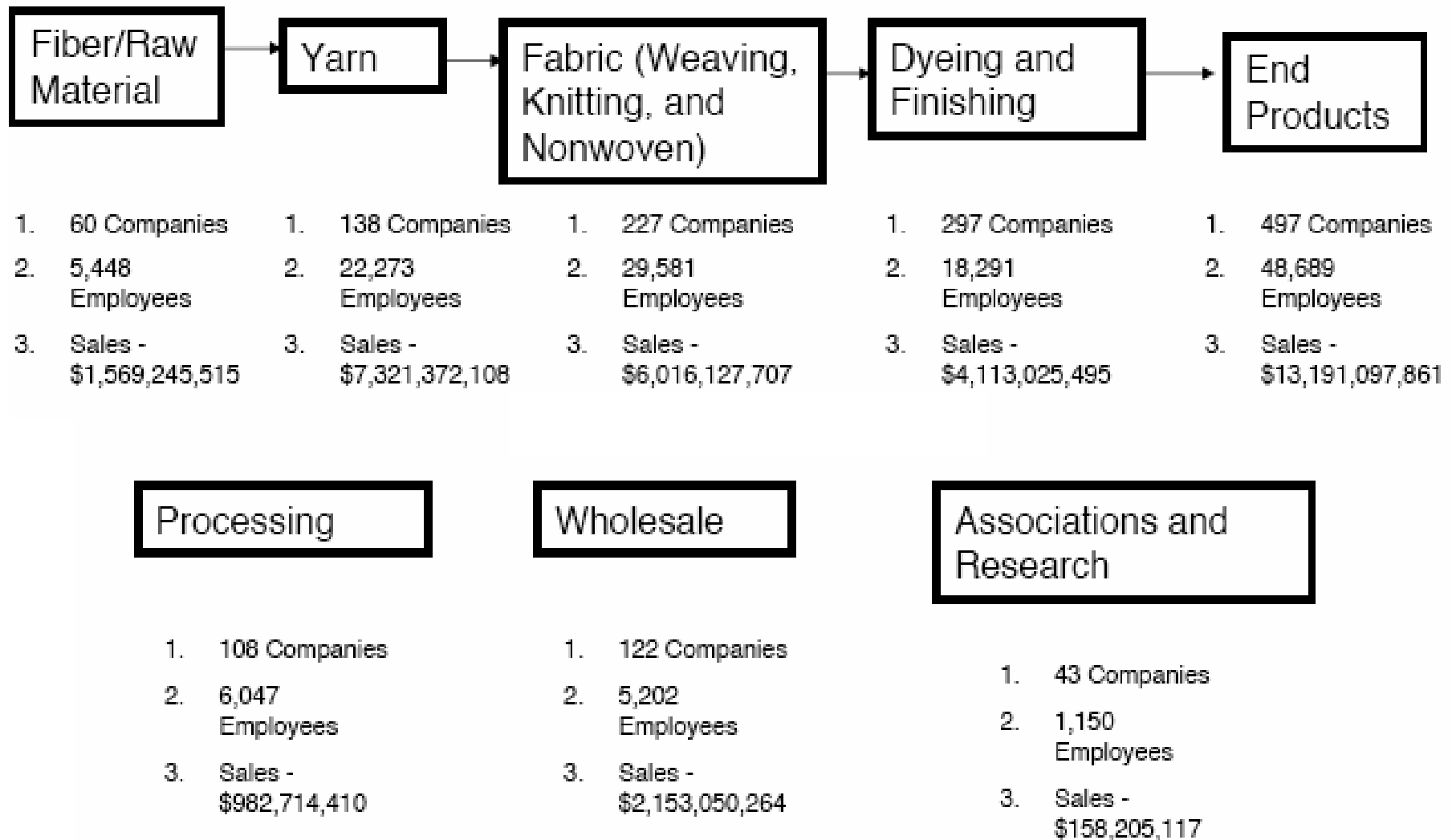
- Student teams researching several projects with direct relevance to North Carolina and to industry.
 - **Project 1:** Focus on U.S. industry that is affected by globalization and outsourcing/insourcing trends
 - **Project 2:** Focus on one of North Carolina’s key industries (furniture, textiles/apparel, 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



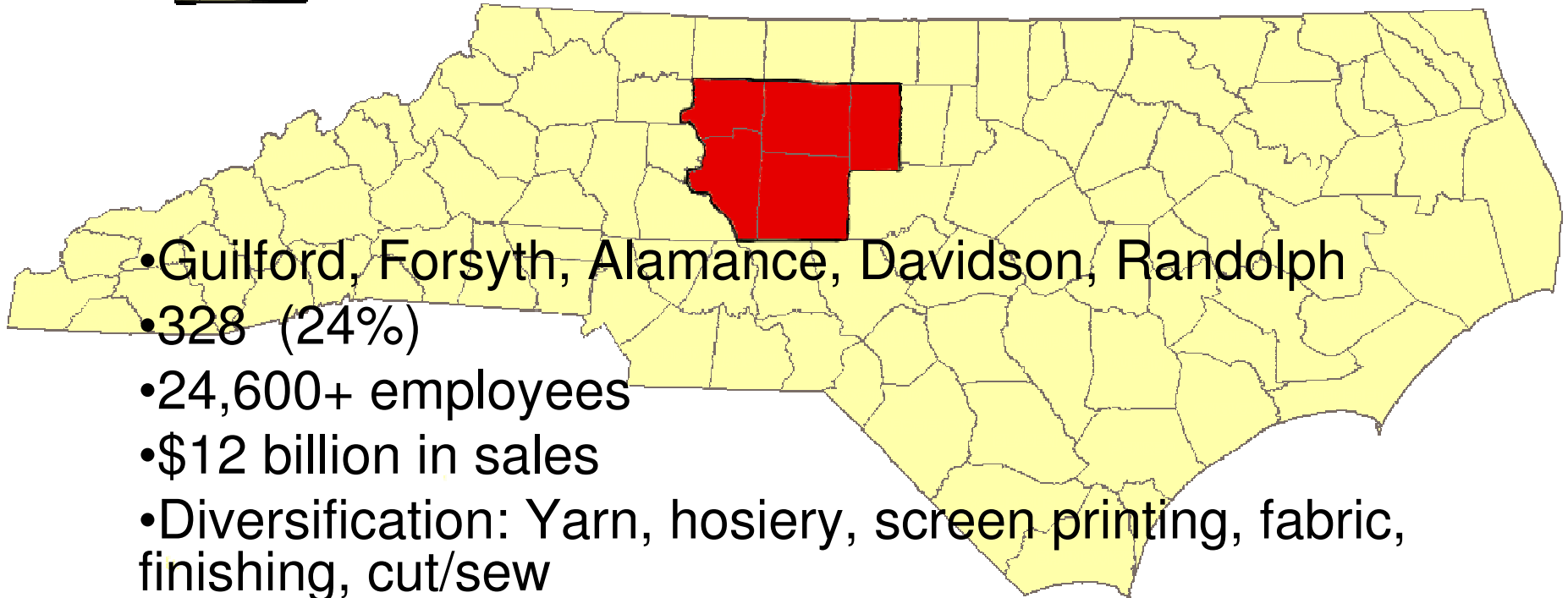
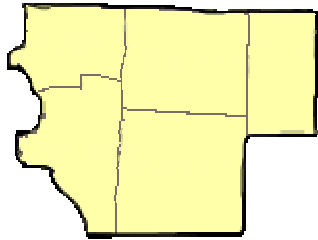
Source: Frederick, Stacey, College of Textiles, North Carolina State University.

North Carolina Textile/Apparel Supply Chain



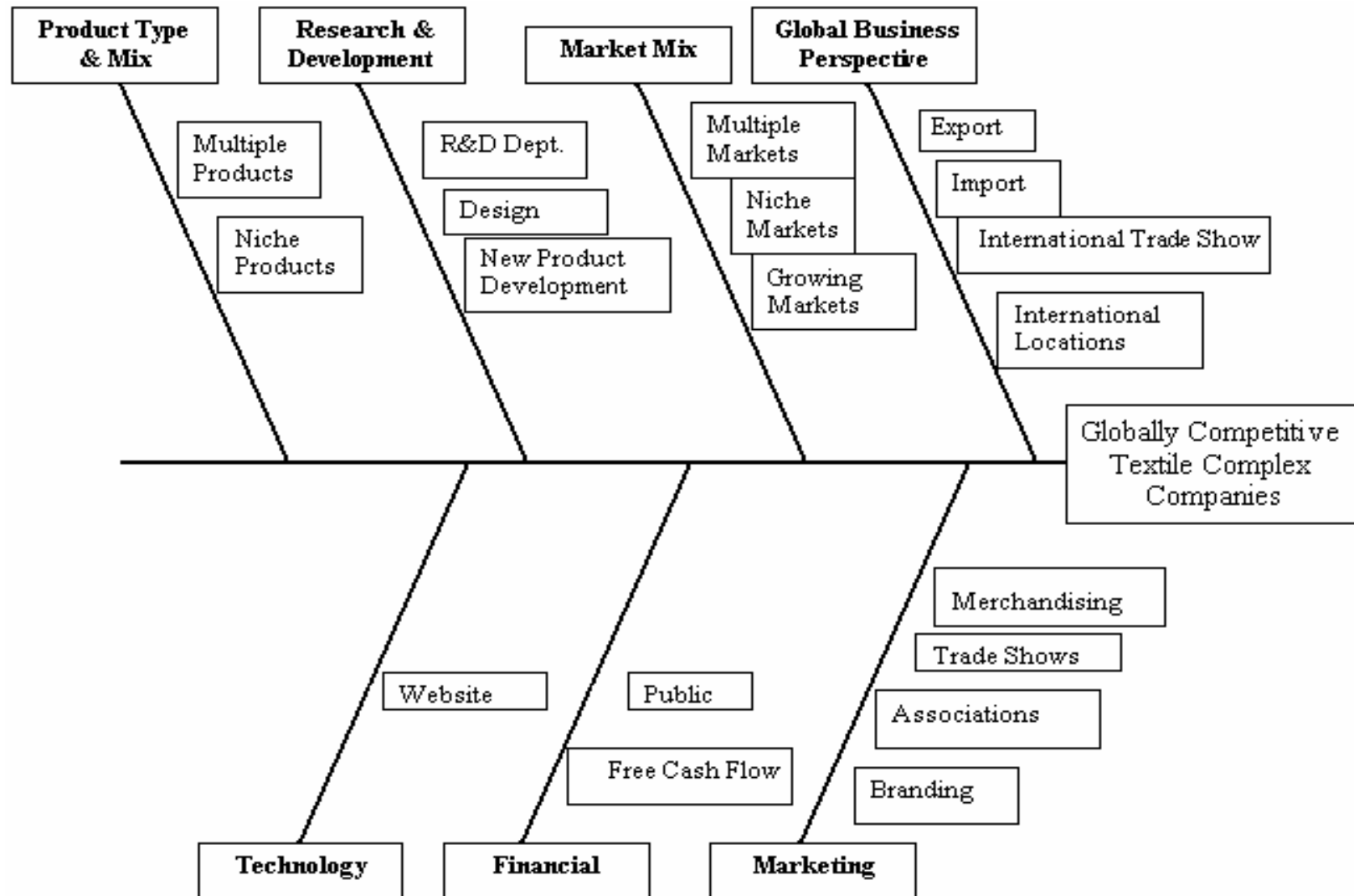
Source: Frederick, Stacey, College of Textiles, North Carolina State University.

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

	2002-03	2005-06
<i>Enrollment</i>	274	903
<i>Community Colleges Offering BioWork</i>	5	12
<i>NC Counties Served</i>	10	20

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!