GLOBAL VALUE CHAINS AND THE ANALYSIS OF INTERNATIONAL BUSINESS OPERATIONS

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Duke University

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Friends of the Chair group on Internationalization
UN/DESA, Statistics Division, New York, NY
AGENDA

1. FRAMEWORK: GVCs and Development

2. USE OF EXISTING TRADE STATISTICS:
   – Industrial Upgrading: Cases of Mexico and China

3. TRADE STATISTICS + FIRM LEVEL SURVEYS:
   – Medical Devices GVC in Costa Rica & Brazil
   – Offshore Services Global Value Chain

4. GVC MAPPING + EXISTING BLS DATA:
   – North Carolina in the Global Economy
GLOBAL VALUE CHAINS AND DEVELOPMENT
Globalization & Development – Key Trends

• **Post-Washington Consensus world** – Global economic recession of 2008-09 and rise of “middle powers” has changed export-oriented model

• **Large emerging economies** like China, India and Brazil are both export platforms and turning inward

• **Small economies** are seeking specialized niches in the global economy and regional economic blocs

• **Lead firms in global value chains** are streamlining and consolidating their sourcing and production networks
The Global Value Chain Approach

Global value chain framework developed over the past decade by a diverse interdisciplinary and international group of researchers who have tracked the global spread of industries and their implications for both corporations and countries.

- Global value chain analysis provides both conceptual and methodological tools for looking at the global economy:
  - **Top down** – a focus on lead firms and inter-firm networks, using varied typologies of industrial “governance”
  - **Bottom up** – a focus on countries and regions, which are analyzed in terms of various trajectories of economic and social “upgrading” or “downgrading”
1. Value Chain Mapping
2. Geographic Scope
3. Governance Structure (Lead Firms & Industry Organization)
4. Upgrading Trajectories
5. Local Institutional Context
6. Industry Stakeholders
Key GVC Research Objectives

1. A detailed mapping of the actors in specific value chains in particular countries or regions

2. An assessment of the upgrading (or downgrading) trajectories in the value chain with regard to multiple analytical dimensions

3. The identification of constraints and opportunities for value chain development leading to strategies to drive industry growth
Industrial Upgrading:
Cases of Mexico and China
UPGRADING: ADDING VALUE TO INDUSTRIES

- **Market entry** - when a new actor begins to participate in the value chain
- **Product upgrading** - moving into more sophisticated product lines
- **Process upgrading** – increase efficiency by reorganizing the production system or introducing superior technology
- **Functional upgrading** - acquiring new functions (or abandoning existing ones) to increase the overall skill content of the activities
- **Chain upgrading** - entry into a new chain by leveraging the knowledge and skills acquired in current chain
Upgrading refers to the strategies that stakeholders (countries, regions and firms) can take to improve their position within the global economy.
Dynamic Value Added -- “Smile” Curve: The Apparel Global Value Chain

Pre-Production  
Intangible

Production: Tangible Activities

Post-Production  
Intangible

R&D

Design

Purchasing

Production

Distribution

Marketing

Services

Value Added

Composition of Mexico’s Exports to the World Market, 1990-2012

Source: UN Comtrade.
Composition of China’s Exports to the World Market, 1990-2012

Source: UN Comtrade.

## Table. Mexico's and China's Competing Exports to the US, 2000-2011

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Value (billions)</td>
<td>Share of US market</td>
<td>Value (billions)</td>
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<tr>
<td>752</td>
<td>Automatic Data Processing Machines and Units</td>
<td>Mexico 6.4 11.2</td>
<td>13.8 17.0</td>
<td>5.8</td>
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<td></td>
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<td>China 6.5 11.4</td>
<td>54.2 66.7</td>
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<td>US Total 57.1</td>
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<td>764</td>
<td>Telecommunications Equipments and Parts</td>
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<td>13.0 12.9</td>
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<td></td>
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<td>China 4.8 10.6</td>
<td>46.2 45.9</td>
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<td>US Total 45.1</td>
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<td>778</td>
<td>Electrical Machinery and Apparatus</td>
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<td>5.3 18.0</td>
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<td>China 2.1 11.9</td>
<td>10.9 36.9</td>
<td>25.0</td>
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<td>US Total 17.6</td>
<td>29.5</td>
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<tr>
<td>784</td>
<td>Auto Parts and Accessories</td>
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<td>14.0 27.5</td>
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<td></td>
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<td>China 0.5 1.7</td>
<td>5.9 11.6</td>
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<td>US Total 29.2</td>
<td>51.0</td>
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<tr>
<td>821</td>
<td>Furniture</td>
<td>Mexico 3.2 15.5</td>
<td>5.2 14.8</td>
<td>-0.8</td>
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<td>China 5.3 25.7</td>
<td>17.8 50.6</td>
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<td>US Total 20.6</td>
<td>35.2</td>
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<td>84</td>
<td>Articles of Apparel and Clothing</td>
<td>Mexico 8.8 13.1</td>
<td>4.1 4.6</td>
<td>-8.5</td>
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<td></td>
<td></td>
<td>China 8.9 13.3</td>
<td>34.9 39.4</td>
<td>26.1</td>
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<tr>
<td></td>
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<td>US Total 67.1</td>
<td>88.6</td>
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</tbody>
</table>

U.S. General Imports, CIF Value
Why is China gaining global market share?

- China is a **lower-cost producer** overall (labor costs lower, but not transport & tariffs)
- China has huge **scale and scope economies** (supply-chain cities)
- China has a **coherent and multidimensional upgrading strategy** – diversify and add high value activities
- China is using **direct foreign investment** to promote “fast learning” in new industries
- China uses **access to its domestic market** to attract TNCs and promote knowledge spillovers
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.


Factory orders, 2003 | PRODUCTION | TOTAL SALES | U.S. EXPORTS
---|---|---|---
MEN’S WEAR | Zhucheng | 100 MILLION PIECES | $600 MILLION | $100 MILLION
CASUAL WEAR | Halyu, Changshu | 160 MILLION PIECES | $260 MILLION | $58 MILLION
DOWN-FILLED PRODUCTS | Xintang, Hangzhou, Xiaoshan | 26 MILLION PIECES | $470 MILLION | $290 MILLION
TIES | Shangzhou | 300 MILLION PIECES | $1.21 BILLION | $384 MILLION
SOCKS | Datang, Zhuji | 9 billion PAIRS | $1.57 BILLION | $240 MILLION
UNDERWEAR | Jinhjiang, Shentu | 969 million PIECES | $360 MILLION | $290 MILLION
WEDDING DRESSES, EVENING GOWNS | Chaozhou | 510 million PIECES | $950 MILLION* | $640 MILLION†
JEANS | Xintang, Zengcheng | 225 million PIECES | $1.04 BILLION | $480 MILLION

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

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

The New York Times
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 1,000 MNC R&D Centers

- GE’s China Technology Center: Advanced research in energy storage, environmental management
- Microsoft Research Asia: Cutting-edge graphics & multimedia research
China Is Climbing the Value Chain

• Moving from low-technology to high-technology manufactured goods

• Moving from manufacturing to high value services
  – R&D, design, marketing of national brands (autos, appliances, telecom), logistics, finance

• Moving from inward FDI (joint ventures & technology transfer) to outward FDI (primary commodities, computers, shipping)
But Beware…

• High tech exports don’t necessarily mean high value added production
  – CASE: China and the iPod

• Export dependence has economic growth and employment risks
China assembles all iPods, but it only gets about $4 per unit—or just over 1% of the US retail price of $300

451 parts that go into the iPod

Hard Drive by Toshiba → Japanese company, most of its hard drives made in the Philippines and China; it costs about $73 - $54 in parts and labor -- so the value that Toshiba added to the hard drive was $19 plus its own direct labor costs

Video/multimedia processor chip by Broadcom → American company with manufactures facilities in Taiwan. This component costs $8.

Controller chip by Portal Player → American company with manufactures. This component costs $5.

- Final assembly → done in China, costs only about $4 a unit

The retail value of the 30-gigabyte video iPod that the authors examined was $299 in June, 2007

The unaccounted-for parts and labor costs involved in making the iPod came to about $110

The largest share of the value added in the iPod goes to enterprises in the United States → $163 of the iPod’s $299 retail value in the United States was captured by American companies and workers, breaking it down to $75 for distribution and retail costs, $80 to Apple, and $8 to various domestic component makers.

The bulk of the iPod’s value is in the conception and design of the iPod. That is why Apple gets $80 for each of these video iPods it sells, which is by far the largest piece of value added in the entire supply chain. Apple figured out how to combine 451 mostly generic parts into a valuable product.

U.S. Bilateral Trade Balance with China for One Unit of iPhone 4 (US$)

Source: OECD (2011: 40)
China’s Dual Challenge

• China wants to capture more value added in manufacturing
  – Many opportunities in domestic market & South-South trade

• China is trying to shift its growth model from making tangible goods to providing high value-added services
  – New option: Shanghai FTZ
Shanghai Pilot Free Trade Zone (FTZ)

• Opening date: Sept. 29, 2013
• Expected year of completion: 2020
• 18 industries granted approval for FTZ liberalization, including:
  – Banking & financial services
  – Customs brokerage
  – Value-added telecom & video games
  – Customer-facing services (health insurance, travel)
  – Employment agencies, construction services, etc.
• **Lots of competition**: Hong Kong, Singapore & Tokyo in Asia; New York and London

• **Major reforms in China will be required** to open the banking system
  – E.g., liberalization of RMB; free interest rate; full convertibility of RMB; offshore finance

• **Shanghai FTZ can be an important “pilot”** to facilitate goods and services trade (simpler) as well as deeper financial reforms (more difficult)
MEDICAL DEVICES
GLOBAL VALUE CHAIN
Local firms are mainly in packaging & support services (12 of 19) versus 4 in limited role in plastics molding & metal finishing and 1 OEM with exports under $2 million.
EVOLUTION OF COSTA RICAN MEDICAL DEVICE EXPORTS

Costa Rica's Medical Exports by Product Category: 1998-2011

- **Disposables** still the largest product category exported, but no longer a strong growth area.
- Exports in **surgical instruments** have grown steadily since 2005.
- **Therapeutics** has become 2nd largest category since 2008; likely to increase as newly established firms complete transfer of new product lines.
- Limited export of highest value **capital equipment** (eg. Electronic/software devices)
<table>
<thead>
<tr>
<th>Entry Year</th>
<th>Firm Characteristics</th>
<th>Main Product Export Category</th>
<th>Core Market Segments</th>
<th>Product Examples</th>
<th>Select Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Up to 2000</strong></td>
<td>4 OEMs 8 Components 1 Input distributor 7 Packaging 1 Finishing 3 Support services</td>
<td>Disposables</td>
<td>Drug delivery; Women’s health</td>
<td>Intravenous tubing (I) Mastectomy bra (I)</td>
<td>Hospira; Baxter; Amoena; Corbel</td>
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<td>24 firms: 8 US 15 CR 1 German</td>
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<tr>
<td>2001–2004</td>
<td>3 OEMs 6 Components 1 Finishing 1 Logistics provider 2 Support services</td>
<td>Instruments</td>
<td>Endoscopic surgery</td>
<td>Biopsy forceps (II)</td>
<td>Arthrocare; Boston Scientific; Oberg Industries</td>
</tr>
<tr>
<td>13 firms: 9 US 3 CR 1 Colombian</td>
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<tr>
<td>2005–2008</td>
<td>2 OEM 4 Components 1 Packaging 1 Finishing</td>
<td>Therapeutics</td>
<td>Cosmetic surgery; Women’s health &amp; urology</td>
<td>Breast implants (III) Minimally invasive devices for uterine surgery (II)</td>
<td>Allergan; Tegra Medical; Specialty Coating Systems</td>
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<td>8 firms: 7 US 1 Puerto Rico</td>
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<td>21 firms: 16 US 1 CR 1 Ireland 1 Japan 2 Joint ventures (US-CR)</td>
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UPGRADING SUCCESS: A LEADING MEDICAL DEVICES MNC IN COSTA RICA

- **2004:** Manufacturing functions
- **2012:** Engineering for process improvements → Focused on cardiology segment; strategy – to alleviate R&D costs in the US.

**Functional Upgrading**

- Biopsy forceps → Labor intensive, basic metal works & extrusion.
- Urethral stent → Thermoforming, laser marking, coating capabilities.
- Today – CR facilities cover 42 manufacturing processes.

**Product & Process Upgrading**

- Gastroenterology segment → Urology → Cardiovascular

**Market Diversification**

- Recent co-location of sterilization vendors will allow the firm to export directly to global distribution centers

**Forward Linkages**

** Timeline:**
- **2004:** First production plant opens in Costa Rica (10,000m²)
- **2005:** Exports: US$18 million
- **2008:** Second plant opens. (32,000m²) First plant restructuring
- **2010:** Initial plant reopens after restructuring
- **2011:** Exports: US$120 million
**EVOLUTION OF BRAZILIAN MEDICAL DEVICE EXPORTS**

- **Disposables** are both the largest product category exported and an area of growing exports.
- **Medical equipment** surpassed **dental products** as the second largest export category in 2002.
- Export statistics hide the sectors of greatest importance, since the main export items tend to be low-tech. Brazilian government and private sector actors are working to promote price-competitive, mid-tech exports.
Brazil’s Position in the Medical Devices GVC

Research & Product Development
- Prototype
- Regulatory Approval
- Process Development
- Sustaining Engineering

Components Manufacturing
- Software Development
- Electronics development
- Precision metal works
- Plastics extrusion & molding
- Weaving/Knitting Textiles

Assembly / Production
- Assembly
- Packaging
- Sterilization

Distribution & Marketing
- Wholesale distributors
- Doctors & Nurses
- Hospitals (Public/Private)
- Individual Patients

Post-Sales Services
- Training
- Consulting
- Maintenance, Repair

Input Suppliers
- Resin
- Metals
- Chemicals
- Textiles

Market Segments
- Dental (26)
- Laboratory (22)
- Disposables (20)
- Medical Equipment (120)
- Implants (32)
- Radiology (10)

82% of national firms are SMEs

MNC Concentration

Number of National Firms
- 0 - 20
- 21 - 40
- > 40
• **GE seeks to gain access to Brazil’s rapidly growing healthcare market.** *Industrial policy tools* create further incentives for local production.
  
  — The Brazilian informatics law creates offers *tax incentives for local production and R&D on medical devices and other electronics.*
  
  — The Dilma administration recently approved of a *25% preference* for the national healthcare system to *purchase locally manufactured medical devices* (Law 12349, Decree 7767).
  
  — Certification by ANVISA, the regulatory arm of the Ministry of Health, is required to distribute medical devices in Brazil. *ANVISA certification is very difficult and time-consuming* (1 year on average), so MNCs frequently find it easiest to acquire local companies.

• **GE is pushing for relaxed ANVISA requirements**, but through its control of the *largest public healthcare system in the world*, the Brazilian government is in a strong bargaining position.
IRELAND AND MEXICO: MEDICAL DEVICE EXPORTS 1998-2011

IRELAND

- Most mature of the three locations
- 2005 shock forced upgrading strategy
- Significant growth in therapeutics & entry into capital equipment production

MEXICO

- Stabilizing disposables exports
- Strong focus in instruments
- Growing gains in capital equipment participation in electronics value chains

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OFFSHORE SERVICES
GLOBAL VALUE CHAIN
OFFSHORE SERVICES GLOBAL VALUE CHAIN

**Horizontal Activities**

- **ITO** (Information Technology Outsourcing)
  - Software R&D
  - IT Consulting
- **Software**
  - ERP (Enterprise Resource Planning): manufacturing/operations, supply chain management, financials & project management
  - Applications Development
  - Applications Integration
  - Desktop management
- **Infrastructure**
  - Applications Management
  - Network Management
  - Infrastructure Management
- **KPO** (Knowledge Process Outsourcing)
  - Business Consulting
  - Business Analytics
  - Market Intelligence
- **Legal Services**

**Vertical Activities**

- **Banking, Financial Services and Insurance (BFSI)**
  - Ex. Investment research, private equity research, and risk management analysis
- **Manufacturing**
  - Ex. Industrial Engineering and sourcing and vendor management
- **Telecommunications**
  - Ex. IP transformation, Interoperability testing and DSP and multimedia
- **Energy**
  - Ex. Energy Trading and Risk Management, and Digital oil field solutions
- **Travel & Transportation**
  - Revenue management systems, customer loyalty solutions
- **Health/Pharma**
  - Ex. R&D, clinical trials, medical transcript
- **Retail**
  - eCommerce and Planning, merchandising and demand intelligence
- **Others**
  - 36

**Value Added**

- LOW
- HIGH
LEAD OFFSHORE SERVICES COMPANIES IN COSTA RICA

General Business Activities

ITO

Broad Spectrum (ITO, BPO & KPO)

KPO

BPO

Back Office

Call Centers IT

Call & Contact Centers

Industry Specific Activities

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COSTA RICA IN THE OFFSHORE SERVICES GVC, 2011

General Business Activities

ITO

- Broad Spectrum (ITO, BPO & KPO)
  - 10,472 employees
  - $638m

- Call Centers IT
  - 7,753 employees
  - $141m

- Back Office
  - 6,034 employees
  - $223m

- Call Centers
  - 6,106 employees
  - $186m

KPO

- 792 employees
- $66m

Industry Specific Activities

- BPO
  - 792 employees
  - $66m

- Call Centers IT
  - 7,753 employees
  - $141m

- Back Office
  - 6,034 employees
  - $223m

- Call Centers
  - 6,106 employees
  - $186m

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COSTA RICA: AVERAGE EXPORTS PER EMPLOYEE
BY VALUE CHAIN SEGMENT, 2011

- Verticals: $94,907 average exports per employee, 890 employees
- KPO: $83,522, 792 employees
- Broad Spectrum Services (ITO-BPO): $60,943, 10,472 employees
- ITO: $45,671, 1,123 employees
- BPO: $27,658, 19,893 employees

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FIRMS IN COSTA RICA’S OFFSHORE SERVICES SECTOR

First Stage
(13 companies → Eg. Western Union, Equifax, P&G, Sykes)

Second Stage
(60 companies → Eg. Convergys, Teleperformance, AvVenta, Amba Reserach, HP, Intel, IBM)
NORTH CAROLINA IN THE GLOBAL ECONOMY
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.

NORTH CAROLINA NEWS

129.10
Harris Stratex hopes rebranding fuels resurgence

129.10
State gets $545 million to beef up rail service

119.10
TransEnterix ready to move forward

118.10
Liquidia Technologies raises $20 million

113.10
IBM still No.1 patent winner

Email us your Suggestions, Comments & New Research

LATEST UPDATES

Value Chains
Users now have the ability to interact with the value chains.
Watch Video Demo >

Google Maps
Users can now see an interactive google map of company locations for each industry.
Watch Video Demo >

Google Earth
Users can view data from the google maps through Google Earth a virtual globe application.
Watch Video Demo >

More News...
What is a value chain?
Textiles & Apparel: Value Chain with Supporting Industries

The Textile Value Chain

1. RESEARCH & DEVELOPMENT
2. DESIGN
3. PRODUCTION
4. LOGISTICS
5. MARKETING

VALUE-ADDED ACTIVITIES

FIBERS
YARN
FABRIC
FABRIC & YARN WHOLESALE

NATURAL
MAN-MADE
INORGANIC

424310 Piece Goods & Notions Wholesalers
This industry comprises establishments primarily engaged in the merchant wholesale distribution of piece goods, fabrics, knitting yarns (except industrial), thread and other notions, and/or hair accessories.

Statistics:
190 establishments
1,204 employees
$50,475 average annual wage per employee

HOME & INTERIORS
HOME FURNISHINGS WHOLESALE
APPAREL HOSIERY & ACCESSORIES
APPAREL WHOLESALE
WAREHOUSE
RETAIL

COMPONENTS TO OTHER VALUE CHAINS
INDUSTRIAL
GEOTEXTILES
SPORTS & LEISURE
MEDICAL
TRANSPORTATION

SUPPLY CHAIN
- RAW MATERIALS
- COMPONENTS
- FINAL PRODUCTS
- DISTRIBUTION
- SALES

SUPPORTING INDUSTRIES
TEXTILE MACHINERY
CHEMICALS
FINISHING
TRADE ASSOCIATIONS

Source: North Carolina in the Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
Data Sources

Types of Data

- General Employment Levels
- Export $ and Top Destinations
- Top Employers of an Industry
- Value-Chain linkages of Activities

Data Analysis

- Inter-state Comparisons of Data
- Change over time
- Data Overlay onto Maps for inter-county comparisons

Bureau of Labor Statistics

National database with employment information by NAICS code. Data also available on a county-level. This will allow inter-state comparisons.

http://www.bls.gov

TradeStats Express

National data on US imports, exports, and trade balances. State-level data on merchandise exports by NAICS code.

http://tse.export.gov

Selectory, Hoovers, OneSource

Company level information about employees and sales. Can be used to get an idea of a company’s footprint in a state.

www.selectory.com
www.hoovers.com
www.onesource.com
## Trends in Employment Across Industries

<table>
<thead>
<tr>
<th>INDUSTRY (NAICS)</th>
<th>NUMBER OF PEOPLE EMPLOYED (1996-2006)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1996</td>
<td>2001</td>
</tr>
<tr>
<td>TEXTILES AND APPAREL (313)</td>
<td>140,703</td>
<td>92,706</td>
</tr>
<tr>
<td>FURNITURE (3371)</td>
<td>63,355</td>
<td>59,576</td>
</tr>
<tr>
<td>BANKS AND FINANCE (523)</td>
<td>7,114</td>
<td>11,256</td>
</tr>
</tbody>
</table>

• Employment over the past ten years in industries such as textiles and apparel has decreased by 65%

• Furniture industries have seen decreases in employment by almost 33%

• Banks and Finance industries, meanwhile, have increased employment by nearly 115%


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Job Losses by Industry and County

Maps 1d-1f: Job Losses by Industry and County (2006)

- Textile job losses have been seen most in the Piedmont Triad Region, the northern/western Charlotte metro, eastern NC, and Robeson County (Southeastern NC).

- Apparel job losses have been seen most in Charlotte/Piedmont Triad corridor, Southeastern NC, and in Cherokee and Wilson counties.

- Furniture job losses have been seen most along the Greensboro-Asheville corridor (I-40).

Source: North Carolina in the Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
Mapping the Supply Chain

Source: North Carolina in the Global Economy Project (http://www.soc.duke.edu/NC_GlobalEconomy/)
NCGE: Upcoming Enhancements

Create a platform for conducting similar analyses for other states or in a comparative manner by automating and standardizing data collection.

Enable interactive data access / manipulation for customizable research and a more in-depth understanding.

Reorganize presentation of website to cater to users and prompt them for feedback to drive improvement.

GDP, based on exchange rates, over time. Values in billion USDs.
Thank you!

QUESTIONS?

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