

Global Value Chain Analysis: Data Requirements, Gaps & Improvements with New Datasets

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Presentation based on discussion paper prepared by
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Conference on the Measurement of International Trade and Economic Globalization
September 29-Oct. 1, 2014
Aguascalientes, Mexico

Overview

1) Data needed for GVC studies

- Value chain model

2) Improvements to GVC analysis with

- TiVA for Domestic Backward Linkages
- I-O Tables for VC Mapping
- Business Functions

3) GVC case study examples

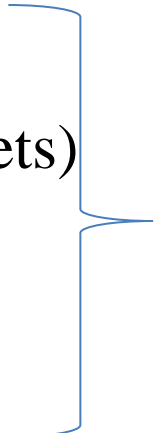
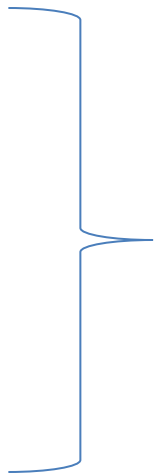
- Governance Typology
- Costa Rica Medical Devices GVC
- Mexico GVC and Clusters Study
- U.S. Value Chains for Jobs and Wages

Introduction

- Proliferation of research labeled as “GVC” over the last 5-10 years
- All related to production fragmentation, but different motives, approaches and definitions of GVCs
- Three main groups involved
 - Social science & geography academic research centers (originators of GVC and GPN frameworks)
 - Economists & national statistics offices (from original firm-level VC approach to new I-O, DCE, TiVA efforts)
 - International NGOs and national governments (funders/implementers)
- Benefits from combining (a) theoretical insights and industry experience from “traditional” GVC researchers and (b) data availability and analysis from economists and statistics agencies

Dimensions of GVC Analysis

For a specific industry, good or service

- Input-output structure (firms and products)
 - Physical transformation (supply chain, end markets)
 - Intangible activities (value-adding activities)
 - Geography (countries)
 - Governance (lead firms and organizations)
- 
- Global**
- Industry stakeholders (firms & organizations along chain)
 - Institutional context
 - Upgrading (functions, products & markets)
- 
- National/
Local**

Four Parts of Value Chain Model

KEY VALUE-ADDING ACTIVITIES Business Functions

Top row: Non-manufacturing
activities that account for most
“value-added”

SUPPLY CHAIN STAGES

Raw Materials

Components

Final Products

Distribution & Sales

Markets

Agriculture
Forestry &
Fishing (A)

Manufacturing
(C)

Manufacturing
(C)

Wholesale
& Retail
Trade (G)

Transport
& Storage
(H)

Admin &
support
service
activities
(N)

Describe by type of
market or industry; use
ISIC divisions

MARKET

MARKET

MARKET

MARKET

Universities &
Education (P)

Utilities (D, E)

Financial and
insurance
activities (K)

Information
and
communication
(J)

Professional,
scientific and
technical
activities (M)

**END MARKETS/
BUYERS &
SUPPORTING
INDUSTRIES**

Data Needed for GVC Analysis

Country-level data on

- 1) Economic activity (industry) of establishments
- 2) Products/services (traded and domestic)
- 3) End buyer markets (for intermediates)
- 4) Supply chain position (input-output flow)
 - Raw materials, intermediates, final products, retail/sales
- 5) Value-adding activities (or business functions), establishments
- 6) Occupations (optional)

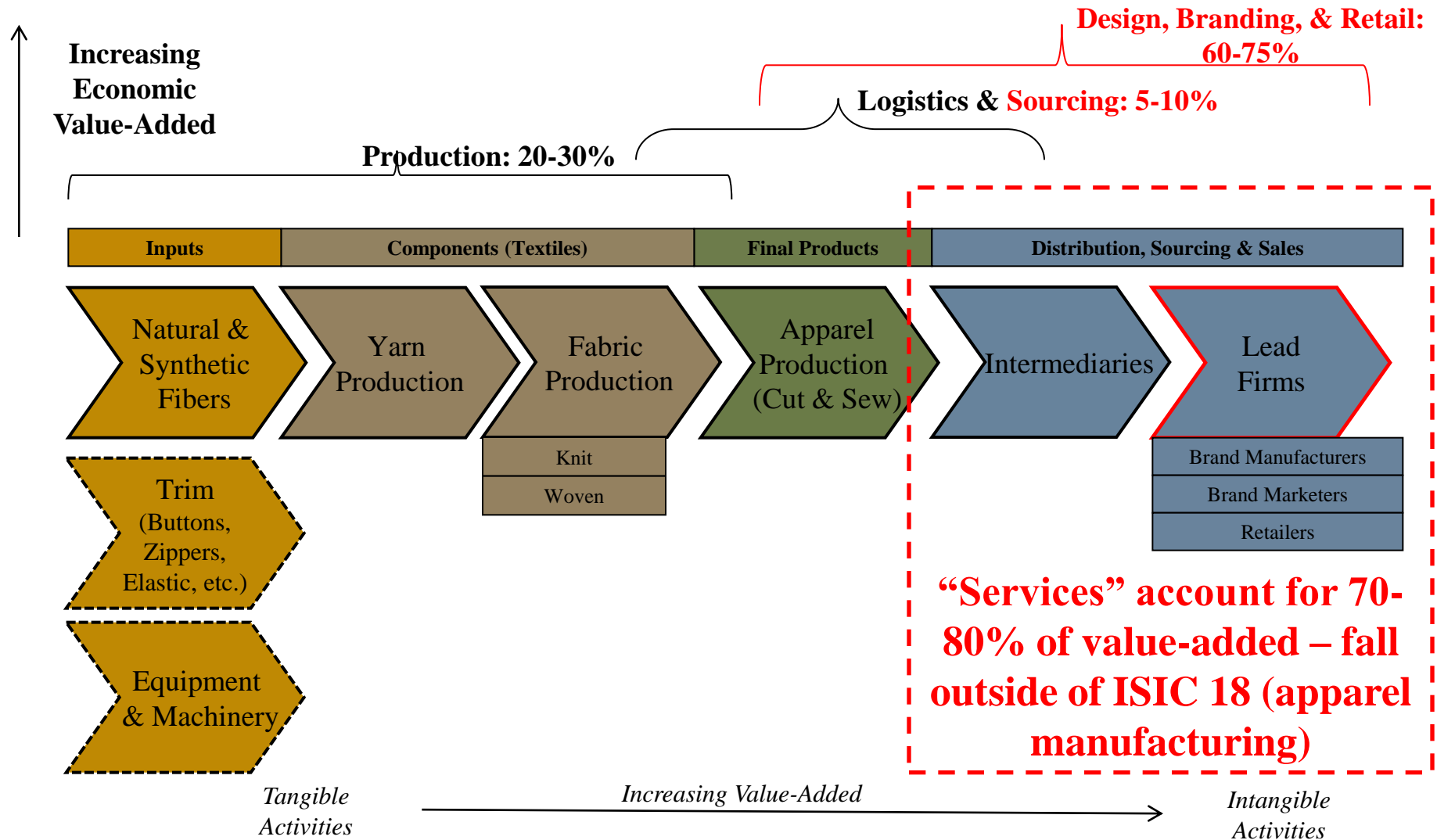
GVC Dimensions:

Current & Proposed Data Sources

GVC Dimensions	Current	Proposed
Input-output structure <ul style="list-style-type: none"> Physical transformation Value-adding activities 	Interviews; secondary lit.	I-O TBLs Business Functions; input categories in I-O TBLs
Geography	Trade data (UN Comtrade)	Business Functions; AMNE
Governance <ul style="list-style-type: none"> Lead Firms Institutions 	Interviews; market reports Interviews; secondary lit.	Requires <i>firm-specific</i> data (not focus for this presentation)
Industry Stakeholders		National I-O & annual surveys
Upgrading <ul style="list-style-type: none"> Functional Linkages End markets 	Interviews; secondary lit. Interviews; secondary lit. Interviews; secondary lit.	Business Functions TiVA; DCE; I-O TBLs Trade data + I-O TBLs; BTDIxE (using EUC)
<ul style="list-style-type: none"> Products 	Trade data	--

Objective: Quantifying or finding ways to measure “qualitative” analysis.

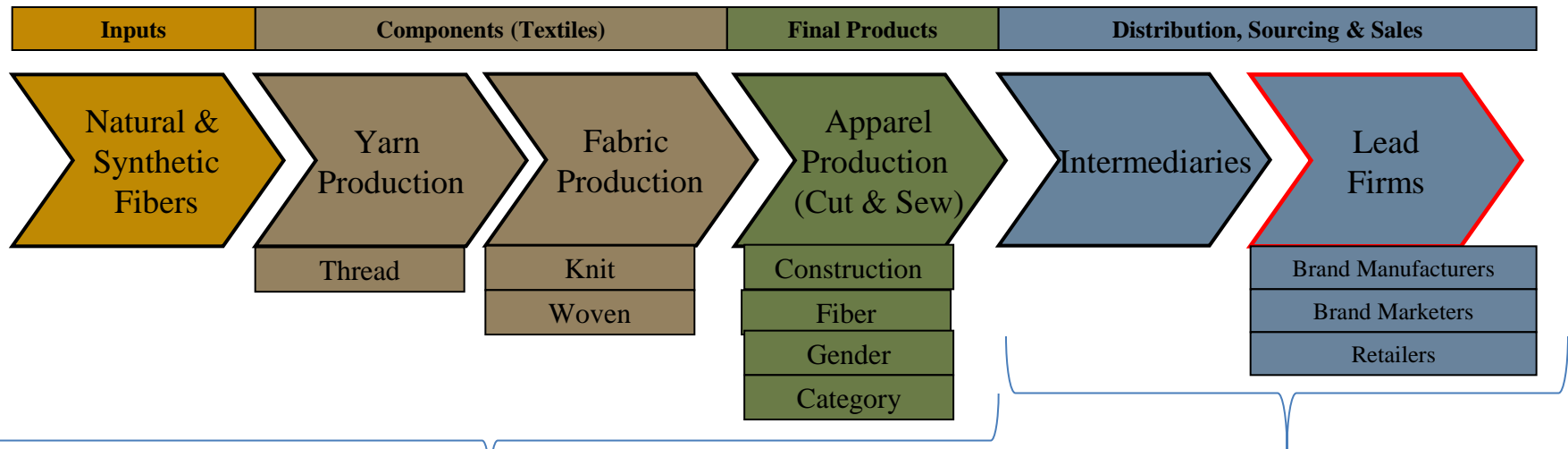
Apparel Value Chain



Red indicates highest value-added activities + control/power over the chain

Percentages represent relative shares of apparel retail selling price attributed to value-adding activities

Detail needed to achieve minimum categories

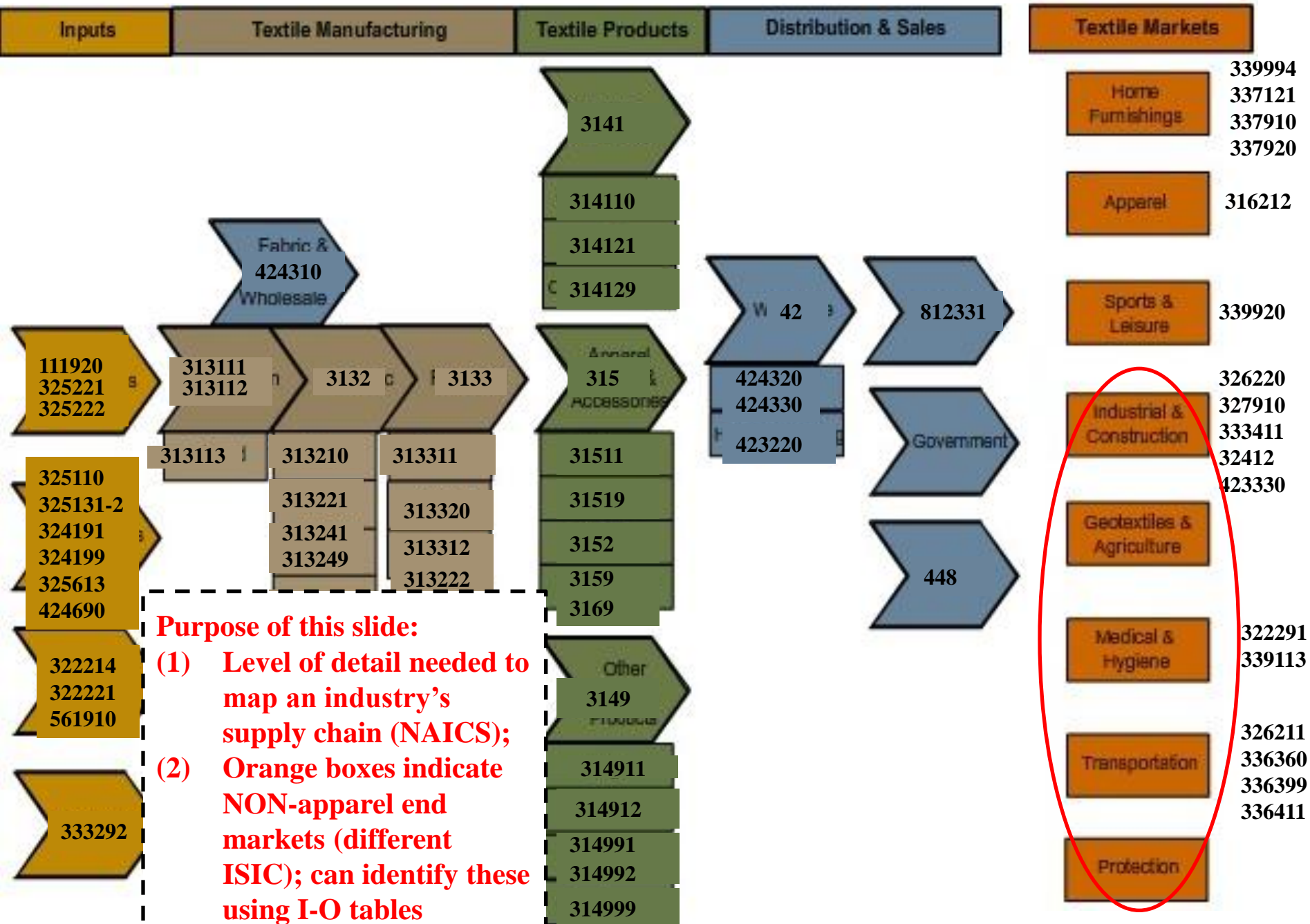


Level of detail needed can be reached by using **6-digit HS codes or potentially 6-digit NAICS** (more detailed extension of ISIC). However required significant re-categorizing.

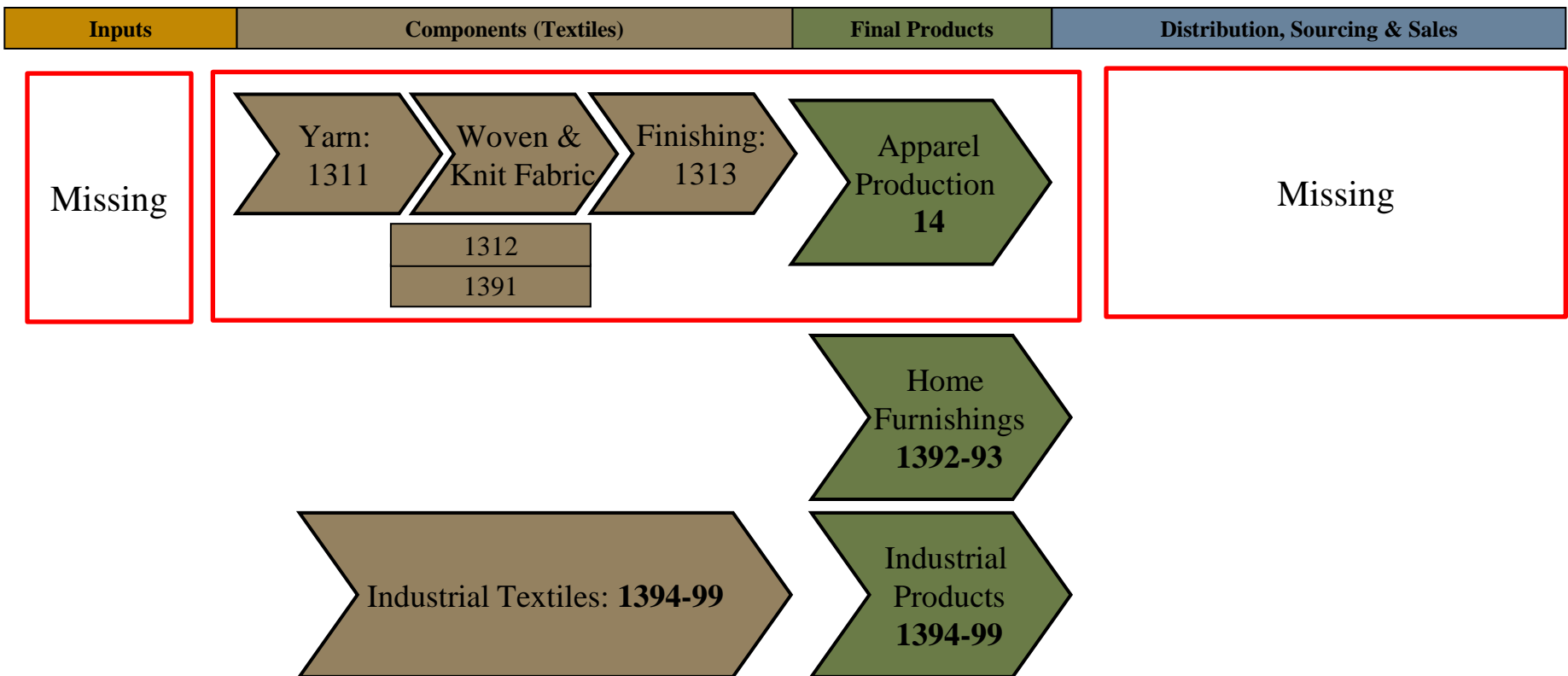
Lead firms are either labeled as manufacturers even if they don't manufacture, or are labeled as generic "wholesale" or "retail"

Example with NAICS codes for textiles

Apparel VC-ISIC Example



Best categorization possible with ISIC

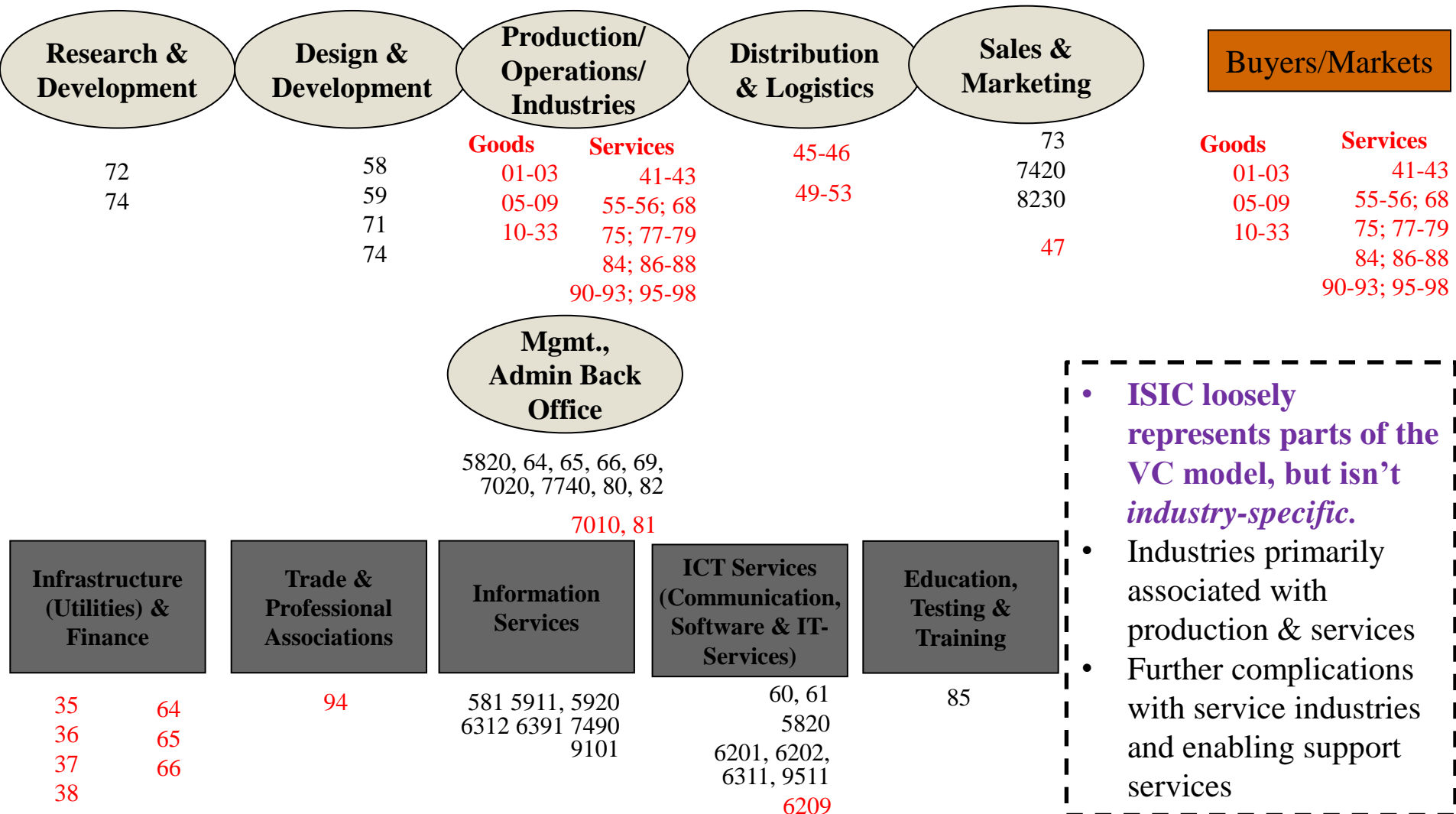


Even the best possible categorizations using ISIC do not provide adequate detail.

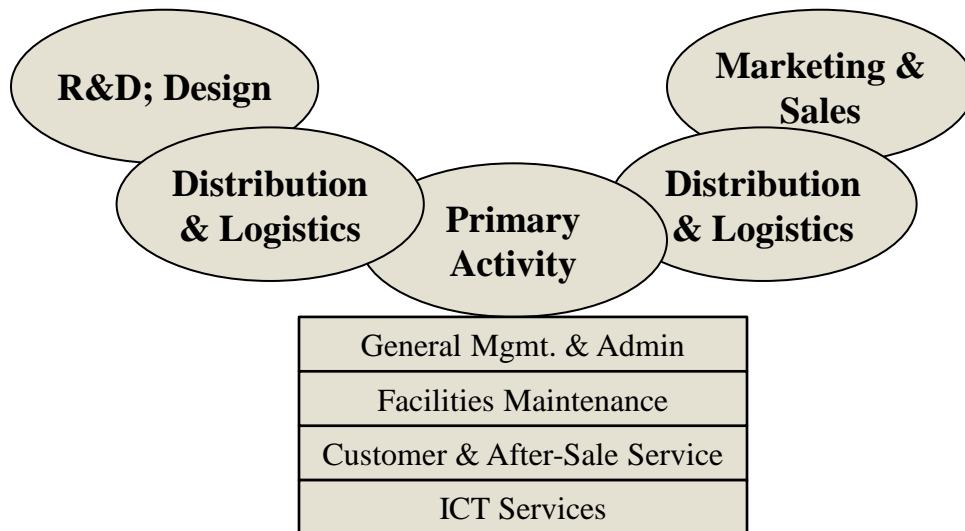
Textile components are grouped with final products and knit fabric classified at 3-digit level with non-apparel end-uses (and was not separated from knit apparel in ISIC Rev. 3). Also not a connection to upstream and more importantly, downstream segments.

Value Chain Model correlated to ISIC:

Value-Adding Activities & Supporting Industries



Business Functions & Organizational Decision Matrix in GVCs



Location/ Organization	Domestic	International
Internal	Make –domestic (in-house) (<i>national surveys</i>)	Make – offshore (FDI) (<i>AMNE</i>)
External	Outsource – domestic (<i>I-O TBLs</i>)	Outsource – offshore (<i>trade data</i>)

- Business function classification
 - 8 activities
 - 1 core + 7 supporting
 - Visual separates activities that relate to “value-adding activities”
- For any of the business functions, a company makes two choices, leading to four potential outcomes
 - Make or buy
 - Domestic or offshore
- *Parenthesis indicate supplemental data sources*

Business Functions

- Business function surveys are asking the right questions, but usefulness depends on ability to link to other classification systems
- Business function results need to be able to be linked to ISIC or CPC
- As such, they will provide data on *where* value-adding activities take place (domestic or offshore) and *how* buyers set up organizational models (make or buy)
- Without links to industries, not a clear way to link data to industry-specific GVC studies

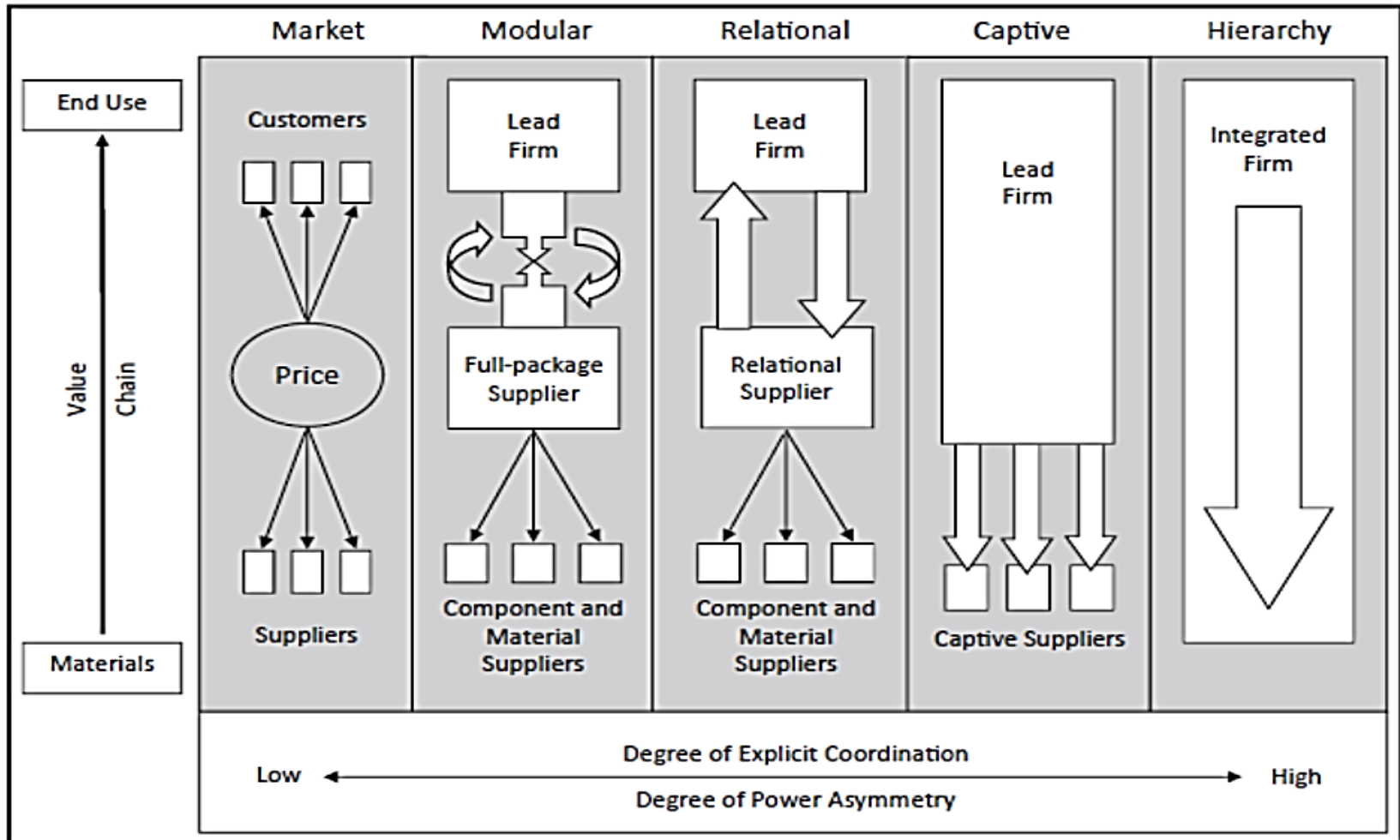
Conclusions for GVC-ISIC comparison

- New datasets offer improvements to filling data gaps for GVC analysis
- Still need more detailed data and ability to link data *along* a chain and to other classification systems in more detail for GVC studies
- Usefulness of data will depend on ability to provide more *industry*-specific data and how business functions linked to ISIC

GVC Case Study Examples

- Governance Typologies
- Costa Rican Medical Devices
- Mexico GVC and Clusters Study (new)
- U.S. Value Chains and Jobs

Five types of global value chain governance



Dynamics in Global Value Chain Governance

Gover nance Ty p e	Co mp lexity of tra nsac ti ons	A bili ty to co di fy tra nsac ti ons	Ca p abil ities in the suppl y- base
Mar ke t	Low	High	High
Modu la r	① High ②	High	High
Relat ion al	High	③ Low ④	⑤ High ⑥
Captive	High	High	Low
Hierarchy	High	Low	Low

① increasing complexity of transactions (harder to codify transactions; effective decrease in supplier competence)

② decreasing complexity of transactions (easier to codify transactions; effective increase in supplier competence)

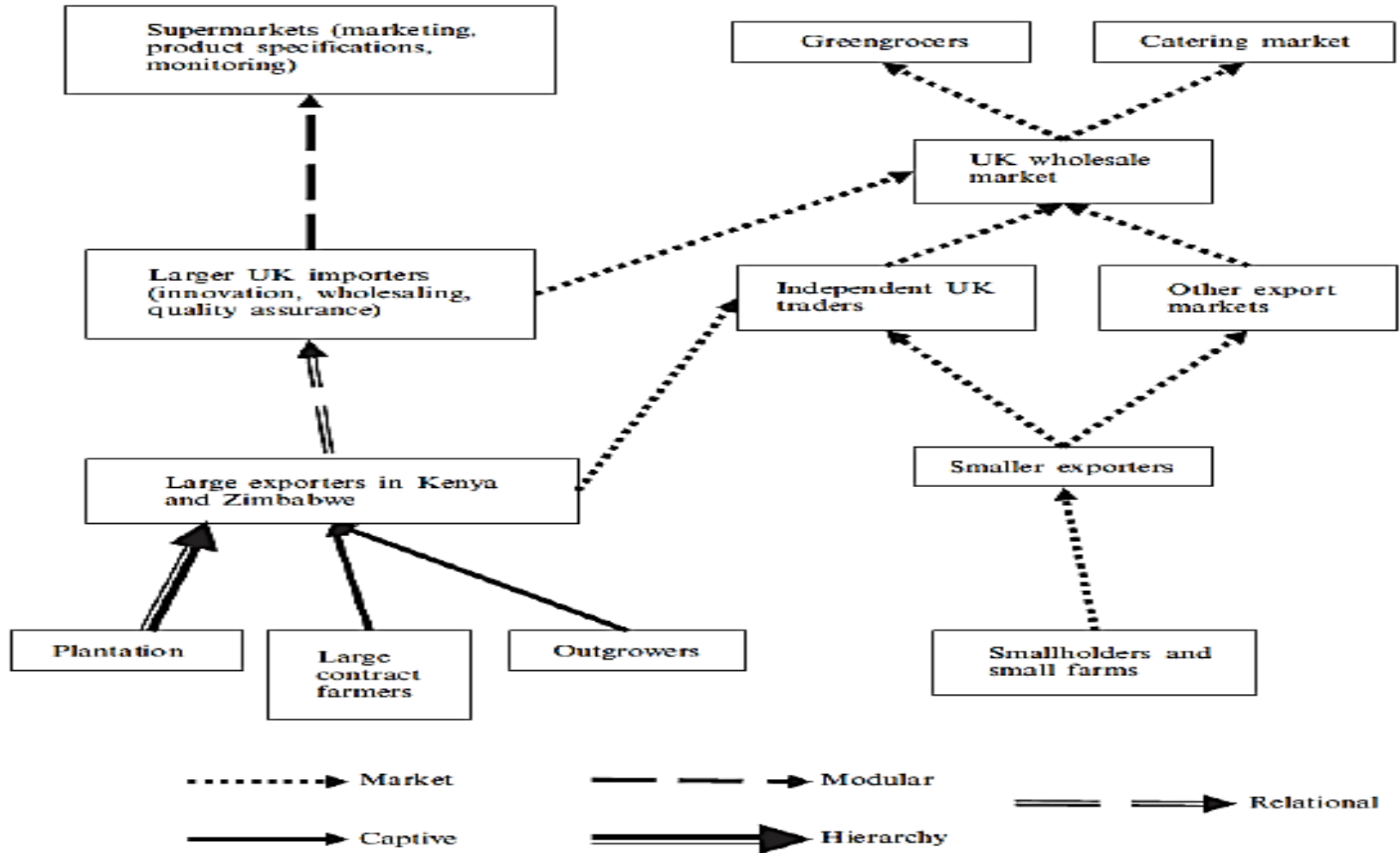
③ better codification of transactions (open or de facto standards, computerization)

④ de-codification of transactions (technological change, new products, new processes)

⑤ increasing supplier competence (decreased complexity, better codification, learning)

⑥ decreasing supplier competence. (increased complexity, new technologies, new entrants)

GVCs in fresh vegetables sector (from Africa to UK)



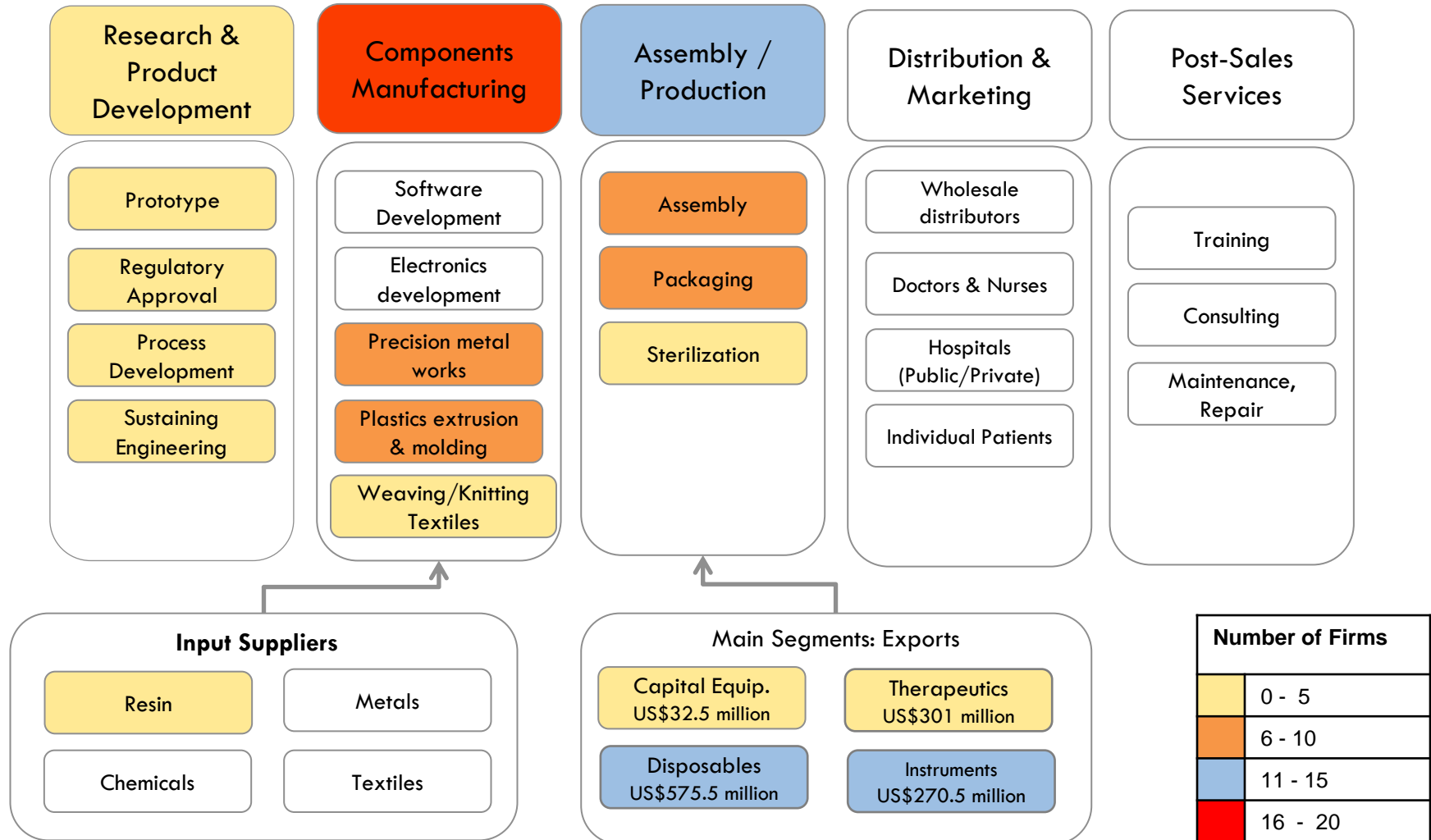
Source: Dolan and Humphrey [2004]

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COSTA RICA'S MEDICAL DEVICES GVC

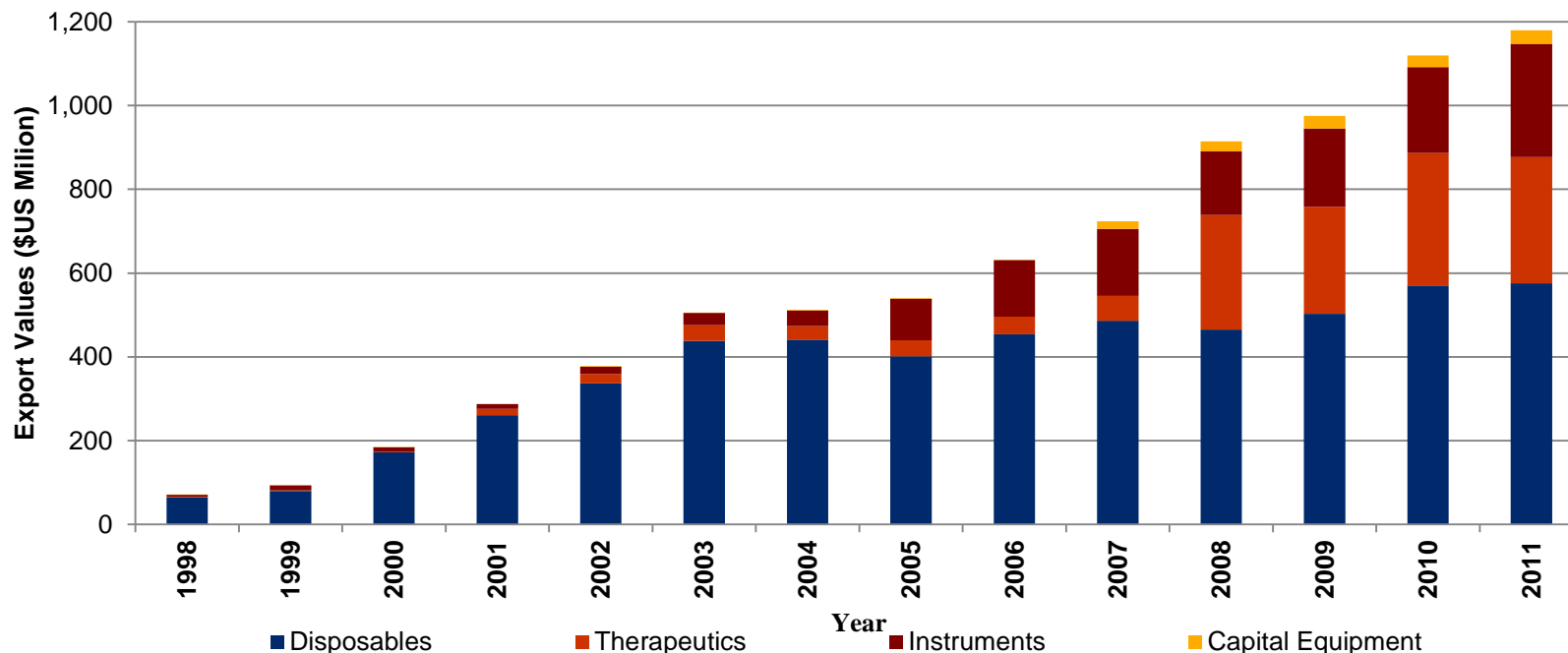
COSTA RICA IN THE MEDICAL DEVICES GVC



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

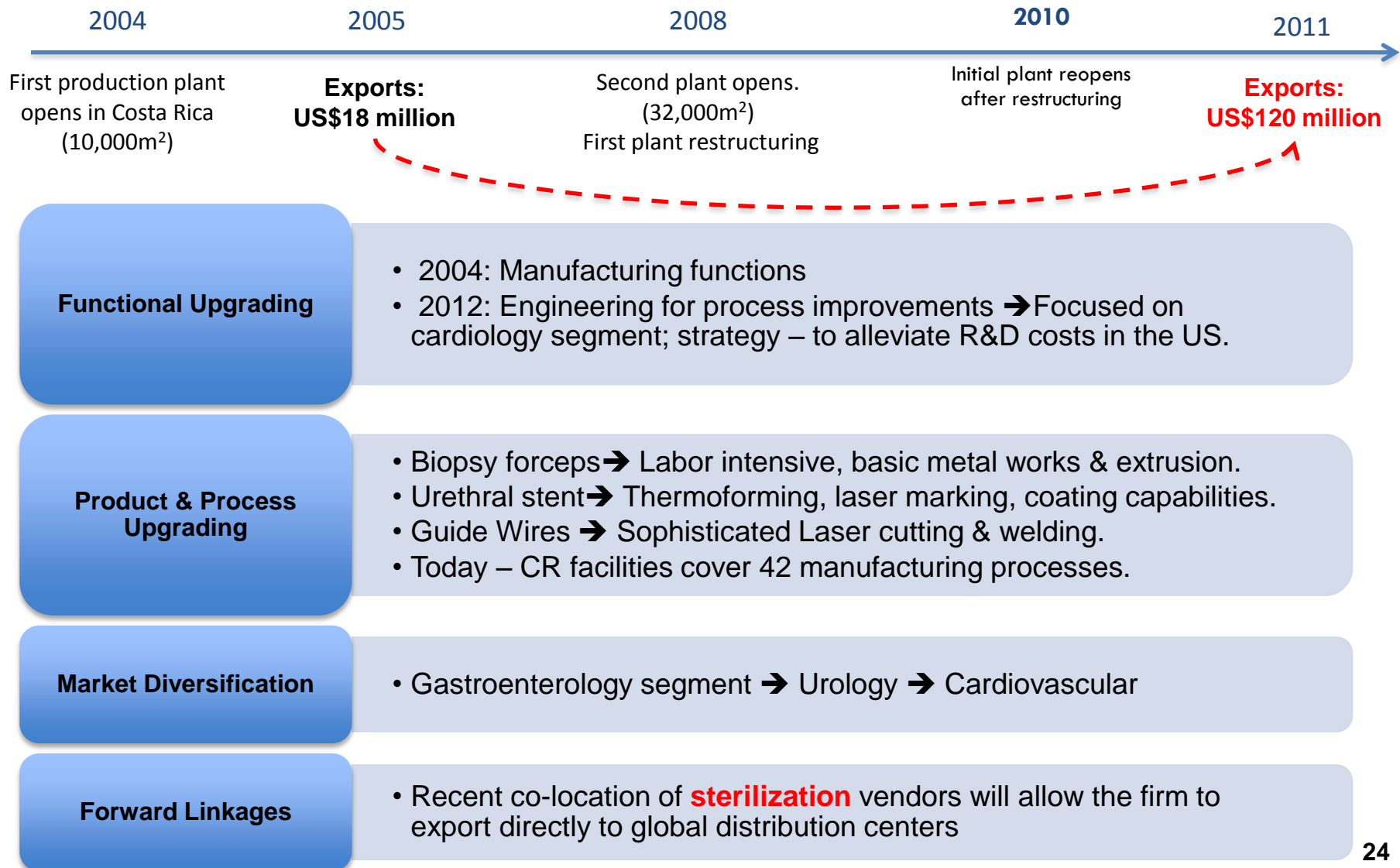


- **Disposables** still the largest product category exported, but no longer a strong growth area.
- Exports in **surgical instruments** have grown steadily since 2005.
- **Therapeutics** has become 2nd largest category since 2008; likely to increase as newly established firms complete transfer of new product lines.
- Limited export of highest value **capital equipment** (eg. Electronic/software devices)

FIRMS IN COSTA RICA MEDICAL DEVICES SECTOR

Entry Year	Firm Characteristics	Main Product Export Category	Core Market Segments	Product Examples	Select Firms
Up to 2000 24 firms: 8 US 15 CR 1 German	4 OEMs 8 Components 1 Input distributor 7 Packaging 1 Finishing 3 Support services	Disposables	Drug delivery; Women's health	Intravenous tubing (I) Mastectomy bra (I)	Hospira; Baxter; Amoena; Corbel
2001–2004 13 firms: 9 US 3 CR 1 Colombian	3 OEMS 6 Components 1 Finishing 1 Logistics provider 2 Support services	Instruments	Endoscopic surgery	Biopsy forceps (II)	Arthrocare; Boston Scientific; Ober Industries
2005–2008 8 firms: 7 US 1 Puerto Rico	2 OEM 4 Components 1 Packaging 1 Finishing	Therapeutics	Cosmetic surgery; Women's health & urology	Breast implants (III) Minimally invasive devices for uterine surgery (II)	Allergan; Tegra Medical; Specialty Coating Systems
2009–2012 21 firms: 16 US 1 CR 1 Ireland 1 Japan 2 Joint ventures (US-CR)	5 OEMS 7 Components 2 Non-OEM assemblers 1 Input Distributor 2 Sterilization 2 Packaging	Therapeutics Disposables Instruments	Cardiovascular Drug delivery	Heart valves (III) Dialysis catheters (III) Guide wires (III) Compression socks (I)	Abbott Vascular St. Jude Medical Covidien Moog Synergy Health Volcano Corp.

UPGRADING SUCCESS: A LEADING MEDICAL DEVICES MNC IN COSTA RICA



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MEXICO STUDY ON GVCs AND CLUSTERS

Linking Clusters & GVCs in Mexico to Regional and Global Contexts

Mapping of GVCs across four dimensions for each industry...

Local

- Local clusters

National

- Links to other
states and
clusters in
Mexico

North
America

- Links to
United States
and Canada

Global

- Other
International
linkages

Mexico's Plan Nacional de Desarrollo, 2013-2018

Estrategia Sectorial

Sectores		
Maduros	Dinámicos	Emergentes
<ul style="list-style-type: none">• Metal mecánico• Textil-vestido y cuero-calzado• Madera y muebles• Siderúrgico• Alimentos y bebidas	<ul style="list-style-type: none">• Automotriz y Autoparte• Aeroespacial• Eléctrico• Electrónico• Químico	<ul style="list-style-type: none">• Biotecnología• Farmacéutico• TI• Industrias creativas• Equipo médico
Impulsar la productividad	Incrementar la competitividad	Atraer y fomentar los sectores emergentes

Pilot Study for 3 Mexican GVCs

Objectives: Design the methodology and measure upgrading and innovation (at the level of clusters, firms and jobs)

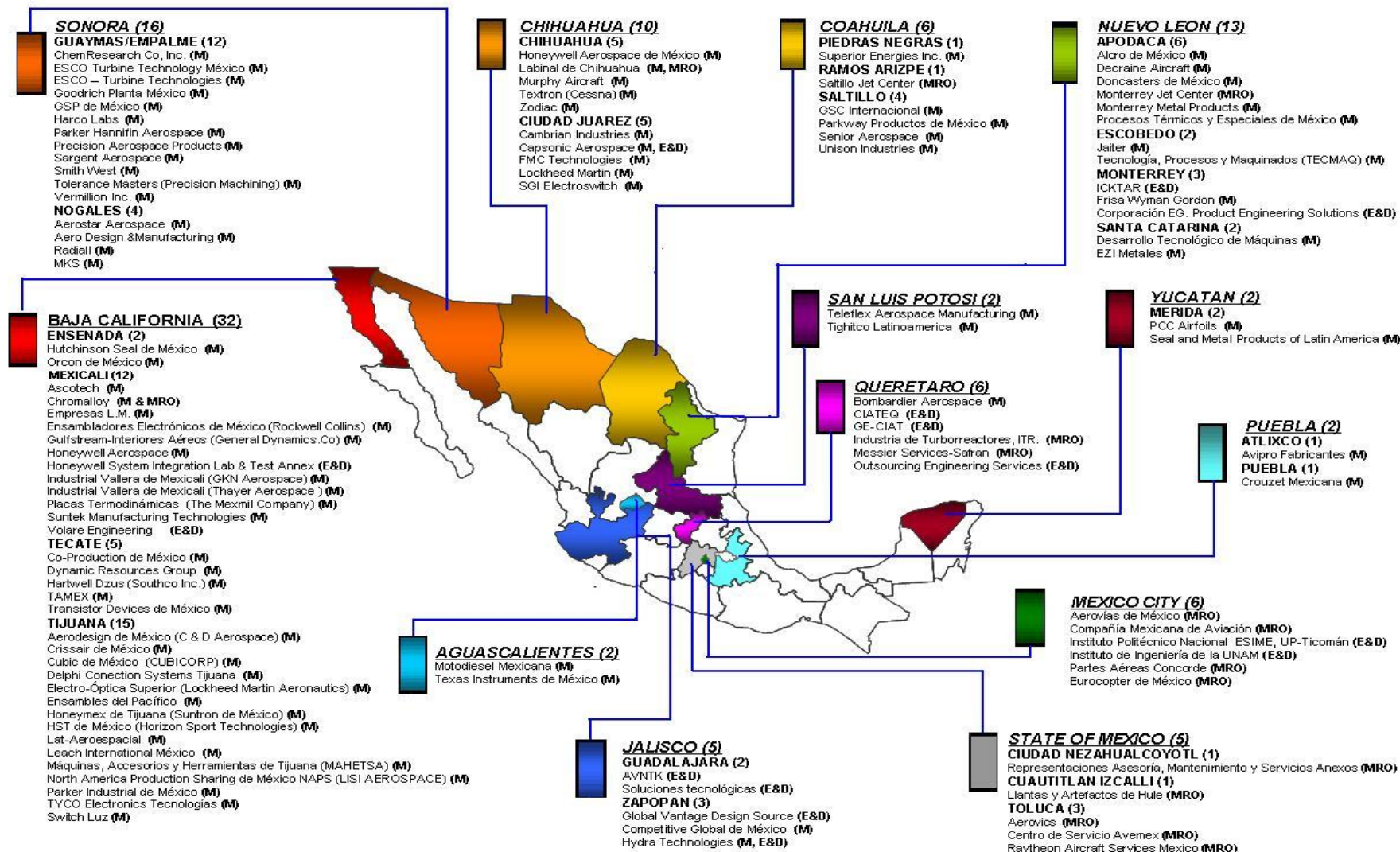
- **Mature Sector**
 - Textile-Apparel Industry
- **Dynamic Sector**
 - Aerospace Industry
- **Emergent Sector**
 - Medical Devices Industry

MEXICAN AERONAUTIC INDUSTRY

(M) Manufacturing

(MRO) Maintenance, Repair and Overhaul

(E&D) Engineering and Design

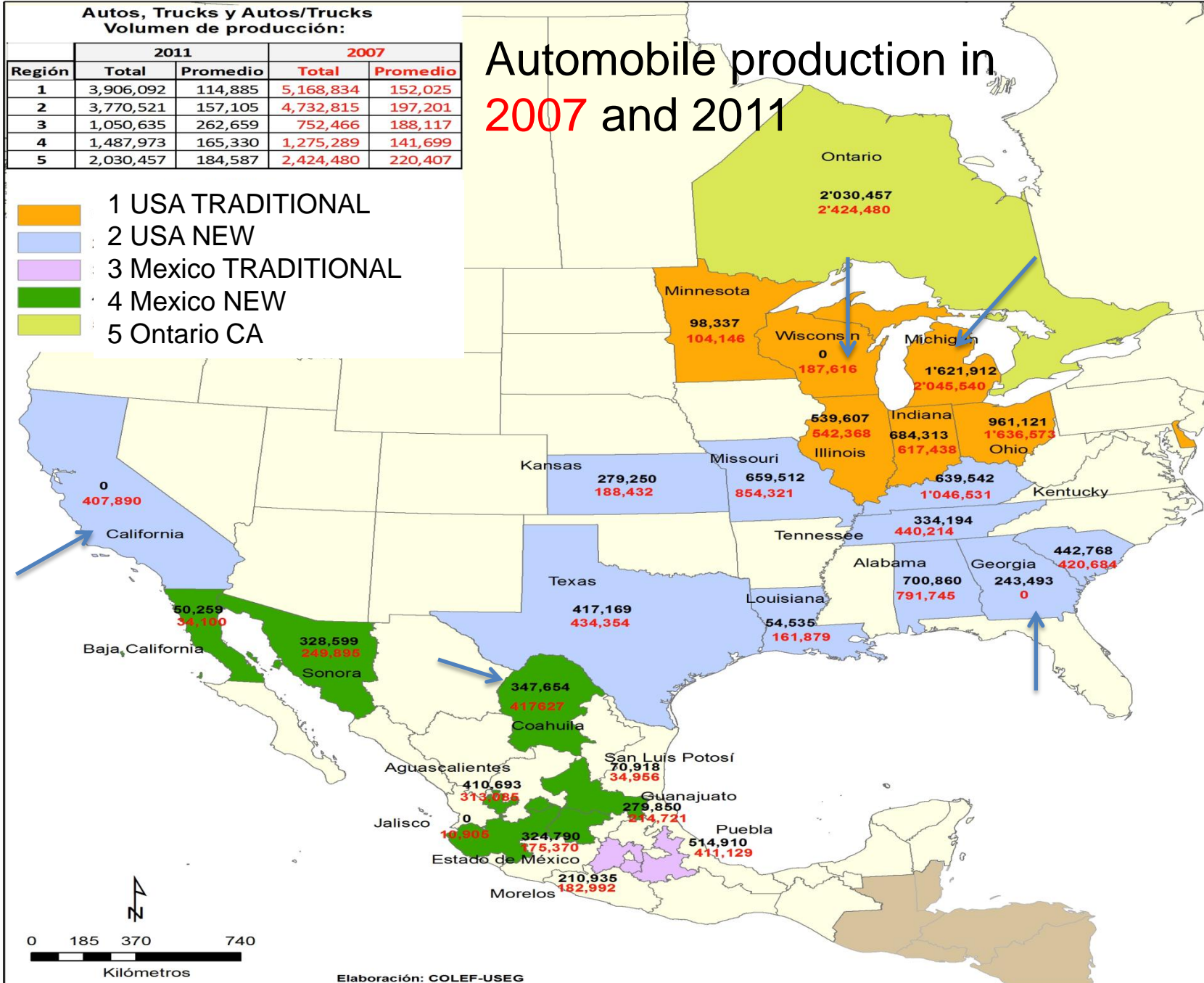


**Autos, Trucks y Autos/Trucks
Volumen de producción:**

Región	2011		2007	
	Total	Promedio	Total	Promedio
1	3,906,092	114,885	5,168,834	152,025
2	3,770,521	157,105	4,732,815	197,201
3	1,050,635	262,659	752,466	188,117
4	1,487,973	165,330	1,275,289	141,699
5	2,030,457	184,587	2,424,480	220,407

- 1 USA TRADITIONAL
- 2 USA NEW
- 3 Mexico TRADITIONAL
- 4 Mexico NEW
- 5 Ontario CA

Automobile production in 2007 and 2011



NC in the Global Economy (NCGE)



- NCGE is a website that provides a web-based value chain analysis of seven key industries in North Carolina
 - Tobacco, textiles & apparel, furniture, IT, biotechnology, banks & finance, hog farming,
- **Goals:** provide useful data and engaging visualizations for better decision making by policy makers, companies and educational institutions leading to more good **jobs** and **innovation**, and improved **competitiveness** in the state

NC Furniture Value Chain - 2012

Pre-production Services

Furniture design & engineering

Employees: 38
Estbm't: 23
Avg. wage: 31,326

Raw Materials & Components

Wood, metal, leather, plastic, glass & rattan

Employees: 6,434
Estbm't: 667
Avg. wage: 35,705

plywood, cut stock, frame & upholstery

Employees: 9,464
Estbm't: 176
Avg. wage: 39,397

Production & Assembly

Household Furniture

Employees: 21,680
Estbm't: 356
Avg. wage: 33,116

Office & Institutional Furniture

Employees: 5,403
Estbm't: 226
Avg. wage: 35,441

Furniture related products

Employees: 5,981
Estbm't: 338
Avg. wage: 37,431

Distribution

Furniture Transportation

Employees: 36,633
Estbm't: 3,043
Avg. wage: 41,679

Furniture Warehousing

Employees: 17,800
Estbm't: 414
Avg. wage: 39,675

Furniture Wholesale

Employees: 2,531
Estbm't: 247
Avg. wage: 46,100

Retail

Furniture Stores

Employees: 7,596
Estbm't: 895
Avg. wage: 33,803

Employees: 319
Estbm't: 88
Avg. wage: 69,042

Employees: 15,898
Estbm't: 843
Avg. wage: 37,903

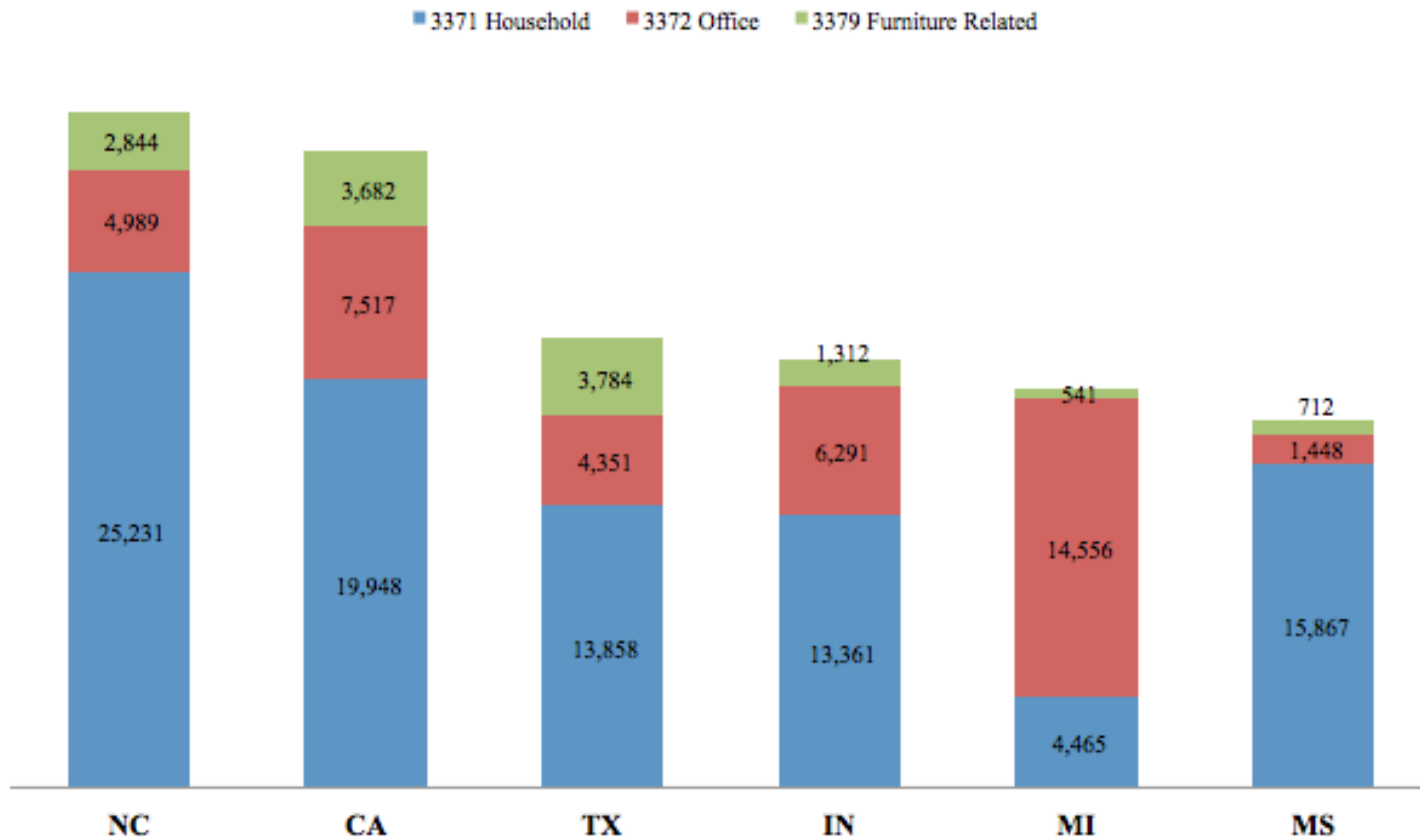
Employees: 33,064
Estbm't: 920
Avg. wage: 34,276

Employees: 59,964
Estbm't: 3,704
Avg. wage: 41,249

Employees: 7,596
Estbm't: 895
Avg. wage: 33,803

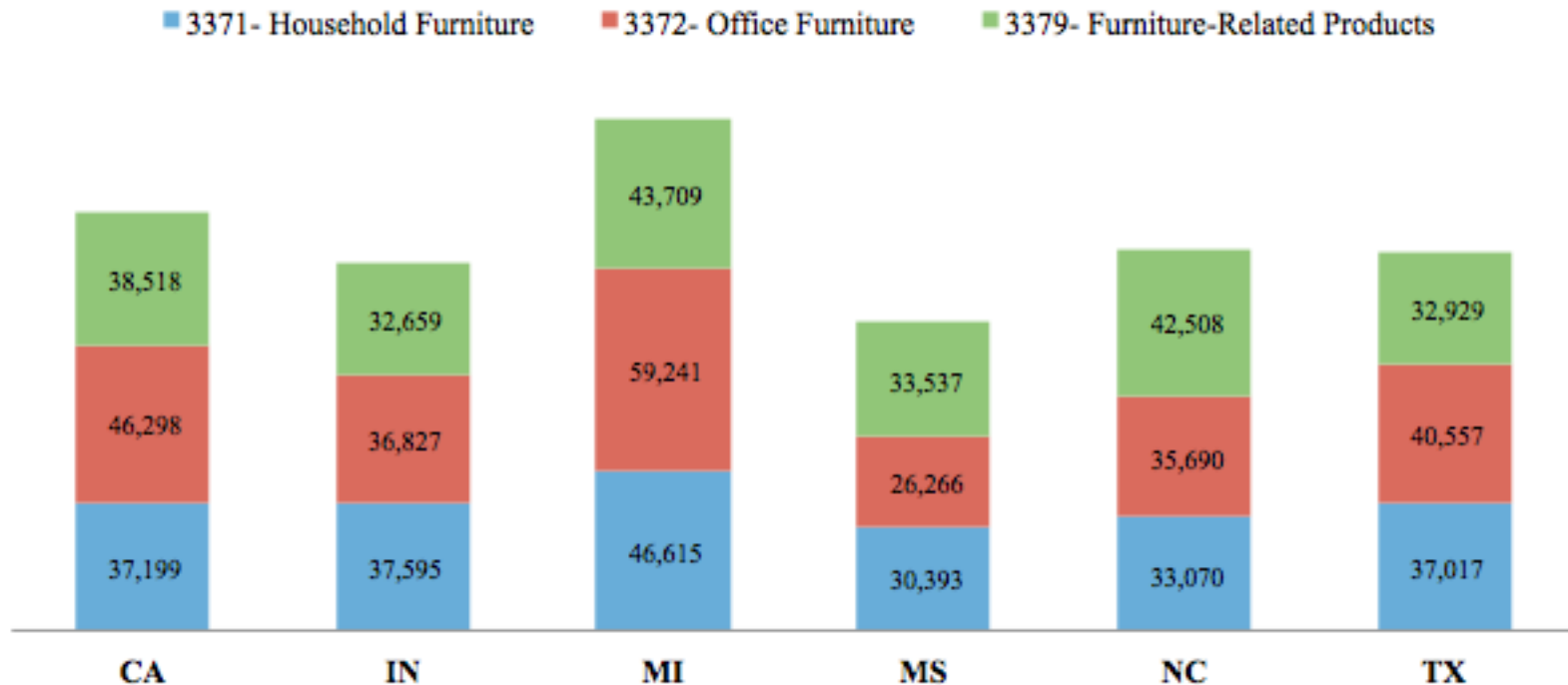
Comparing NC's employment with main US competitors

Top State Furniture Employment, by NAICS Codes: 2012



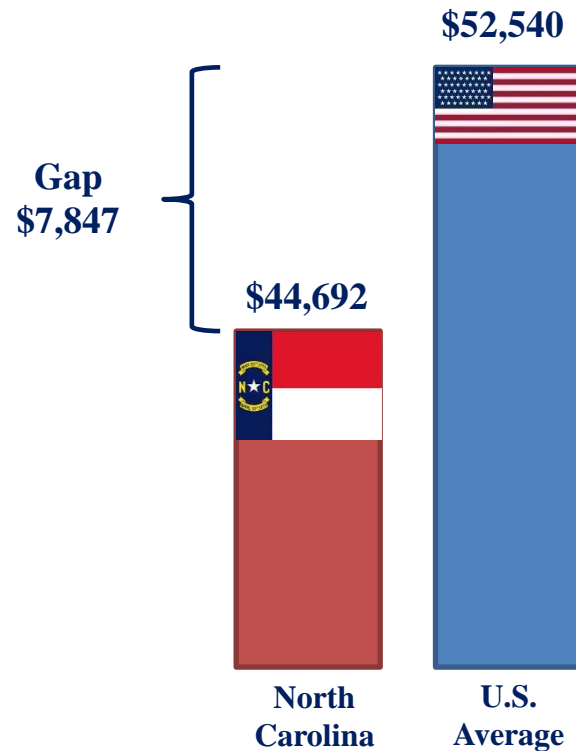
Comparing NC wages with main US competitors

**Top Furniture State Average Annual Wages,
by NAICS Code: 2012**



Manufacturing workers in North Carolina make, on average, nearly \$8,000 less than the U.S. average

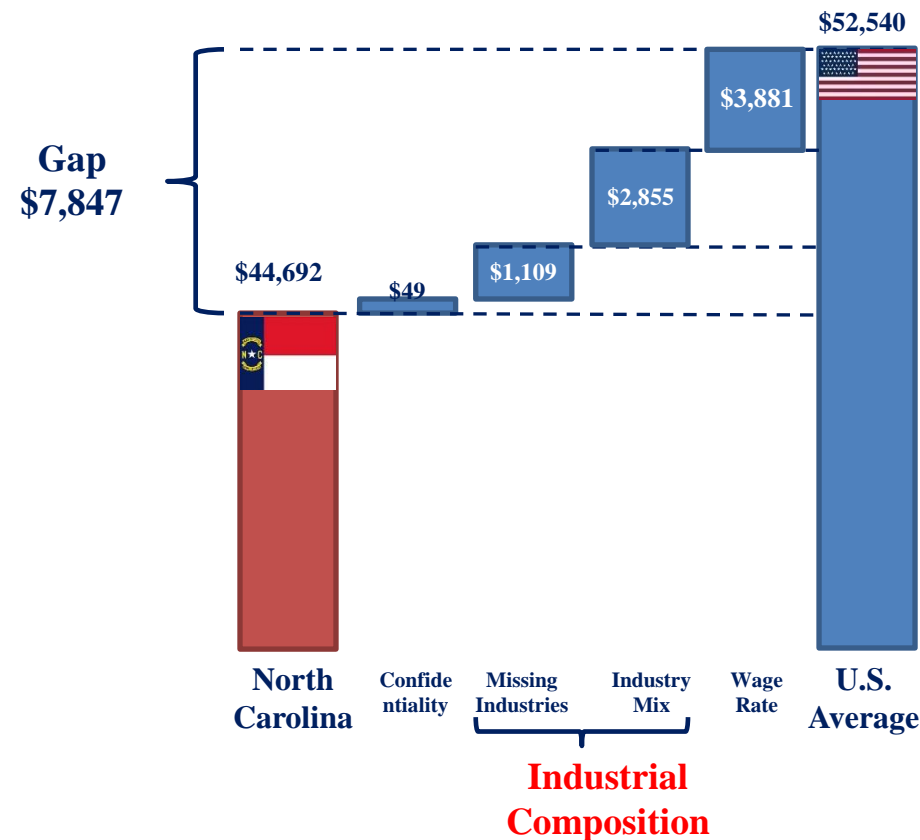
Manufacturing Wages in North Carolina Compared to the National Average



Data: US Census Bureau, Annual Survey of Manufacturing, 2011.
Authors' calculations.

Sources of North Carolina's Manufacturing Wage Gap

Source of Gap between Manufacturing Wages in North Carolina and National Average



Broadly, there are **three sources** for North Carolina's manufacturing wage gap:

1. Lower share of employment in high wage industries
2. Greater share of employment in low-wage industries
3. Lower average wage for seemingly similar industries

Data: US Census Bureau, Annual Survey of Manufacturing, 2011.
Authors' calculations.

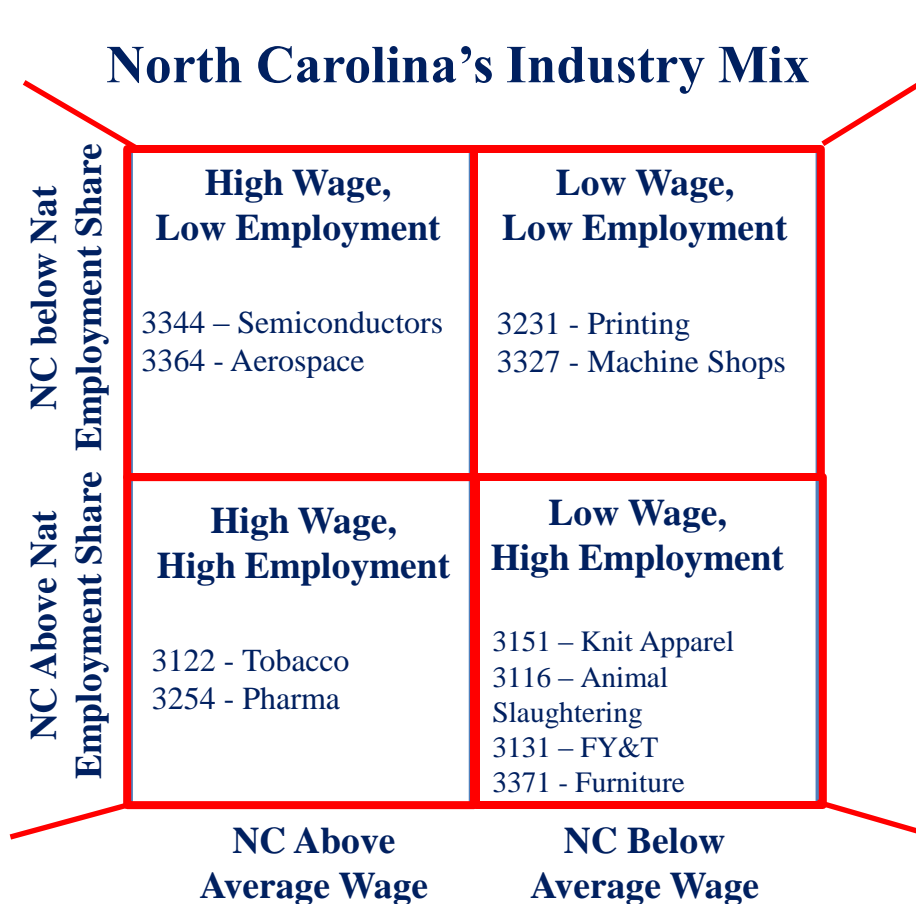
NC's Potential Upgrading Strategies

Future Growth

- 8.4% of employment
- NC often has numerous scattered firms, but no well defined cluster

Strengthen

- 12.3% of employment
- Existing strengths
- High R&D
- Fill technology gaps or cross-chain upgrading



Localized

- 36.5% of employment
- Minimal scope for specialization or upgrading

Transition

- 42.9% of employment
- NC's traditional mfg. strengths
- Generally low tech
- Upgrade or mitigate decline

Data: US Census Bureau, Annual Survey of Manufacturing, 2011.
Authors' calculations.

Policy Relevance of GVC Sector Profiles

- Closing North Carolina's manufacturing wage gap could significantly improve wages and the standard of living in North Carolina
- Higher productivity is the key to doing this, but also a need to improve NC's industry mix and high wage jobs
- Upgrading strategies are needed to define NC's investment, employment and innovation priorities
- Intra-U.S. comparisons are relevant, but GVC competitiveness is increasingly defined at the regional level (e.g., North America, East Asia, EU)



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THANK YOU

Questions?