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
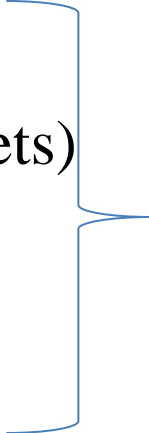September 29-Oct. 1, 2014
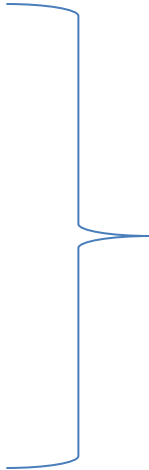Aguascalientes, Mexico

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

Research & Development

Design & Development

Production/ Operations

Distribution & Logistics

Sales & Marketing

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)

Mining & Quarrying (B)

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

Source: Frederick, S. (2014). Represents ISIC 4 sections

Data Needed for GVC Analysis

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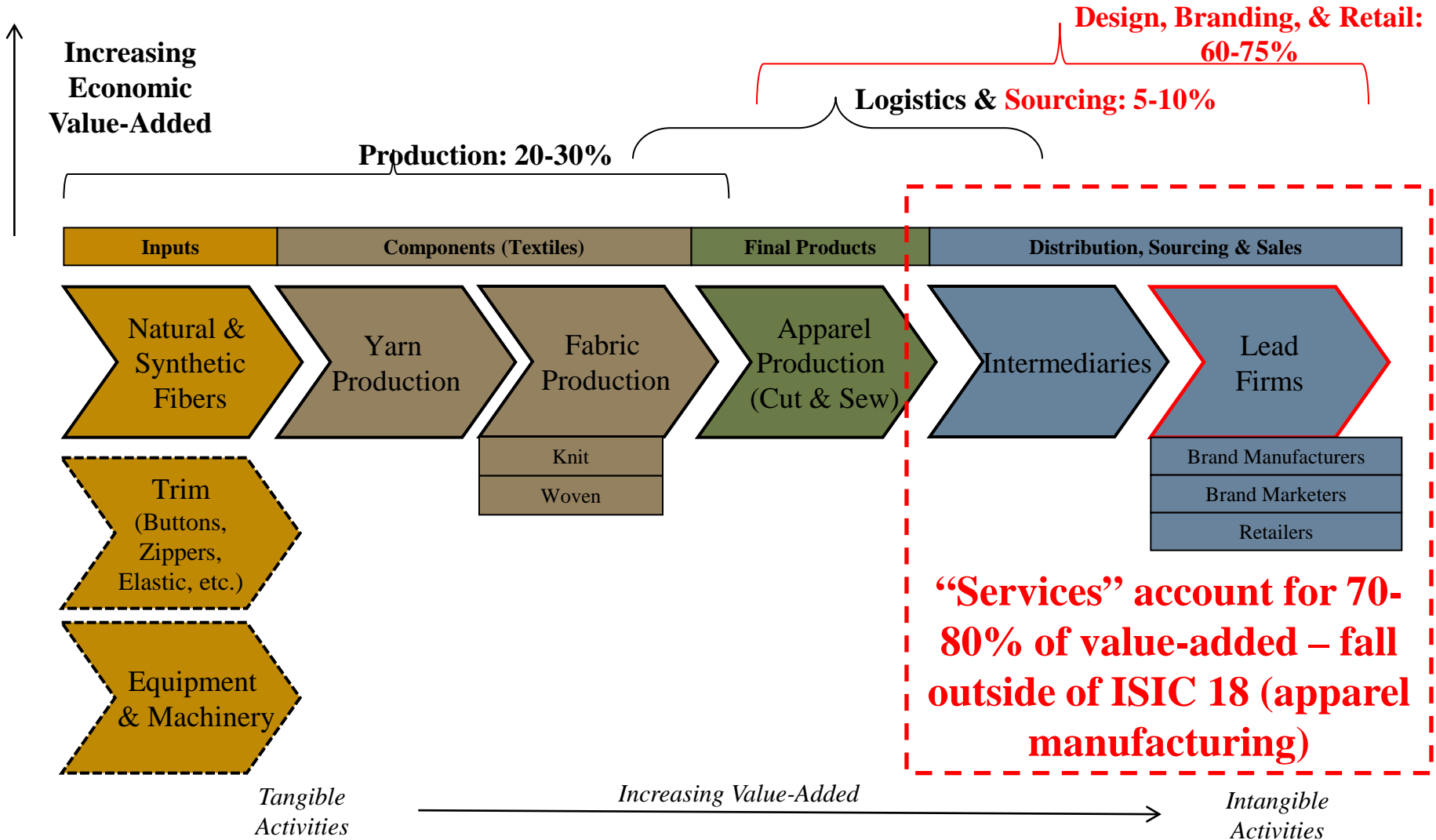
1) Economic activity (industry) of establishments
2) Products/services (traded and domestic)
3) End buyer markets (for intermediates)
4) Supply chain position (input-output flow)
   - Raw materials, intermediates, final products, retail/sales
5) Value-adding activities (or business functions), establishments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

GVC Dimensions:
Current & Proposed Data Sources

GVC Dimensions	Current	Proposed
Input-output structure • 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 • Lead Firms • Institutions	Interviews; market reports Interviews; secondary lit.	Requires *firm-specific* data (not focus for this presentation)
Industry Stakeholders		National I-O & annual surveys
Upgrading • Functional • Linkages • End markets • Products	Interviews; secondary lit. Interviews; secondary lit. Interviews; secondary lit. Trade data	Business Functions TiVA; DCE; I-O TBLs Trade data + I-O TBLs; BTDIxE (using EUC) --

Objective: Quantifying or finding ways to measure "qualitative" analysis.

Apparel Value Chain

Design, Branding, & Retail: 60-75%

Increasing Economic Value-Added

Logistics & Sourcing: 5-10%

Production: 20-30%

| Inputs | Components (Textiles) | | Final Products | Distribution, Sourcing & Sales | |

Natural & Synthetic Fibers → Yarn Production → Fabric Production → Apparel Production (Cut & Sew) → Intermediaries → Lead Firms

Knit
Woven

Trim (Buttons, Zippers, Elastic, etc.)

Equipment & Machinery

Brand Manufacturers
Brand Marketers
Retailers

"Services" account for 70-80% of value-added – fall outside of ISIC 18 (apparel manufacturing)

Tangible Activities   *Increasing Value-Added*   *Intangible Activities*

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

Inputs	Components (Textiles)	Final Products	Distribution, Sourcing & Sales

Natural & Synthetic Fibers → Yarn Production → Fabric Production → Apparel Production (Cut & Sew) → Intermediaries → Lead Firms

Yarn Production
- Thread

Fabric Production
- Knit
- Woven

Apparel Production (Cut & Sew)
- Construction
- Fiber
- Gender
- Category

Lead Firms
- Brand Manufacturers
- Brand Marketers
- Retailers

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

| Inputs | Textile Manufacturing | Textile Products | Distribution & Sales | Textile Markets |

Inputs:
- 111920
- 325221
- 325222

- 325110
- 325131-2
- 324191
- 324199
- 325613
- 424690

- 322214
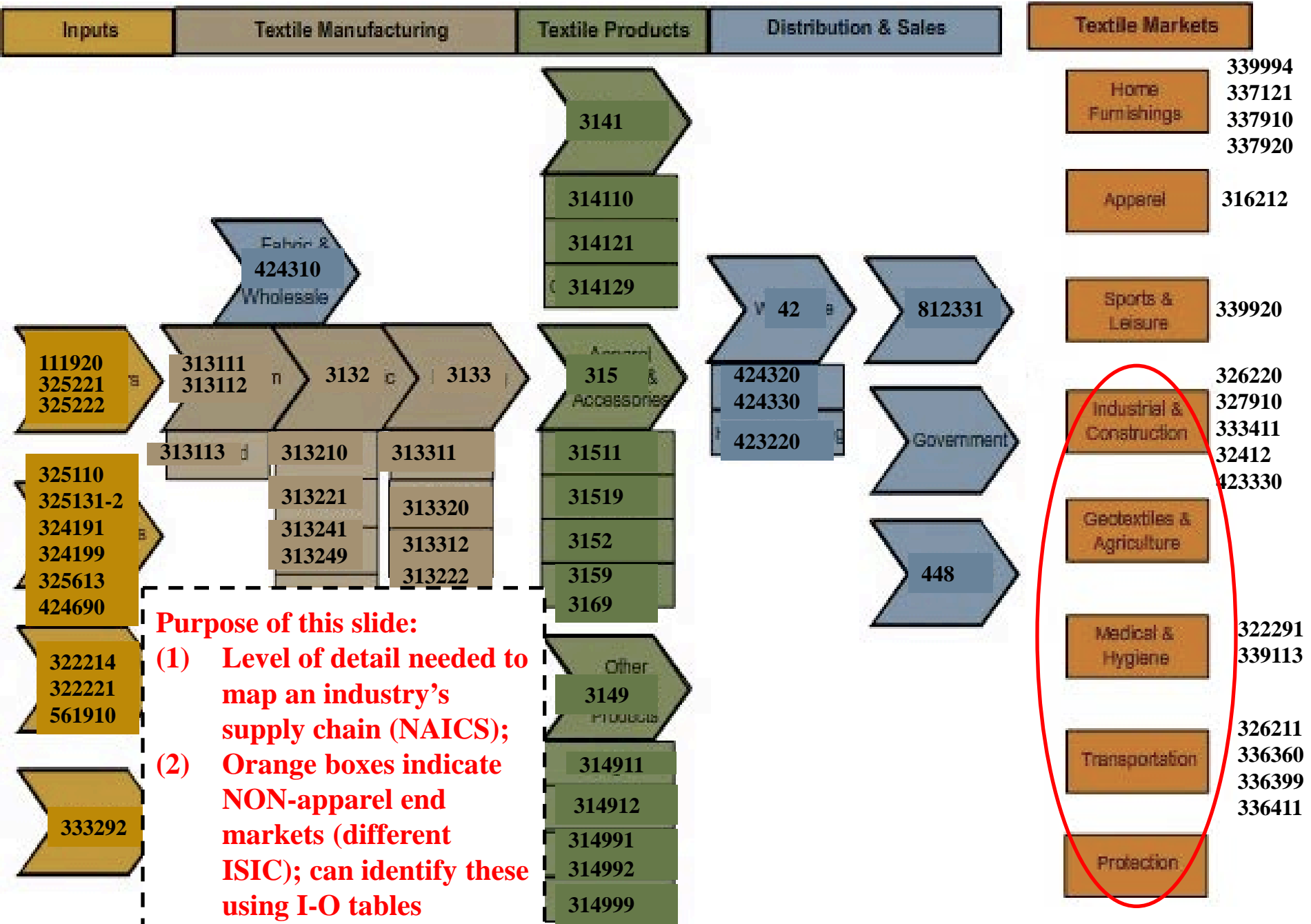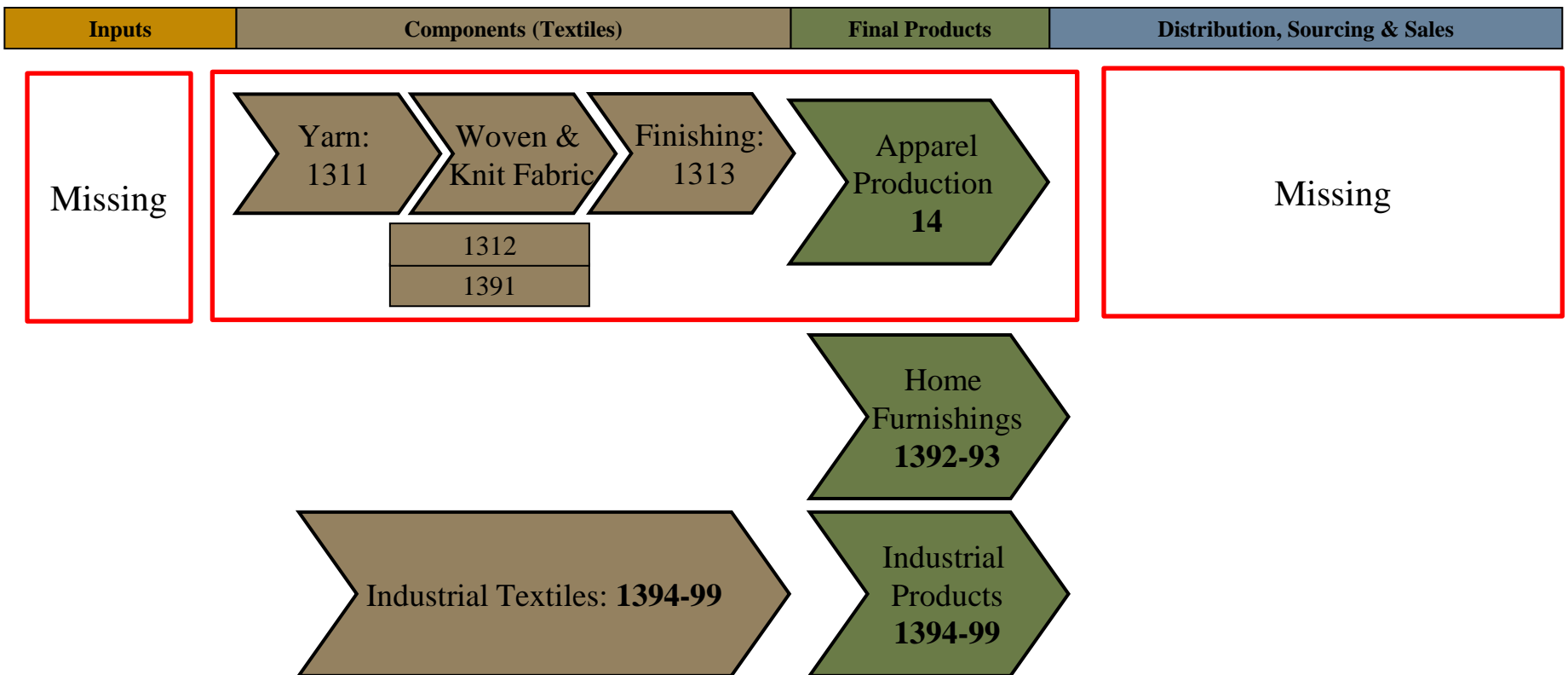- 322221
- 561910

- 333292

Textile Manufacturing:

Fabric & 424310 Wholesale

- 313111
- 313112
- 3132
- 3133
- 313113
- 313210
- 313311
- 313221
- 313241
- 313249
- 313320
- 313312
- 313222

Textile Products:

- 3141
- 314110
- 314121
- 314129

Apparel 315 & Accessories
- 31511
- 31519
- 3152
- 3159
- 3169

Other Products
- 3149
- 314911
- 314912
- 314991
- 314992
- 314999

Distribution & Sales:

- 42
- 424320
- 424330
- 423220
- 812331
- Government
- 448

Textile Markets:

- Home Furnishings — 339994, 337121, 337910, 337920
- Apparel — 316212
- Sports & Leisure — 339920
- Industrial & Construction — 326220, 327910, 333411, 32412, 423330
- Geotextiles & Agriculture
- Medical & Hygiene — 322291, 339113
- Transportation — 326211, 336360, 336399, 336411
- Protection

Purpose of this slide:
(1) Level of detail needed to map an industry's supply chain (NAICS);
(2) Orange boxes indicate NON-apparel end markets (different ISIC); can identify these using I-O tables

Best categorization possible with ISIC

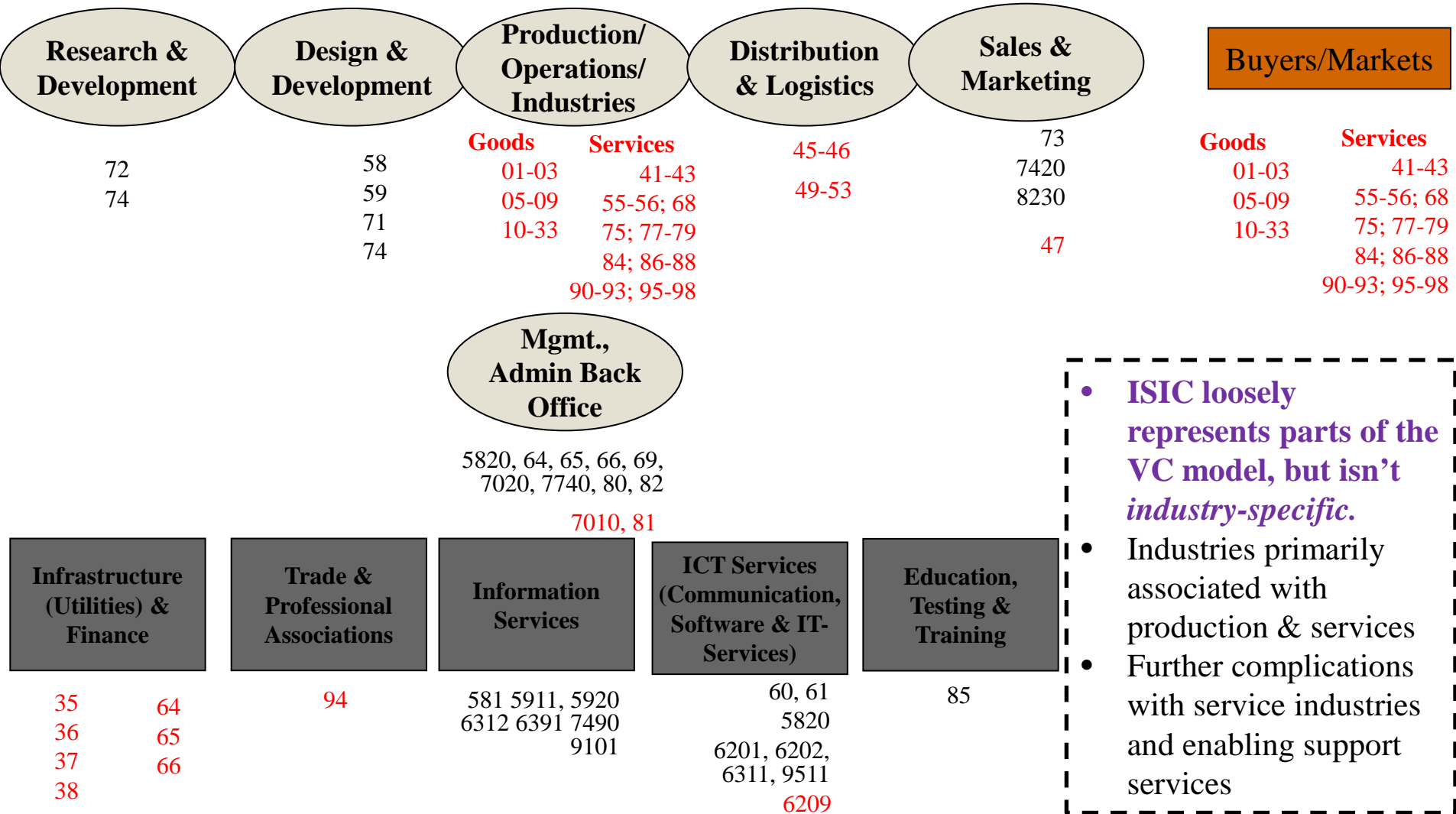| Inputs	Components (Textiles)	Final Products	Distribution, Sourcing & Sales

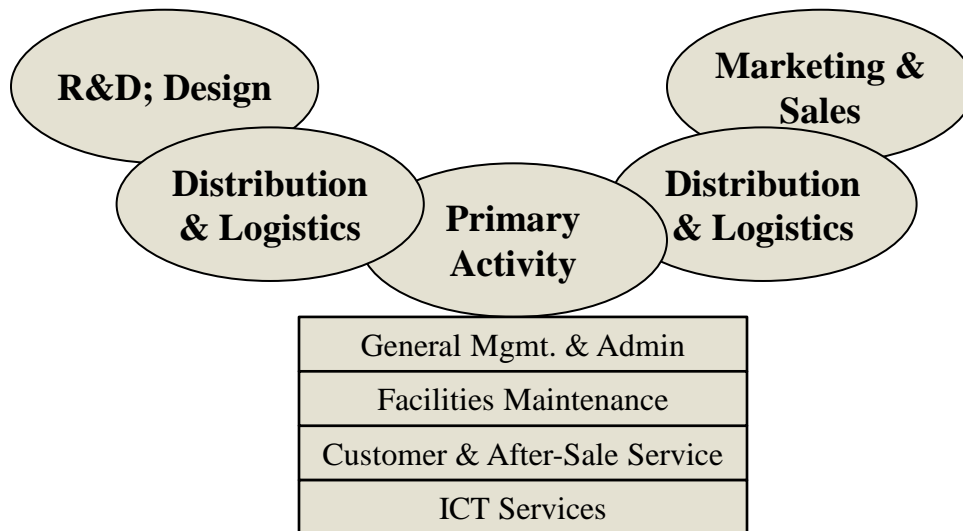**Even the best possible categorizations using ISIC do not provide adequate detail.**
Textile components are grouped with final products and knit fabric classified at 3-digit level with non-apparel end-uses (and was not separated from knit apparel in ISIC Rev. 3). Also not a connection to upstream and more importantly, downstream segments.

Value Chain Model correlated to ISIC:
Value-Adding Activities & Supporting Industries

Research & Development

72
74

Design & Development

58
59
71
74

Production/ Operations/ Industries

Goods	Services
01-03	41-43
05-09	55-56; 68
10-33	75; 77-79
	84; 86-88
	90-93; 95-98

Distribution & Logistics

45-46
49-53

Sales & Marketing

73
7420
8230

47

Buyers/Markets

Goods	Services
01-03	41-43
05-09	55-56; 68
10-33	75; 77-79
	84; 86-88
	90-93; 95-98

Mgmt., Admin Back Office

5820, 64, 65, 66, 69,
7020, 7740, 80, 82

7010, 81

- **ISIC loosely represents parts of the VC model, but isn't *industry-specific.***
- Industries primarily associated with production & services
- Further complications with service industries and enabling support services

Infrastructure (Utilities) & Finance

35   64
36   65
37   66
38

Trade & Professional Associations

94

Information Services

581 5911, 5920
6312 6391 7490
9101

ICT Services (Communication, Software & IT-Services)

60, 61
5820
6201, 6202, 6311, 9511
6209

Education, Testing & Training

85

ISIC codes linked to value chain reference model; codes in black match S-DOT (traded, potential ICT-enabled supporting industries)

Business Functions & Organizational Decision Matrix in GVCs

R&D; Design

Distribution & Logistics

Primary Activity

Marketing & Sales

Distribution & Logistics

General Mgmt. & Admin

Facilities Maintenance

Customer & After-Sale Service

ICT Services

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

- 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
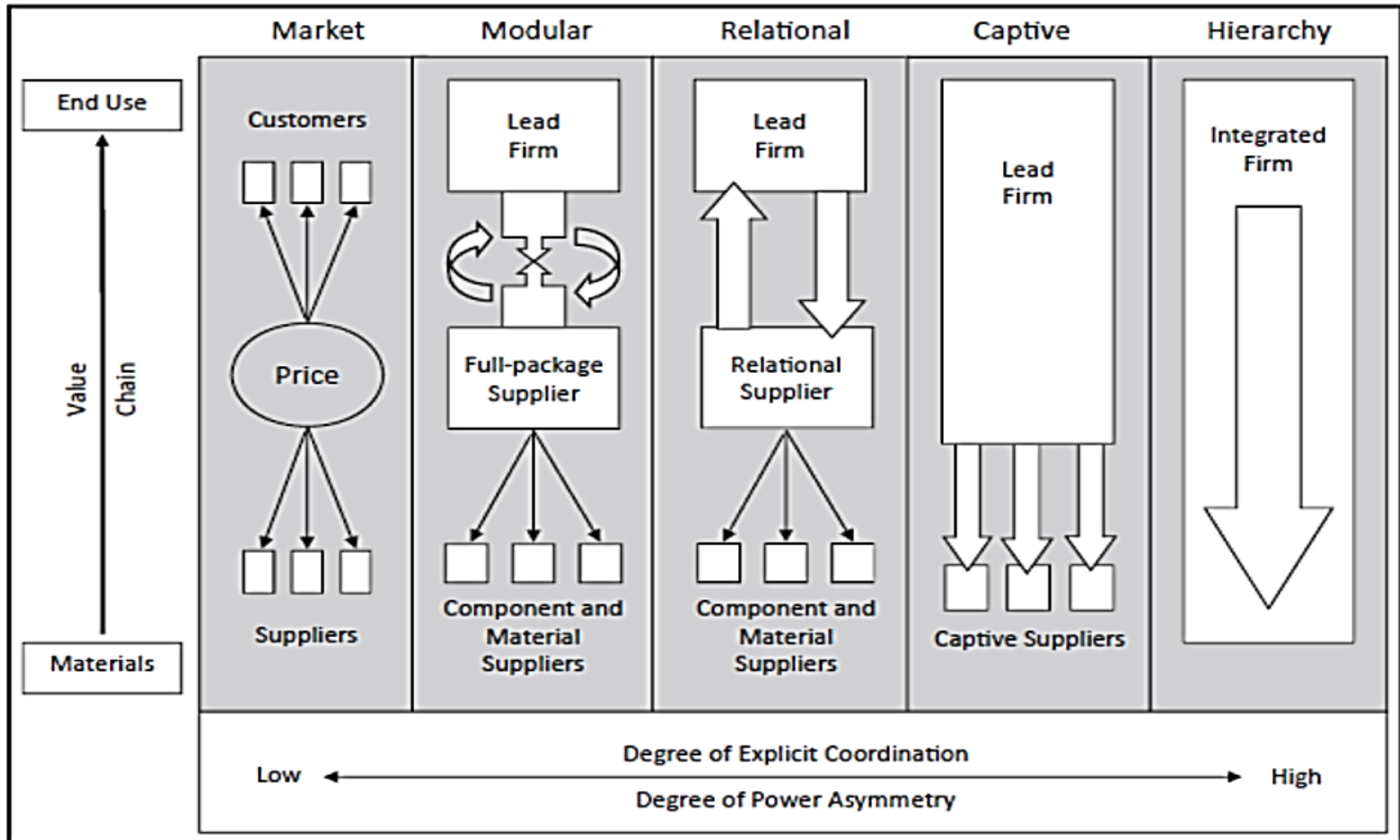
Source: Gereffi at al. [2005]

Dynamics in Global Value Chain Governance

Governance Type	Complexity of transactions	Ability to codify transactions	Capabilities in the supply-base
Market	Low	High	High
Modular	① High ②	High	High
Relational	High	③ Low	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)
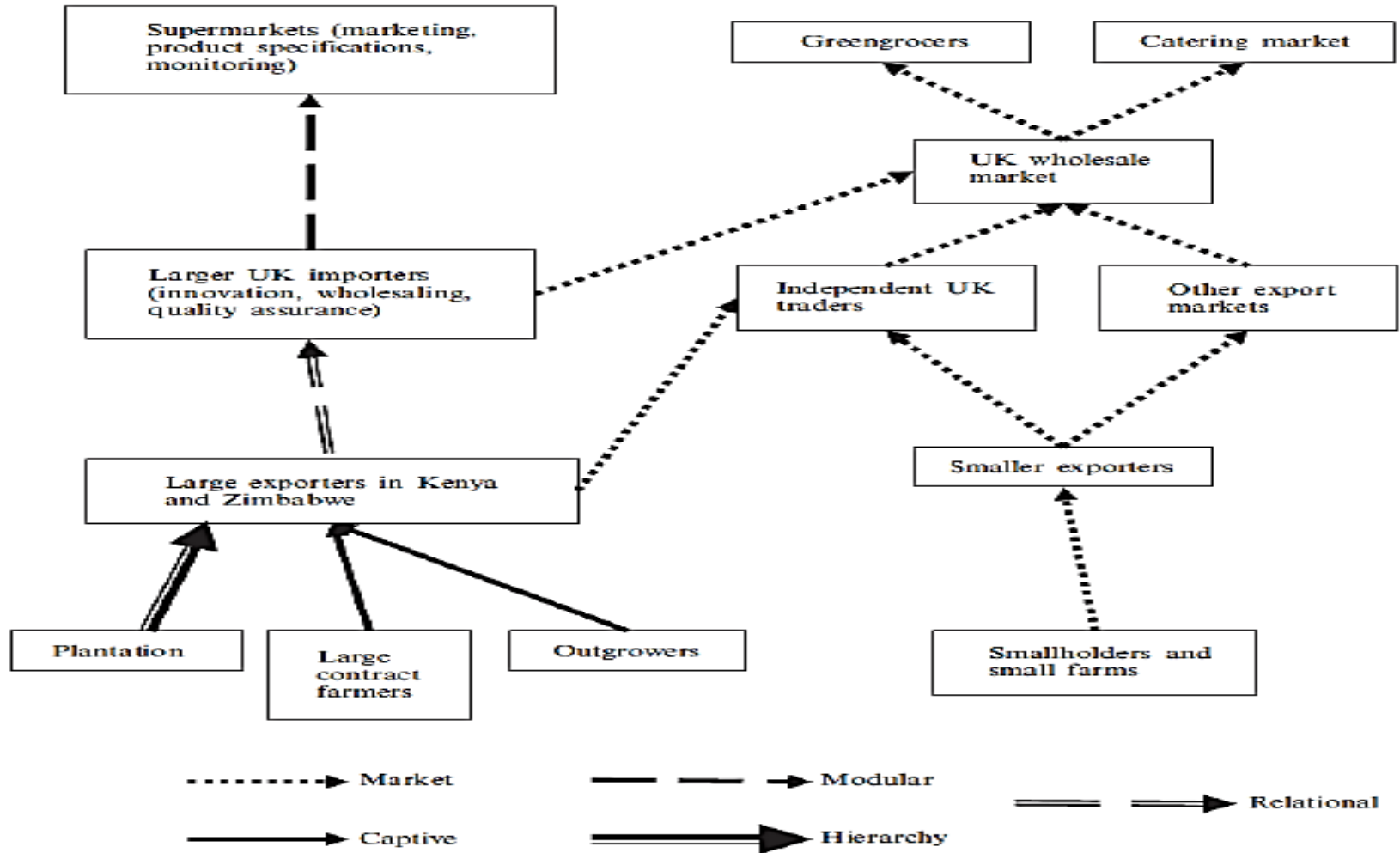③ better codification of transactions (open or de facto standards, computerization)
④ de-codification of transactions (technological change, new products, new processes)
⑤ increasing supplier competence (decreased complexity, better codification, learning)
⑥ decreasing supplier competence.(increased complexity, new technologies, new entrants)

GVCs in fresh vegetables sector (from Africa to UK)
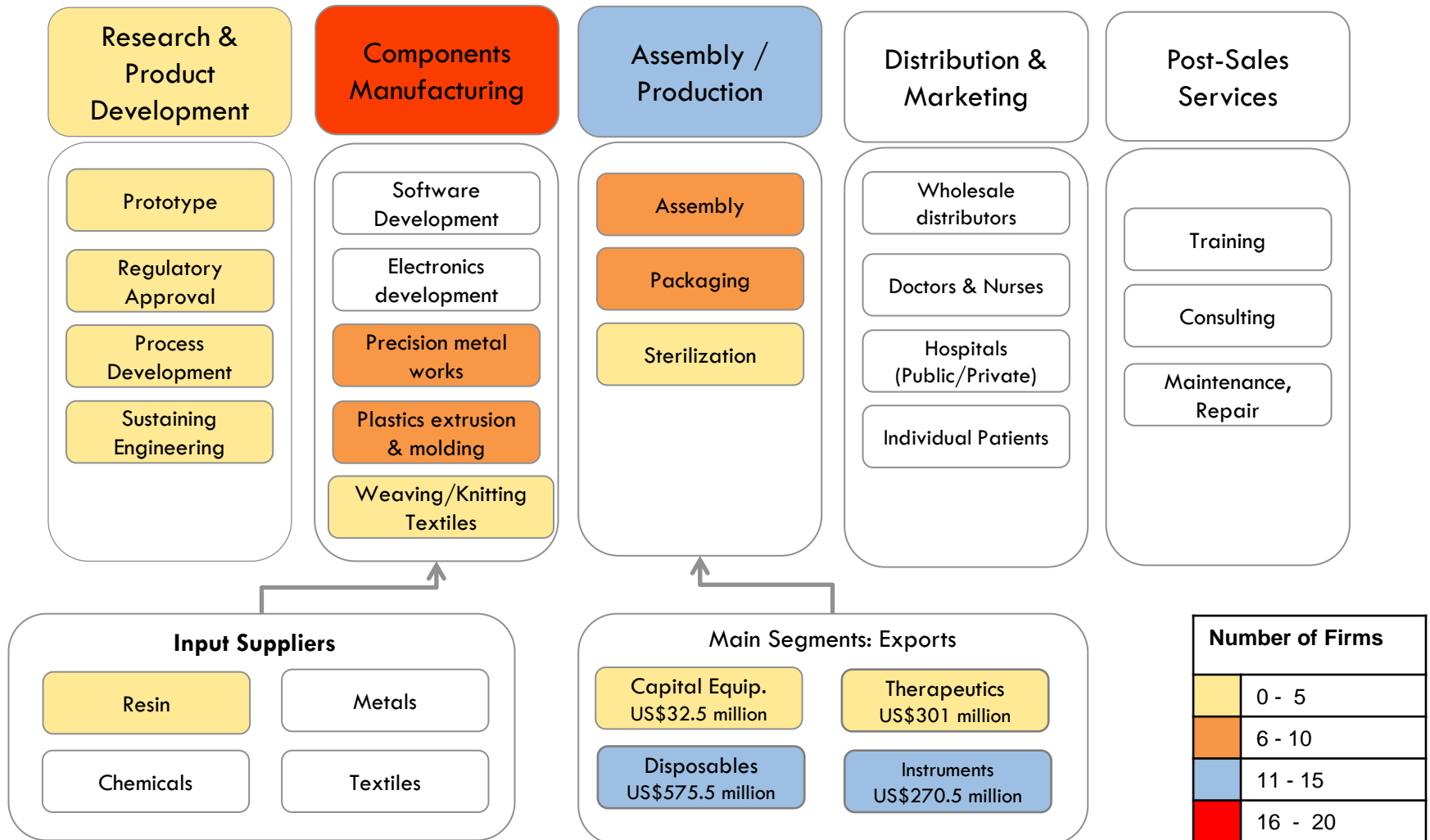

Source: Dolan and Humphrey [2004]

COSTA RICA'S MEDICAL DEVICES GVC

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COSTA RICA IN THE MEDICAL DEVICES GVC

Research & Product Development	Components Manufacturing	Assembly / Production	Distribution & Marketing	Post-Sales Services
Prototype	Software Development	Assembly	Wholesale distributors	Training
Regulatory Approval	Electronics development	Packaging	Doctors & Nurses	Consulting
Process Development	Precision metal works	Sterilization	Hospitals (Public/Private)	Maintenance, Repair
Sustaining Engineering	Plastics extrusion & molding		Individual Patients	
	Weaving/Knitting Textiles			

Input Suppliers

Resin	Metals
Chemicals	Textiles

Main Segments: Exports

Capital Equip. US$32.5 million	Therapeutics US$301 million
Disposables US$575.5 million	Instruments US$270.5 million

Number of Firms	
	0 - 5
	6 - 10
	11 - 15
	16 - 20

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.

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EVOLUTION OF COSTA RICAN MEDICAL DEVICE EXPORTS

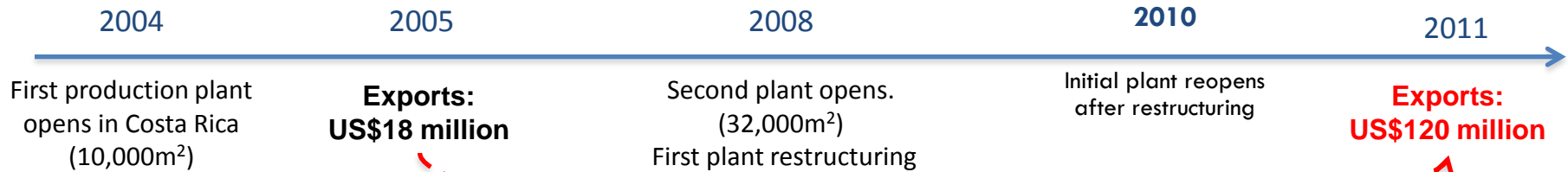## Costa Rica's Medical Exports by Product Category: 1998-2011
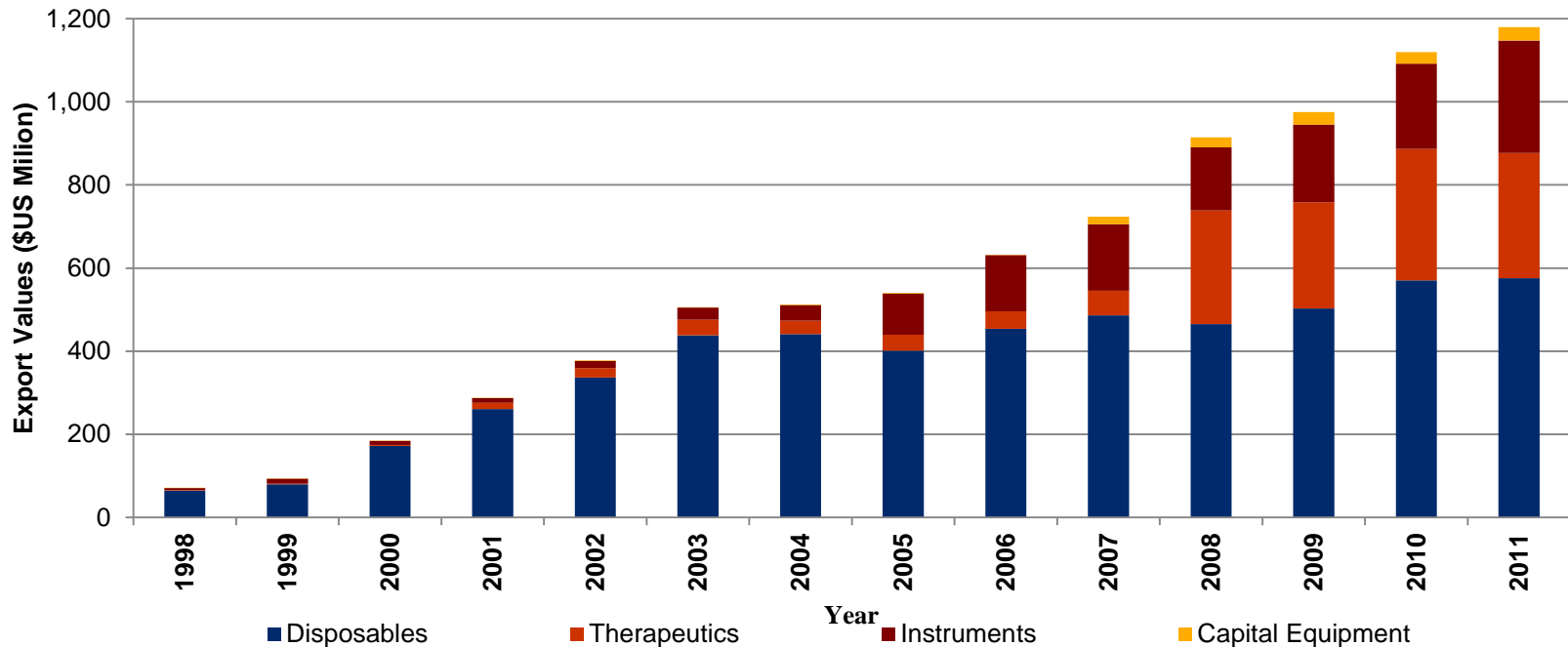
- **Disposables** still the largest product category exported, but no longer a strong growth area.
- Exports in **surgical instruments** have grown steadily since 2005.
- **Therapeutics** has become 2nd largest category since 2008; likely to increase as newly established firms complete transfer of new product lines.
- Limited export of highest value **capital equipment** (eg. Electronic/software devices)

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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; Oberg 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.

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UPGRADING SUCCESS: A LEADING MEDICAL DEVICES MNC IN COSTA RICA

2004

2005

2008

2010

2011

First production plant opens in Costa Rica (10,000m²)

Exports: US$18 million

Second plant opens. (32,000m²)
First plant restructuring

Initial plant reopens after restructuring

Exports: US$120 million

Functional Upgrading

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

Product & Process Upgrading

- Biopsy forceps➔ Labor intensive, basic metal works & extrusion.
- Urethral stent➔ Thermoforming, laser marking, coating capabilities.
- Guide Wires ➔ Sophisticated Laser cutting & welding.
- Today – CR facilities cover 42 manufacturing processes.

Market Diversification

- Gastroenterology segment ➔ Urology ➔ Cardiovascular

Forward Linkages

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

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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	National	North America	Global
- Local clusters	- Links to other states and clusters in Mexico	- Links to United States and Canada	- Other International linkages

Mexico's Plan Nacional de Desarrollo, 2013-2018

Estrategia Sectorial

Sectores		
Maduros	**Dinámicos**	**Emergentes**
• Metal mecánico • Textil-vestido y cuero-calzado • Madera y muebles • Siderúrgico • Alimentos y bebidas	• Automotriz y Autoparte • Aeroespacial • Eléctrico • Electrónico • Químico	• 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**
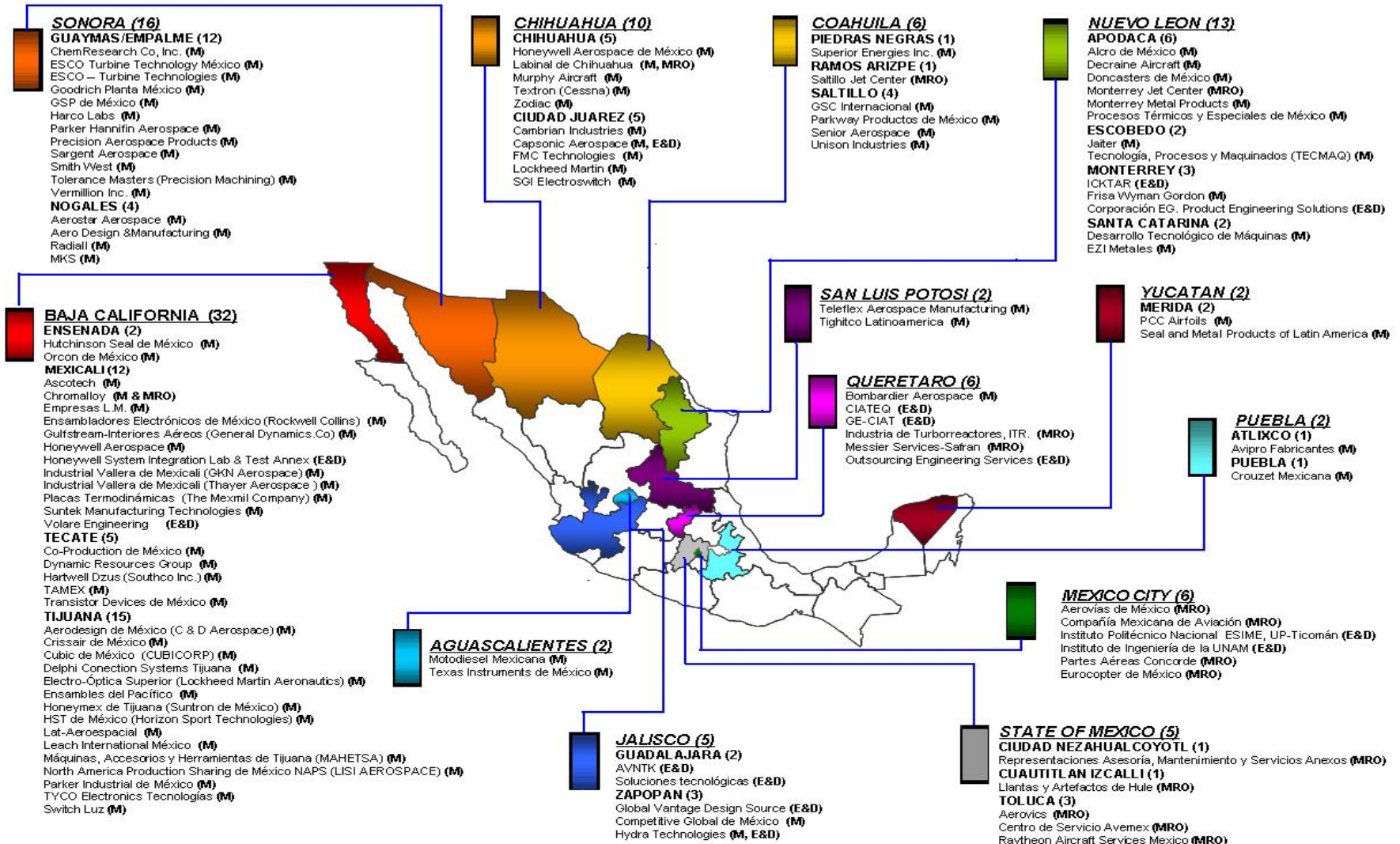 - Aerospace Industry

- **Emergent Sector**
  - Medical Devices Industry

MEXICAN AERONAUTIC INDUSTRY

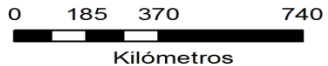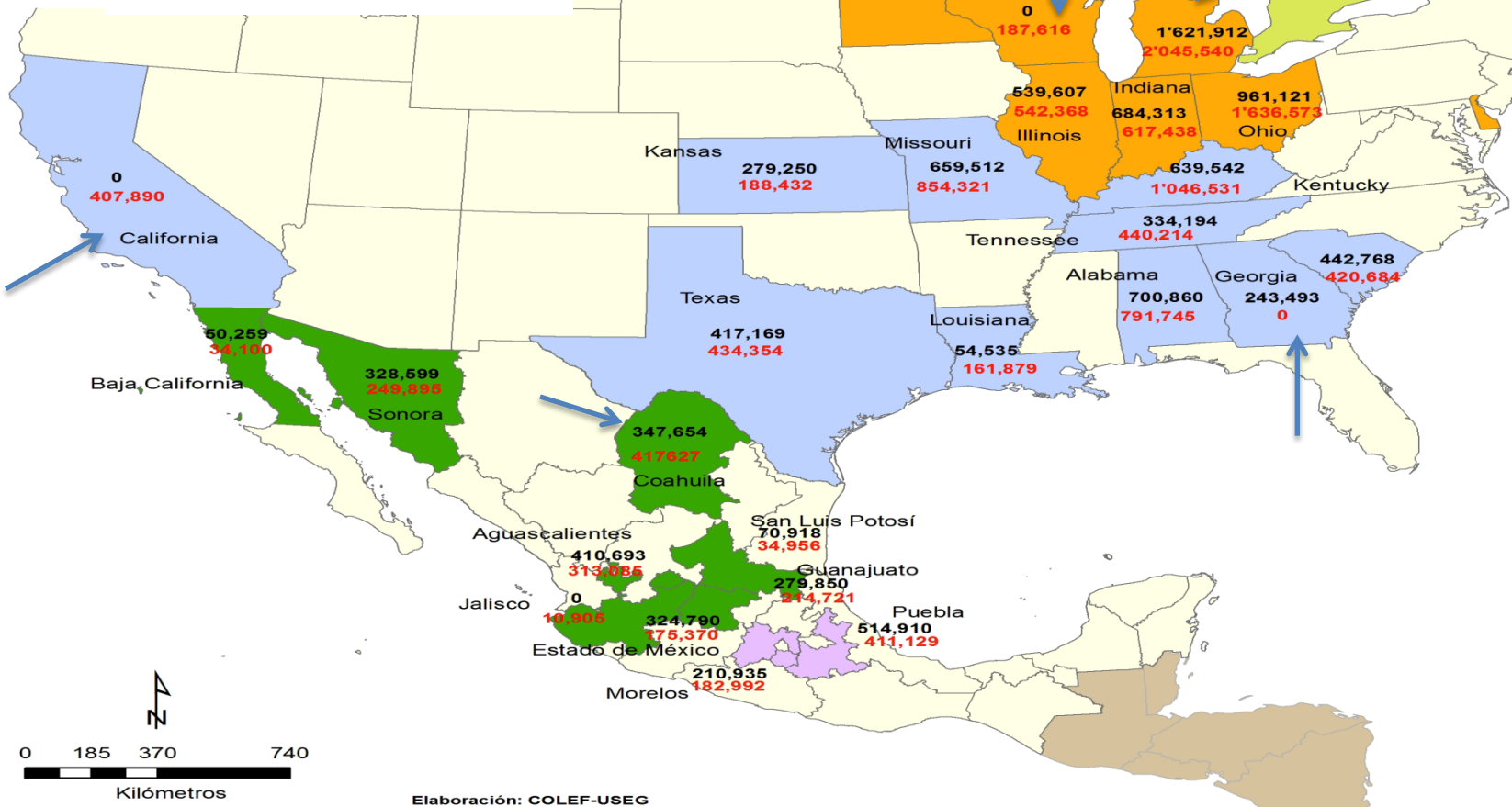**(M)** Manufacturing   **(MRO)** Maintenance, Repair and Overhaul   **(E&D)** Engineering and Design

SONORA (16)
GUAYMAS/EMPALME (12)
ChemResearch Co, Inc. (M)
ESCO Turbine Technology México (M)
ESCO – Turbine Technologies (M)
Goodrich Planta México (M)
GSP de México (M)
Harco Labs (M)
Parker Hannifin Aerospace (M)
Precision Aerospace Products (M)
Sargent Aerospace (M)
Smith West (M)
Tolerance Masters (Precision Machining) (M)
Vermillion Inc. (M)
NOGALES (4)
Aerostar Aerospace (M)
Aero Design &Manufacturing (M)
Radiall (M)
MKS (M)

BAJA CALIFORNIA (32)
ENSENADA (2)
Hutchinson Seal de México (M)
Orcon de México (M)
MEXICALI (12)
Ascotech (M)
Chromalloy (M & MRO)
Empresas L.M. (M)
Ensambladores Electrónicos de México (Rockwell Collins) (M)
Gulfstream-Interiores Aéreos (General Dynamics.Co) (M)
Honeywell Aerospace (M)
Honeywell System Integration Lab & Test Annex (E&D)
Industrial Vallera de Mexicali (GKN Aerospace) (M)
Industrial Vallera de Mexicali (Thayer Aerospace) (M)
Placas Termodinámicas (The Mexmil Company) (M)
Suntek Manufacturing Technologies (M)
Volare Engineering   (E&D)
TECATE (5)
Co-Production de México (M)
Dynamic Resources Group (M)
Hartwell Dzus (Southco Inc.) (M)
TAMEX (M)
Transistor Devices de México (M)
TIJUANA (15)
Aerodesign de México (C & D Aerospace) (M)
Crissair de México (M)
Cubic de México (CUBICORP) (M)
Delphi Conection Systems Tijuana (M)
Electro-Óptica Superior (Lockheed Martin Aeronautics) (M)
Ensambles del Pacífico (M)
Honeymex de Tijuana (Suntron de México) (M)
HST de México (Horizon Sport Technologies) (M)
Lat-Aeroespacial (M)
Leach International México (M)
Máquinas, Accesorios y Herramientas de Tijuana (MAHETSA) (M)
North America Production Sharing de México NAPS (LISI AEROSPACE) (M)
Parker Industrial de México (M)
TYCO Electronics Tecnologías (M)
Switch Luz (M)

CHIHUAHUA (10)
CHIHUAHUA (5)
Honeywell Aerospace de México (M)
Labinal de Chihuahua   (M, MRO)
Murphy Aircraft (M)
Textron (Cessna) (M)
Zodiac (M)
CIUDAD JUAREZ (5)
Cambrian Industries (M)
Capsonic Aerospace (M, E&D)
FMC Technologies (M)
Lockheed Martin (M)
SGI Electroswitch (M)

COAHUILA (6)
PIEDRAS NEGRAS (1)
Superior Energies Inc. (M)
RAMOS ARIZPE (1)
Saltillo Jet Center (MRO)
SALTILLO (4)
GSC Internacional (M)
Parkway Productos de México (M)
Senior Aerospace (M)
Unison Industries (M)

NUEVO LEON (13)
APODACA (6)
Alcro de México (M)
Decraine Aircraft (M)
Doncasters de México (M)
Monterrey Jet Center (MRO)
Monterrey Metal Products (M)
Procesos Térmicos y Especiales de México (M)
ESCOBEDO (2)
Jaiter (M)
Tecnología, Procesos y Maquinados (TECMAQ) (M)
MONTERREY (3)
ICKTAR (E&D)
Frisa Wyman Gordon (M)
Corporación EG. Product Engineering Solutions (E&D)
SANTA CATARINA (2)
Desarrollo Tecnológico de Máquinas (M)
EZI Metales (M)

SAN LUIS POTOSI (2)
Teleflex Aerospace Manufacturing (M)
Tighitco Latinoamerica (M)

YUCATAN (2)
MERIDA (2)
PCC Airfoils (M)
Seal and Metal Products of Latin America (M)

QUERETARO (6)
Bombardier Aerospace (M)
CIATEQ (E&D)
GE-CIAT (E&D)
Industria de Turborreactores, ITR. (MRO)
Messier Services-Safran (MRO)
Outsourcing Engineering Services (E&D)

PUEBLA (2)
ATLIXCO (1)
Avipro Fabricantes (M)
PUEBLA (1)
Crouzet Mexicana (M)

AGUASCALIENTES (2)
Motodiesel Mexicana (M)
Texas Instruments de México (M)

JALISCO (5)
GUADALAJARA (2)
AVNTK (E&D)
Soluciones tecnológicas (E&D)
ZAPOPAN (3)
Global Vantage Design Source (E&D)
Competitive Global de México (M)
Hydra Technologies (M, E&D)

MEXICO CITY (6)
Aerovías de México (MRO)
Compañía Mexicana de Aviación (MRO)
Instituto Politécnico Nacional ESIME, UP-Ticomán (E&D)
Instituto de Ingeniería de la UNAM (E&D)
Partes Aéreas Concorde (MRO)
Eurocopter de México (MRO)

STATE OF MEXICO (5)
CIUDAD NEZAHUALCOYOTL (1)
Representaciones Asesoría, Mantenimiento y Servicios Anexos (MRO)
CUAUTITLAN IZCALLI (1)
Llantas y Artefactos de Hule (MRO)
TOLUCA (3)
Aerovics (MRO)
Centro de Servicio Avemex (MRO)
Raytheon Aircraft Services Mexico (MRO)

©

Automobile production in 2007 and 2011

Autos, Trucks y Autos/Trucks
Volumen de producción:

Región	2011 Total	2011 Promedio	2007 Total	2007 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

Ontario
2'030,457
2'424,480

Minnesota
98,337
104,146

Wisconsin
0
187,616

Michigan
1'621,912
2'045,540

Illinois Indiana
539,607 684,313
542,368 617,438

Ohio
961,121
1'636,573

Kansas
279,250
188,432

Missouri
659,512
854,321

Kentucky
639,542
1'046,531

California
0
407,890

Tennessee
334,194
440,214

Alabama
700,860
791,745

Georgia
243,493
0

Georgia
442,768
420,684

Texas
417,169
434,354

Louisiana
54,535
161,879

Baja California
50,259
34,100

Sonora
328,599
249,895

Coahuila
347,654
417627

San Luis Potosí
70,918
34,956

Guanajuato
279,850
244,721

Aguascalientes
410,693
313,035

Jalisco
0
10,905

Estado de México
324,790
175,370

Puebla
514,910
411,129

Morelos
210,935
182,992

0   185   370   740
Kilómetros

Elaboración: COLEF-USEG

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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	Raw Materials & Components	Production & Assembly	Distribution	Retail

Furniture design & engineering

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

Wood, metal, leather, plastic, glass & rattan

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

Household Furniture

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

Furniture Transportation

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

Furniture Stores

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

plywood, cut stock, frame & upholstery

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

Office & Institutional Furniture

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

Furniture Warehousing

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

Furniture related products

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

Furniture Wholesale

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

Employees: 319	Employees: 15,898	Employees: 33,064	Employees: 59,964	Employees: 7,596
Estbm't: 88	Estbm't: 843	Estbm't: 920	Estbm't: 3,704	Estbm't: 895
Avg. wage: 69,042	Avg. wage: 37,903	Avg. wage: 34,276	Avg. wage: 41,249	Avg. wage: 33,803

Comparing NC's employment with main US competitors

Top State Furniture Employment, by NAICS Codes: 2012

■ 3371 Household ■ 3372 Office ■ 3379 Furniture Related

| State	3379 Furniture Related	3372 Office	3371 Household
NC	2,844	4,989	25,231
CA	3,682	7,517	19,948
TX	3,784	4,351	13,858
IN	1,312	6,291	13,361
MI	541	14,556	4,465
MS	712	1,448	15,867
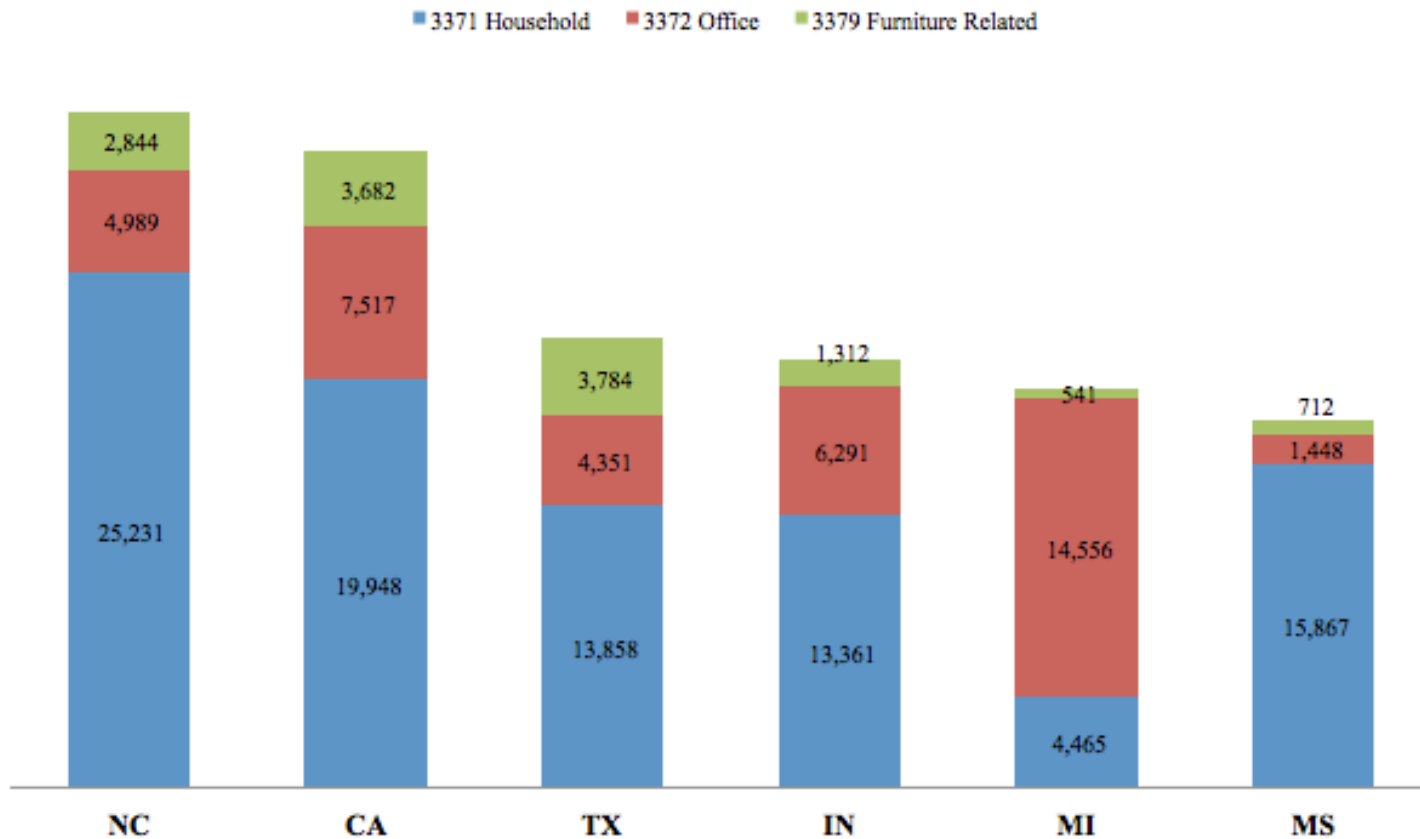
Comparing NC wages with main US competitors

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

Legend: ■ 3371- Household Furniture ■ 3372- Office Furniture ■ 3379- Furniture-Related Products

State	3371- Household Furniture	3372- Office Furniture	3379- Furniture-Related Products
CA	37,199	46,298	38,518
IN	37,595	36,827	32,659
MI	46,615	59,241	43,709
MS	30,393	26,266	33,537
NC	33,070	35,690	42,508
TX	37,017	40,557	32,929

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**
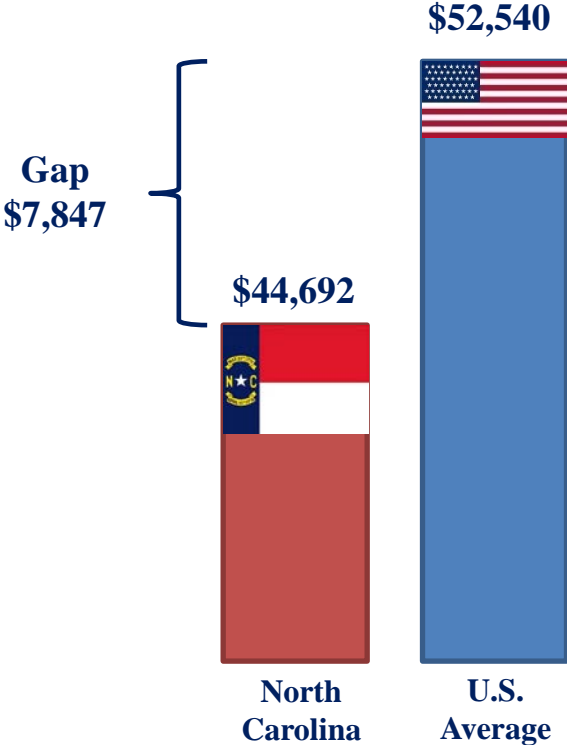
$52,540

Gap
$7,847

$44,692

North
Carolina

U.S.
Average

Sources of North Carolina's Manufacturing Wage Gap

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

Gap $7,847

$52,540

$44,692

$49

$1,109

$2,855

$3,881

North Carolina

Confidentiality

Missing Industries

Industry Mix

Wage Rate

U.S. Average

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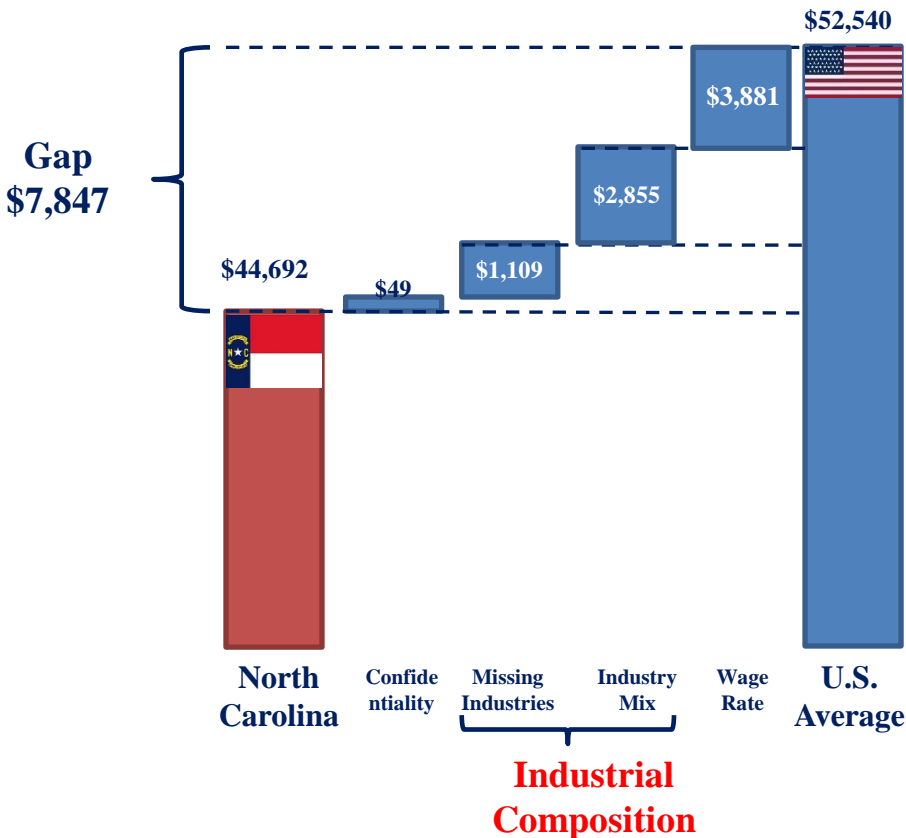
Broadly, there are three sources for North Carolina's manufacturing wage gap:

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**

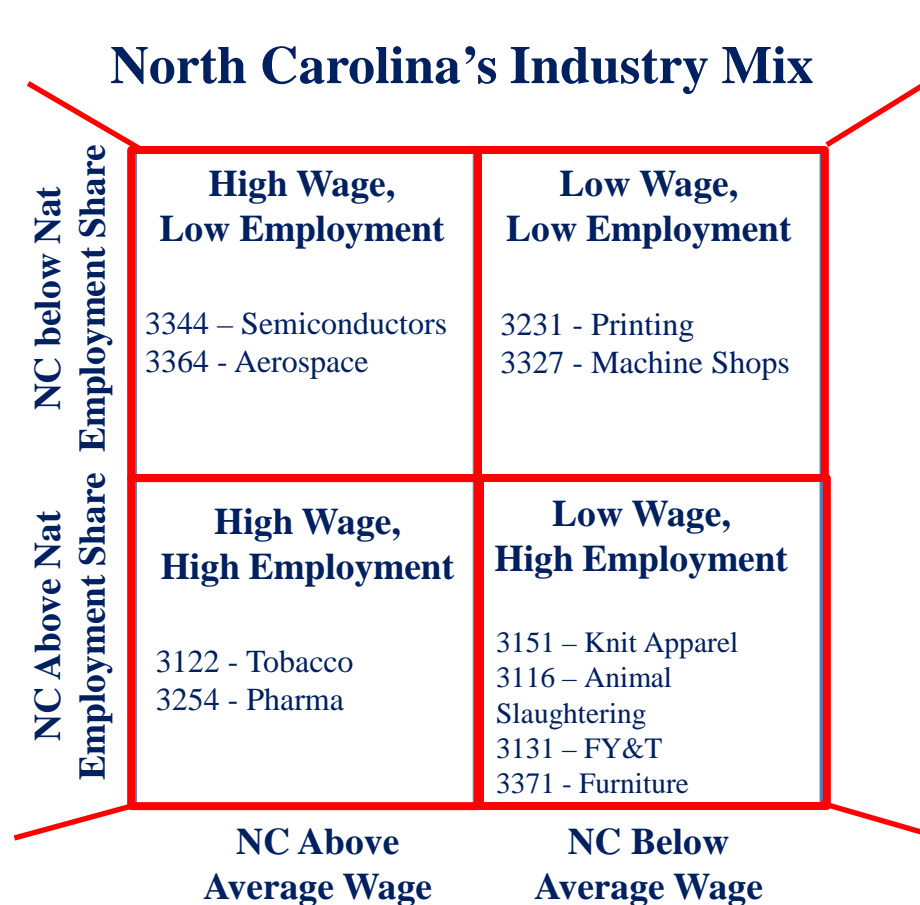Data: US Census Bureau, Annual Survey of Manufacturing, 2011. Authors' calculations.

NC's Potential Upgrading Strategies

Future Growth

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

North Carolina's Industry Mix

Localized

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

	NC Above Average Wage	NC Below Average Wage
NC below Nat Employment Share	**High Wage, Low Employment** 3344 – Semiconductors 3364 - Aerospace	**Low Wage, Low Employment** 3231 - Printing 3327 - Machine Shops
NC Above Nat Employment Share	**High Wage, High Employment** 3122 - Tobacco 3254 - Pharma	**Low Wage, High Employment** 3151 – Knit Apparel 3116 – Animal Slaughtering 3131 – FY&T 3371 - Furniture

Strengthen

- 12.3% of employment
- Existing strengths
- High R&D
- Fill technology gaps or cross-chain 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 American, East Asia, EU)

THANK YOU

Questions?

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