Second LAEBA Annual Meeting
Buenos Aires, Argentina – November 28-29, 2005

The Governance of Global Value Chains;
implication for state action

Timothy J. Sturgeon, Ph. D – Massachusetts Institute of Technology

Sponsored by
Inter-American Development Bank Integration and Trade Sector
Institute for the Integration of Latin American and the Caribbean (INTAL)
The Governance of Global Value Chains; Implications for State Action

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Latin America and Asia: Strategic Policies for Global Competition
Second Annual Meeting, Latin America/Caribbean and Asia/Pacific Economics and Business Association (LAEBA)
An Initiative of the Inter-American Development Bank (IDB) and the Asian Development Bank Institute, with the support of the IDB Office in Japan and the Institute for the Integration of Latin America and the Caribbean (INTAL))
Raúl Prebisch Auditorium, IDB/INTA
Esmeralda 130, Piso 16, Buenos Aires, Argentina, November 28-29, 2005
Structure of the Presentation

1. Supplier-led industrial upgrading strategies in global value chains

2. Global suppliers are creating new constraints in industries that have already globalized

3. The global value chains framework, a typology of network governance forms (if there is time)
Frame of Reference — Key Trends

- Increased outsourcing
- Computerization of product design
- Computerization of process technology
- Formalization and segmentation of work tasks (services offshoring)
- Increasing market volatility and industry clock-speed
- Increasing geographic scope of production systems
- Better integration of geographically dispersed production systems
- The rise of a new, global-scale supply-base

 ✓ *The global value chains framework* is an overarching rubric that ties these trends together

 ✓ New features are *global suppliers, global buyers, and value chain modularity*, which eases coordination between the two.
Weakening of traditional development tools

- High tariffs on imports
- Local content requirements
- Targeted credits and tax breaks
- Duty free materials and component imports for exporters
- Quota systems and Most Favored Nation status

⇒ Supplier led industrial upgrading has become a main policy focus
  - Suppliers with links to global buyers and lead firms
  - National and cluster specializations
  - A focus on upgrading process technology
  - Value chain specialization (contract manufacturing, components)
  - Inward foreign direct investment

⇒ Assumes that foreign firms will take a major role in driving development.
Is supplier-led upgrading the answer?

Old requirements for suppliers:

- High quality
- Low costs
- Continuous improvement
- A strategic location (low operating costs, close to end markets, in key cluster, trade advantages, etc.)

➤ **Lead firms were willing to help in the upgrading process and develop distinct supply bases in multiple locations**

➤ **Excellent manufacturing and low costs are now minimum requirements**
New requirements for suppliers:

- Product and component design and engineering capabilities
  - Physical layout, (re)design for manufacturability
  - Post architectural design, module design
- Process R&D capability, process upgrading, process validation
- Heavy use of information technology
  - Design collaboration
  - Supply chain and inventory management (MRP, ERP)
- Global locations
  - Product, module, and process co-development in design hubs
  - Regional production bases, increasingly Mexico and East Europe
  - China

- Lead firms are less willing to help local firms to upgrade or to develop multiple supply bases
- May become stuck in supplier role - capacity to innovate at the product-level can remain underdeveloped, process upgrades increasingly embedded in equipment, competition with customers is a huge problem
1) Upgrading in a world of national value chains:
   • Import substitution
     – Protected national champions selling in the domestic market.
   • Export promotion
     – (Decreasingly) protected national champions selling in international markets.

2) Upgrading in a world of global value chains:
   • Supplier-led industrial upgrading paths
     1. FDI creates employment but makes little use of local firms (Mexico)
     2. From supplier to brand name competitor, OEM->ODM->OBM (Taiwan)
     3. From trading firm to network coordinator (Hong Kong)
     4. Specialized suppliers to MNC affiliates; brand aspirations low (Singapore)
   • 2-4 involve typically involve some form of functional upgrading and bundling
The rise of the global supplier

- Many are American firms (exceptions include some European and Japanese auto parts suppliers, Taiwan semiconductor foundries, Hong Kong apparel trading firms, Taiwan and Korean apparel manufactures, etc.)
- Highly capable, full-service stance, pure-play, merchant
  - Many customers, own brand businesses absent or very limited
- Purchase and hold in-bound and out-bound inventory for customers
  - Huge financial burden
  - Sophisticated global purchasing, logistics, capacity planning, and inventory control systems with links to customer IT systems
- Support customers globally
  - Global operational footprint
  - Co-location in design hubs for interaction on tacit elements
- From parts to modules to complete products (full package contract manufacturing)
  - Upstream and downstream integration and consolidation (functional bundling)
  - Module, component, and process R&D (functional upgrading)
The Deverticalization of the U.S. Motor Vehicle Industry; assembly and parts employment, 1958-2000 (‘000 jobs)

**Revenue Growth at the Top Five Electronics Contract Manufacturers, 1994 through 2001, $M**

<table>
<thead>
<tr>
<th></th>
<th>1994</th>
<th>1999</th>
<th>2002</th>
<th>CAGR '94-'02</th>
<th>Share of Top 100, 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flextronics</td>
<td>$211</td>
<td>$1,808</td>
<td>$13,615</td>
<td>68%</td>
<td>20%</td>
</tr>
<tr>
<td>Solectron</td>
<td>$1,642</td>
<td>$8,391</td>
<td>$12,261</td>
<td>29%</td>
<td>18%</td>
</tr>
<tr>
<td>Sanmina-SCI</td>
<td>$2,364</td>
<td>$8,624</td>
<td>$10,168</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>Celestica</td>
<td>$1,989</td>
<td>$5,297</td>
<td>$8,272</td>
<td>20%</td>
<td>12%</td>
</tr>
<tr>
<td>Jabil Circuit</td>
<td>$404</td>
<td>$2,400</td>
<td>$3,729</td>
<td>32%</td>
<td>5%</td>
</tr>
<tr>
<td>Top 5</td>
<td>$6,610</td>
<td>$26,520</td>
<td>$48,045</td>
<td>28%</td>
<td>70%</td>
</tr>
<tr>
<td>Top 100</td>
<td>NA</td>
<td>$46,029</td>
<td>$68,149</td>
<td>NA</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: All Celestica revenues in 1994 were from IBM.
Sources: Company annual and quarterly reports; Electronic Business Top 100 Contract Manufacturers, 2003.
Top Five EMS Contract Manufacturers 
Revenues, Employment, and Facilities, and Location, 1999 and 2002; Compound Annual Growth Rate 1999-2002; and Top Five Share of Top 100, 2002

<table>
<thead>
<tr>
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<th>1999</th>
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<th>CAGR '99-'02</th>
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<tbody>
<tr>
<td>Revenues ($M)</td>
<td>$26,520</td>
<td>$48,045</td>
<td>22%</td>
<td>70%</td>
</tr>
<tr>
<td>Employment</td>
<td>123,580</td>
<td>280,030</td>
<td>31%</td>
<td>63%</td>
</tr>
<tr>
<td>Worldwide Facilities</td>
<td>244</td>
<td>420</td>
<td>20%</td>
<td>69%</td>
</tr>
<tr>
<td>Facilities Outside N. America</td>
<td>131</td>
<td>257</td>
<td>25%</td>
<td>82%</td>
</tr>
</tbody>
</table>

Notes: Flextronics facility figures are for 2000; growth rates have been adjusted accordingly. Solectron facility figures are for 2001; growth rates have been adjusted accordingly.
Revenue Growth at the Top Five EMS and ODM Electronics Contract Manufacturers, 1993-2003, $M

Source: Company annual reports.
Note: The largest five EMS firms are Flextronics, Solectron, Sanmina-SCI, Celestica, and Jabil.
The largest five ODM firms are Hon Hai, Quanta, Acer, Compal, and Asustek.
Comparison of typical ODM and EMS electronics contract manufacturers: value chain scope, product/customer scope, and geographic scope

Value Chain Scope

Key Lead Firm Functions

Product/Customer Scope

Taiwan-Based ODM Firm

US-Based EMS Firm

Pcs

Datacom

Telecom

e

Geographic Scope

Asia  •  North Am  •  Eur  •  East Eur  •  South Am
The new global supply-base; Celestica’s global footprint

1997  2001
National Production Systems
Regional Production Systems — the shift to low cost peripheries
Consolidation in China - larger scale, large local market, low costs
Global Production Systems - total geographic flexibility

Regional production systems are nested within global production systems
New obstacles to supplier-led industrial upgrading
Upgrading options in a world of global suppliers

• Develop second tier suppliers
  – Attract global suppliers and nurture the local supply base.

• Participate, learn, and spin-off
  – Attract global suppliers and lead firms and use them to train managers, engineers, and workers and then help them start their own firms.

• Develop locally-owned global suppliers
  – Continue to upgrade managerial, technical, and geographic capabilities of local suppliers but abandon brand name aspirations.

• Develop suppliers in just-globalizing industries (e.g., services)

• Move to the head of global value chains; use existing global supply-base
  – Develop “virtual” lead firms that tap the capabilities of GVCs to serve local and global markets—separate product development and marketing from manufacturing.
  – Encourage the emergence of design and marketing hubs—design and customer-centric, not manufacturing-centric.
  – May require changes in regulation and business culture.
A world of possibility and constraint (National, regional, and global production systems all co-exist and interact, and for now, consolidation in China is real)
The governance of global value chains: an analytic framework

Based on a paper by:
Gary Gereffi, Duke University
John Humphrey, IDS
Timothy Sturgeon, MIT

Published in:
Review of International Political Economy, 12(1) 2005

Summary of approach with related literature:
www.globalvaluechains.org
Theoretical Underpinnings
(starting point: industrial organization)

1. Transaction Costs Economics
   Asset specificity

2. Production Network Theory
   Trust, reputation, repeat transactions, social proximity, geographic proximity, power

3. Complementary Competencies
   Resource view of the firm, learning, core competence
Three Variables

1. **Complexity** of information required for a transaction

2. Extent to which this information can be **codified**

3. **Supplier capabilities** in relation to a transaction’s requirements
• Three variables
• Two options for each - High or Low
• Eight possible outcomes
The Matrix

<table>
<thead>
<tr>
<th>Complexity of transactions</th>
<th>Ability to codify transactions</th>
<th>Capabilities in the supply-base</th>
<th>Outcome: Value Chain Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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<tr>
<td>Low</td>
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<tr>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
## Discard Three Combinations

### Complexity of transactions
- Low
- Low
- Low

### Ability to codify transactions
- High
- Low
- Low

### Capabilities in the supply-base
- Low
- Low or High
- Low or High

### Outcome: Value Chain Governance
- Excluded from chain
- Unlikely to occur
- Unlikely to occur
# Five GVC Governance Types

<table>
<thead>
<tr>
<th>Governance Type</th>
<th>Complexity of transactions</th>
<th>Ability to codify transactions</th>
<th>Capabilities in the supply-base</th>
<th>Degree of explicit coordination and power asymmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Modular</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Relational</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Captive</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Hierarchy</td>
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Five GVC Governance Types

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<th>Relational</th>
<th>Captive</th>
<th>Hierarchy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customers</td>
<td>Lead Firm</td>
<td>Lead Firm</td>
<td>Lead Firm</td>
<td>Integrated Firm</td>
</tr>
<tr>
<td>Relational Supplier</td>
<td>Component and Material Suppliers</td>
<td>Component and Material Suppliers</td>
<td>Captive Suppliers</td>
<td></td>
</tr>
<tr>
<td>Value Chain</td>
<td>End Use</td>
<td>Price</td>
<td>Suppliers</td>
<td>Materials</td>
</tr>
</tbody>
</table>

Degree of Explicit Coordination
Degree of Power Asymmetry
Country-Specific Production Network Models: How the GVC Typology Fits

Hierarchical (including “quasi-hierarchical,” or captive)

The Modern Corporation: Vertical Integration
- Design
- Mfg.
- Sales
- Market

The Japanese Model: The Hierarchical, Captive Network
- Design
- Mfg.
- Sales
- Market

The German Model: The Self-Reliant Network
- Design
- Mfg.
- Sales
- Market

The Italian Model: The Egalitarian, Cooperative Network
- Design
- Mfg.
- Sales
- Market

Relational

The New American Model: Shared Manufacturing Capacity in the Modular Network
- Deverticalized Lead Firm A
- Deverticalized Lead Firm B
- Turn-key Supplier (Shared Capacity)

Modular
Global value chain dynamics: Opposing forces

- Codification vs innovation
- Increasing supplier competence vs new suppliers and new requirements
### Some Dynamics in Global Value Chain Governance

<table>
<thead>
<tr>
<th>Governance Type</th>
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<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Modular</td>
<td>① High</td>
<td>② High</td>
<td></td>
</tr>
<tr>
<td>Relational</td>
<td>High</td>
<td>③ Low</td>
<td>⑤ High ⑥ Low</td>
</tr>
<tr>
<td>Captive</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Hierarchy</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>

① increasing complexity of transactions (harder to codify transactions, effective decrease in supplier competence)
② decreasing complexity of transactions (easier to codify transactions effective decrease 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)
New product introduction in electronics manufacturing

Product Firm

Industrial design  Electronic design  Circuit board layout

Contract Manufacturer

SMT placement  Solder Re-flow  Test  Final Assembly

Design for performance (size, weight, speed, power consumption)

IC Design House

Electronic design  Circuit geometry

Foundry

Lithography  Deposition  Test  Dicing

Supplier push for co-design (re)DFx

- Design for manufacturability (yield)
- Design for cost reduction
- Design for test
- Design for reliability (quality) and repair
- Design for supply chain availability
- Design for environmental compliance and recycling
Framework limitations

• Institutional context and path dependence matter
  – Local, national, regional

• Corporate strategy and culture matters
  – “Open pathways” at the firm level

• Regulations and policies matter
  – National, bi-lateral, multi-lateral; states and institutions can be powerful value chain actors

• Underdeveloped view of consumption
  – Advanced users
  – Consumer cultures and geographies

• Multiple and overlapping value chain governance mechanisms are the norm
The Full Package Supplier
Mixing the relational and modular

DIADIC VIEW OF ASSET
SPECIFICITY IN
INSTITUTIONAL
ECONOMICS

A MIXTURE OF
GENERAL AND
SPECIFIC ASSETS IN
FULL PACKAGE
SUPPLIERS

The commodity supplier
Customer interfaces

Specific Assets
(dedicated resources)

The captive supplier

General Assets
(potentially shared resources)

Co-design
(Full package supplier, instance A)

Build-to-print
(Full package supplier, instance B)
So What?

• Upgrading (or not) in global value chains

• Consolidation, modularity, and growing knowledge intensity in GVCs affects inclusion and exclusion for late entrants

• Increased geographic flexibility provided by value chain modularity poses new challenges for adjustment in both advanced and developing economies
Supplier Upgrading (and Downgrading) in Global Value Chains

Few customers
Few capabilities

MORE CUSTOMERS
• Product upgrading
• Inter-sectoral upgrading
• Base process focus

CAPTIVE

More capabilities
• Process upgrading
• Functional upgrading
• Functional bundling

RELATIONAL

De-codification and reduced competence
through technological change, new requirements, and new competitors

FULL PACKAGE (TURN-KEY)

Many customers
Many capabilities

MODULAR
<table>
<thead>
<tr>
<th>Governance Type</th>
<th>Linkage mechanism</th>
<th>Developing country firm roles and competencies</th>
<th>Policy emphasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market</td>
<td>Arms-length exports</td>
<td>Branded exporter</td>
<td>Brand and product development, market research and access, import substitution and export promotion</td>
</tr>
<tr>
<td>Modular</td>
<td>Buyer-supplier complimentary specialization in cross-border value chains</td>
<td>Full package supplier with generic, base process competencies and ability to coordinate local and/or regional networks</td>
<td>Knowledge of global standards, process and information technology upgrading, linkages to global buyers, strengthening of backward linkages and networks</td>
</tr>
</tbody>
</table>
| Relational      | Collaboration in cross-border value chains (lots of air travel)  
Collaboration with co-location (foreign direct investment) | Specialist supplier with process and/or domain-specific competencies | Competence building, linkages to buyers, support of clusters and districts, focus on building tacit domain knowledge |
| Captive         | Foreign direct investment | Dependent supplier, customer-specific competencies | Recruitment of MNC affiliates, local content rules |
| Hierarchy       | Foreign direct investment | Lower tier supplier | Recruitment of MNC affiliates, education and training, infrastructure development |