Clusters, Global Value Chains and Innovation Systems: How are they linked?

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28th February 2017

MY CV in brief

- Degree in Economics Università Bocconi in Milan; MSc in Development Economics University of Oxford; PhD Institute of Development Studies, University of Sussex;
- Main research interests: Clusters, Global Value Chains, Innovation in developing countries; Emerging market multinationals and their innovation strategy;
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Agenda

- Some basic definitions:
  - Clusters
  - Global Value Chains
  - Innovation systems (yesterday);
- How do they interact?
- Policy implications.

Clusters

- A cluster is a spatial concentration of sectorial specialized firms;
- The competitive advantages that firms may derive from clustering are:
  - **External economies** (incidental effect of clustering):
    - Specialized labor market;
    - Supply of specialized inputs;
    - Access to specialized knowledge and dissemination of information;
    - Market access: spatial concentration attracts customers.
  - **Joint actions** such as vertical or horizontal cooperation between firms or through business associations.


Pergamon

www.elsevier.com/locate/worlddev

World Development Vol. 27, No. 9, pp. 1553–1570, 1999
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Printed in Great Britain
0305-750X/99/$ - see front matter

PII: S0305-750X(99)00077-7

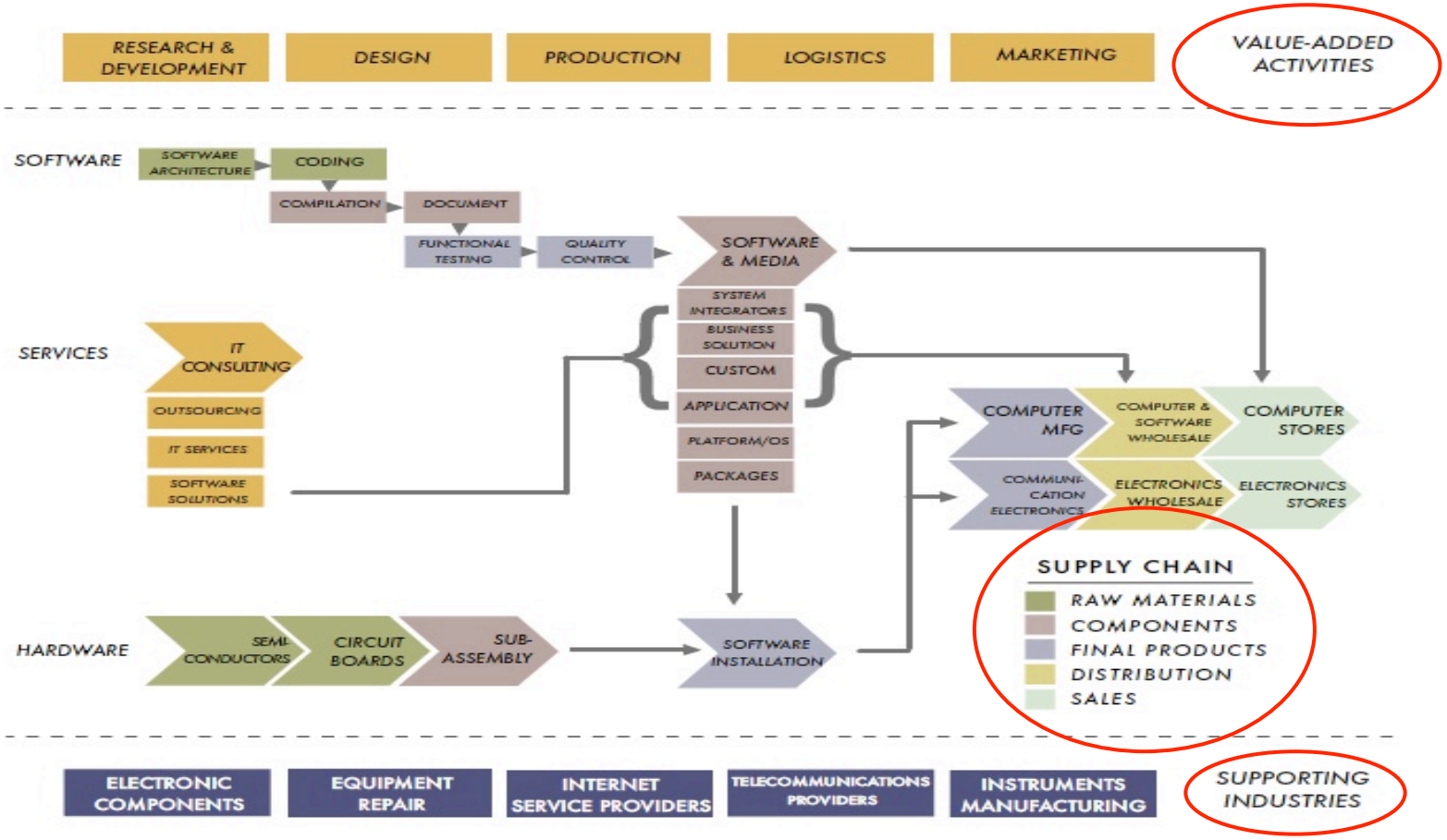
A Comparison of Clustered and Dispersed Firms in the Small-Scale Clothing Industry of Lima

EVERT-JAN VISSER *
Netherlands Economic Institute, Rotterdam, The Netherlands

Summary. — This study provides empirical evidence on the strength and type of clustering advantages, contrasting the performance of small clustered firms with several control groups of dispersed producers in the garment industry of Lima, Peru. Repeated measurement facilitates an evaluation of the ability of clustered firms to respond to pressures arising from the swift trade liberalization carried out in Peru after 1990. The evidence suggests that clustering advantages have been significant, particularly for the smallest firms. Cost reductions and information spillovers are the dominant type of advantages. These are however, passive advantages of clustering. They largely arise at the level of transactions in goods and services, and to a lesser extent in the transformation of inputs into output. While significant, these advantages are insufficient for sustaining competitiveness in the liberalized markets. The garment cluster runs the risk of entropic death if information spillovers remain limited in origin and diversity and if interfirm cooperation does not cross local borders. © 1999 Elsevier Science Ltd. All rights reserved.

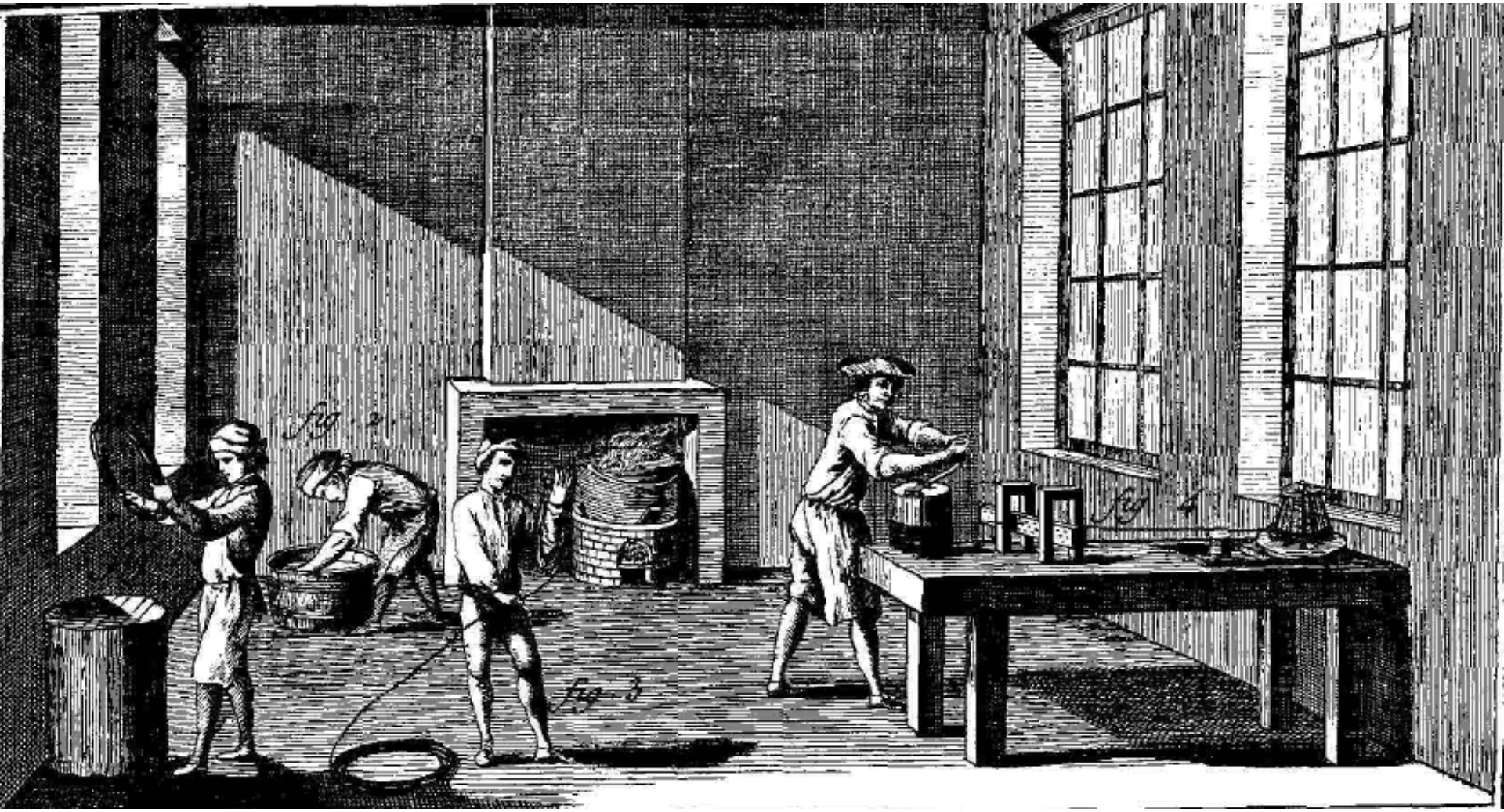
What is a value chain?

A value chain describes the full range of activities that firms and workers carry out to bring a product from its conception to its end use and beyond.



Source: CGGC (http://www.cggc.duke.edu), More Information: Global Value Chains (www.globalvaluechains.org)

Adam Smith's on task specialization



Value chains

Can produce goods or services.

Can be contained within a single firm or **divided among different firms.**

and

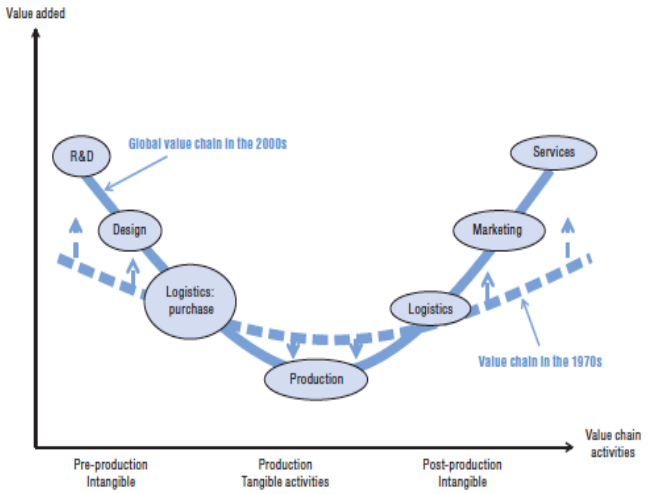
Can be contained within a single geographical location or **spread over the globe.**

The Nutella GVC

Figure 6. The Nutella® global value chain

Source: Ferrero, Sourcemap and various on-line sources.

Value Added along the GVC: The Smiling Curve



Source: Based on Shih (1992), Dedrick and Kraemer (1999), and Baldwin (2012).

- **Along the GVC there are activities that are more lucrative than others:**
- Most value creation is generally found in: a) **upstream activities** (design, product development, R&D and manufacturing of key parts and components) and b) **downstream activities** (marketing, branding and customer service);
- **Assembly,** often offshored, to LDCS, **represents only a small part of value generation**.

GVCs in developing countries

- The participation in GVCs is a key opportunity for firms in developing countries to reach international markets;
- Countries can specialize in one or few tasks, phases of the GVC;
- Lead firms (e.g. Gap, Ferrero, Apple) organize the GVC and play a key role in fostering and supporting the upgrading process within GVC;
- Upgrading depends on the governance patterns and on the power relations characterizing the GVC;
- GVC analysis focus on the relationships between global lead firms and local producers to investigate the opportunities and constraints that result from entering such relationships.

Who are the lead firms?

Giant Retailers: Wal-Mart

- Largest retailer in the world directs the biggest supply chain
- > 60,000 suppliers worldwide and over 80% are in China

Global Brands: Nike

- Nike, the largest sportswear company in the world, does not own any factories.
- Nike products made in 930 factories (subcontractors) in 50 countries
- >1 million workers in supply chain, but just 38,000 direct employees in U.S.

Manufacturers w/o Factories: Apple

- Apple, the top smartphone company in the world, designs and markets its products but owns no factories
- Foxconn, the largest electronics contract manufacturer in the world, makes Apple products and employs >1 million workers in mainland China

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Economic Upgrading

- Economic upgrading is **moving up the value chain;**

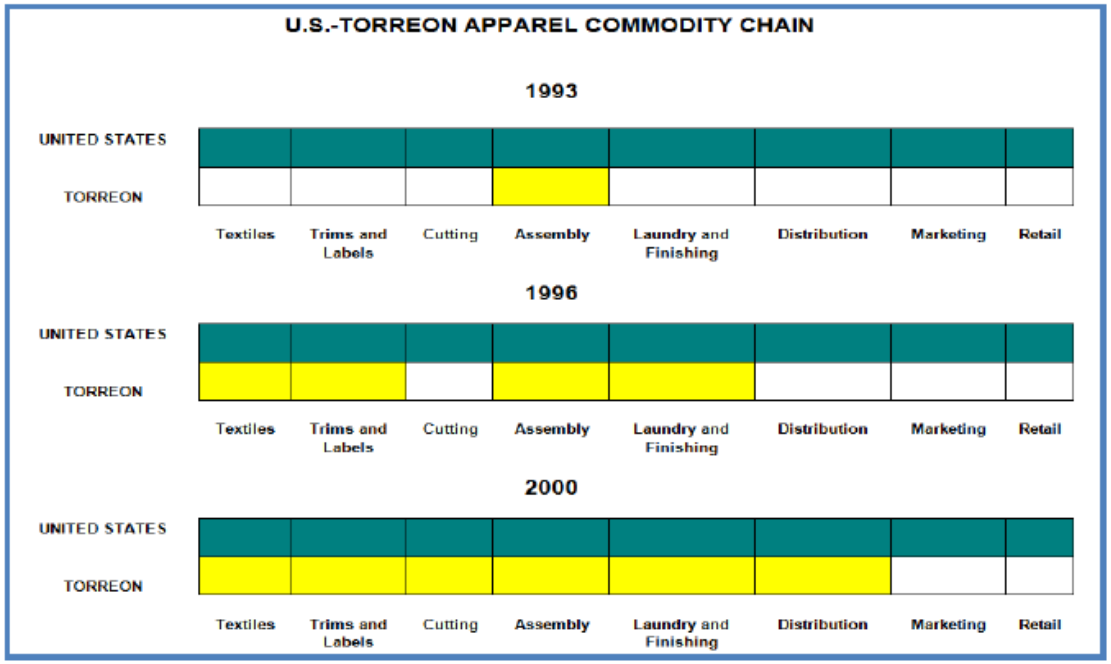
① **Process upgrading:** reduction in costs, productivity and flexibility increases by reorganizing the production system or investing in new or better equipment/technology (indicator: measures of productivity);

② **Product upgrading**: shifting to more sophisticated, complex, better quality products as well as producing a larger range of products (indicator: unit price of goods);

③ **Functional upgrading:** changing the mix of activities and acquiring new skill intensive functions (i.e. from manufacturing to design) (indicator: increase in domestic value added);

④ **Inter-sectorial/Inter-chain upgrading:** applying competences acquired in one function of a chain and using them in a different sector/chain (indicator: diversification into new/related industries).

Functional upgrading



Upgrading refers to the strategies that stakeholders (countries, regions and firms) can take to improve their position within the global economy.

Gereffi, Gary and Jennifer Bair. 2001. "Local Clusters in Global Chains: The Causes and Consequences of Export Dynamism in Torreon's Blue Jeans Industry". *World Development*. Vol. 29 No. 11

Upgrading in GVC is conditioned by governance

- **Complexity of the information** required for a transaction;
- Extent to which this information can be **codified** (e.g. rules, norms and standards);
- **Suppliers' competence** in relation to a transaction's requirements .

Governance Type	Complexity of transactions	Ability to codify transactions	Capabilities in the supply-base	*Degree of explicit coordination and power asymmetry*
Market	Low	High	High	*Low* ↕ *High*
Modular	High	High	High	
Relational	High	Low	High	
Captive	High	High	Low	
Hierarchy	High	Low	Low	

Gereffi et al, 2015

Clusters and GVCs: Two different focuses

Clusters: focus on the role of **local linkages** in generating competitive advantages in local industry.

Global Value Chains: focus on **cross-border linkages** between firms in global production and distribution systems.

What is missing in the GVC framework?

- General positive expectation that firms coordinating the GVC (i.e. the lead firms) produce a positive impact on suppliers by transferring them valuable knowledge to compete in global end-markets;
- GVC studies tend to overlook the wide heterogeneity existing at the local level, as local suppliers in developing countries are very different in terms of their capacity to absorb, master, and change knowledge and capabilities that lead firms in GVCs can potentially transfer to them;
- They are also heterogeneous in terms of their openness to sources of knowledge other than the GVCs, and they are embedded in very diverse local innovations systems, some being more advanced and mature than others.

How do local firms involved in GVCs learn and innovate?

- Based on a survey of the GVC literature we have identified the following learning sources (De Marchi, Giuliani & Rabellotti, 2015):
  - **Within the GVCs**;
  - **Outside the GVC:**
    - Firm level;
    - Collective (cluster) level;
    - Other external.

Learning sources within the GVCs

a) Mutual learning from face-to-face interactions;
b) Training of local workforce by GVC lead companies;
c) Knowledge transfer from GVC lead firms related to a narrow range of tasks;
d) GVC pressure to adopt international standards.

GVC governance patterns and learning

Table IV.9. Learning mechanisms within GVCs

Governance type	Technology/knowledge-related determinants of governance types: Complexity of transactions	Codification of transactions	Competence of suppliers	Predominant learning mechanisms
FDI (ownership hierarchy)	High	Low	Low	• Imitation • Turnover of skilled managers and workers • Training by foreign leader/owner • Knowledge spillovers
NEMs:				
- Modular	High	High	High	• Learning through pressure to accomplish international standards • Transfer of knowledge embodied in standards, codes, technical definitions
- Relational	High	Low	High	• Mutual learning from face-to-face interactions
- Captive	High	High	Low	• Learning through deliberate knowledge transfer from lead firms; confined to a narrow range of tasks – e.g. simple assembly
Trade (market)	Low	High	High	• Learning from exporting or importing • Imitation

Source: Adapted from Pietrobelli, C. and R. Rabellotti (2011) "Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?", *World Development*, 39:1261-9.

How can policy support upgrading within GVC? The role of innovation systems (ISs)

	Governance Type	Determinants	Innovation Systems
1	**Market**	Low complexity	
		High codification	MSTQ organizations matter
		High supplier competence	Education, training organizations matter
2	**Modular**	High complexity	
		High codification	MSTQ organizations matter
		High supplier competence	Education, training organizations matter
3	**Relational**	High complexity	"Local" systems and complementary knowledge matter
		Low codification	MSTQ are perhaps less crucial
		High supplier competence	Education, training organizations matter
4	**Captive**	High complexity	
		High codification	MSTQ organizations matter
		Low supplier competence	
5	**Hierarchy**	High complexity	Local R&D organizations may benefit from interaction
		Low codification	
		Low supplier competence	GVC is expected to improve human technical skills

A well-structured, complete, smooth system makes **1-2-3** more likely to occur.
4-5 may prevail also with 'poorer', fragmented systems. The chain leader may compensate system weknesses, but upgrading is restricted.

Possible Dynamics

- **From 5 and 4 to 2**: thanks to improvement in MSTQ
- **From 5 and 4 to 3**: thanks to improvement in "local" systems
- **From 5 and 4 to 2 and 3**: thanks to IS supporting the co-evolution of suppliers and GVC competences

Source: authors' elaboration

Well functioning ISs facilitate relational forms of governance

- **Active technical bodies** where the chain leaders and their local partners can meet, ease the exchange of knowledge and reduce the complexity of transactions. **This is common in clusters**;
- **Electronics in Jalisco (Mexico):** the development of an efficient IS has supported the transition from hierarchy and captive chains led by foreign leaders to the creation of a local innovation capacity and functional upgrading undertaken by domestic firms;

  - **Policy instruments**: training programs, high tech incubators, Science and Technology programs co-developed by the State and the private sector.

Codification of transactions & IS

- Well functioning standards and metrology organizations facilitate the handling of complex transactions and modular chains are more likely to prevail;
- **Salmon in Chile:** learning to comply with standards has allowed the involvement of local firms both as value chain leaders and qualified suppliers in foreign-led chains.
  - **Policy implications**: a meso-level institution, the Association of Salmon Industries, has played a crucial role in supporting local firms to upgrade their capabilities.

Suppliers' competence & IS

- Increasing capabilities in the supply-base help to push the architecture of GVC away from hierarchy and captive networks and towards more relational and modular chains;
- **Wine in Chile and South Africa**: successful catch up in the highly competitive global wine market;

  - **Policy implications:**
  - Public-private partnership in research consortia involving companies, business associations and universities have facilitated the upgrade of the local wine producers;
  - In SA, WINETECH has implemented a participatory mechanism to set up the research agenda.

Learning mechanisms outside the GVC

- **Firm-level:**
  - Internal R&D efforts;
  - Hiring skilled managers and workers;
  - Learning via acquisitions/joint venture, other equity agreements;
- **Collective learning at the local level;**
- **Other external sources:**
  - Imitation from competitors;
  - Learning from suppliers (outside the GVC), universities and consulting agencies.

GVC & Innovation

- In a recent literature survey (De Marchi, Giuliani & Rabellotti, 2015), based on Scopus and grey literature, we have found only 50 GVCs dealing with GVC & Innovation since 2005;
- In these 50 GVC cases we have undertaken a **cluster analysis** based on:
  a) The *local firms' degree of innovativeness* taking into account the extent to which different types of innovations (product, process, market and organizational) have been undertaken at the level of the local firms that are part of the GVCs;
  b) The *learning mechanisms* adopted considering the extent to which local firms use:
     - Within the GVCs;
     - Outside the GVC (Firm level; Collective level; Other external).

A Typology of GVCs

	GVC-led Innovators (9 cases)	*Autonomous Innovators (14 cases)*	*Marginal Innovators (27 cases)*
Innovation	High	High	Low
Within GVC learning	**Intensive use** • Mutual learning from face-to-face interactions • Training of local workforce by GVC lead companies • Knowledge transfer from GVC lead firms related to a narrow range of tasks • GVC pressure to adopt international standards	**Some use** • Mutual learning via face-to-face interactions • Knowledge transfer from GVC lead firms related to a narrow range of tasks	**Low use** • Mutual learning from face-to-face interactions • Knowledge transfer from GVC lead firms related to a narrow range of tasks • GVC pressure to adopt international standards
Outside GVC learning	**Some use** • Internal R&D effort • Imitation of competitors • Learning from suppliers (outside the GVC), universities and consultancy agencies	**Intensive use** • Internal R&D effort • Hiring skilled managers and workers	**Very low use**
E.G.	**Brazil: Coffee GVC lead by Illycaffè**	**China: Wind GVC**	**Kenya: Clothing GVC to the US market**

Innovation in GVC: a virtuous *liaison*? Not always…

- In spite of being part of one or more GVCs, local suppliers do not always use the GVC as a privileged source of learning to access knowledge and technologies;
- In most of the observed cases, **GVC-related knowledge is exploited only as a complementary source to other channels of knowledge** (e.g. firm level efforts, collective learning at the local level, imitation, learning from other non-GVC actors, etc.);
- About half of our empirical observations are GVCs where **innovation is hardly taking place**, a condition that coexists with local firms' relative closure to both GVC-related and other kinds of knowledge sources, as well as with local firms' poor skills and knowledge creation efforts;
- Therefore, **local heterogeneity** – at the level of firms, clusters, regional or national system of innovation – **strongly conditions the extent to which suppliers in developing countries take advantage of GVC-related knowledge**.

Policy implications (1)

- Participation in GVCs cannot, on its own, promote innovation in developing country firms;
- GVC programs are widespread among international organizations and donors because they offer a practical way of working with the private sector;
- GVC initiatives are mainly aimed at:
  a) strengthening the weakest links in the chain (e.g. by improving the capabilities of local small suppliers);
  b) strengthening the linkages between firms (e.g. by improving knowledge flows between the local firms and the lead firms);
  c) creating new links in the chain for connecting local firms with new lead firms and/or end markets.

Policy implications (2)

- Need for more systematic assessment of the impact in terms of innovation of the existing GVCs initiatives;
- It is also key investing in firm-level learning via purposeful innovation policies and in building well functioning innovation systems – not least because participation in GVCs alone will not fix the internal weaknesses of developing countries.

Forthcoming a special issue of EJDR on Innovation Systems in the Era of Global Value Chains

Thank you

Check my website for more works on related topics

http://robertarabellotti.it