

Greening MSE Clusters to compete globally: innovation and joint action

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Nonita T. Yap, PhD., M.E.S.
Professor
University of Guelph

Agenda

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Why the interest in MSEs?

- ▶ Micro and small enterprises are ubiquitous in both urban and rural areas in developing countries,
- ▶ Sectors with
 - low barriers to entry,
 - a workforce with low technical skills, and
 - produce basic products for poor consumers
- ▶ MSEs create more than 50% of jobs
- ▶ But high employment numbers do not translate to a proportionate share in GDP

Low productivity of MSEs

- ▶ old technologies,
- ▶ inefficient management,
- ▶ weak support institutions,
- ▶ limited access to inputs, and
- ▶ unfavourable regulatory environment
- ▶ has a negative impact on worker health and the environment

Focus: Pollution Prevention or Cleaner Production of MSEs

- ▶ In its simplest form, pollution prevention or cleaner production seeks to eliminate the *production of waste* rather than the *waste* itself
- ▶ In Canada and U.S. pollution prevention is “the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and reduce the overall risk to the environment and human health”.

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Focus: CP of MSEs

- ▶ Cleaner production – “continuous application of an integrated preventive environmental strategy to reduce risks to humans and the environment” (UNEP 1994, p.4)
 - Good housekeeping, reuse, reduce, process modification, technological upgrading, on-or off-site recycling, durability enhancement
- ▶ Enhances resource efficiency, reduces environmental burden and improves workplace safety

Other terms used: eco-efficiency

- ➔ Reducing material and energy intensities of goods and services,
- ➔ reducing the dispersion of toxic materials,
- ➔ enhancing the recyclability of materials,
- ➔ maximising the sustainable use of renewable resources,
- ➔ increasing the useful lifetime of materials, and
- ➔ increasing the service intensity of goods and services.

(WBCSD, 1996)

CP techniques

1. Optimisation of resource use – such as by employing by-products as raw materials in new production (reuse)
2. Closing of material loops (on site-recycling) and minimising emissions, in particular of toxic materials (process modification)
3. “Dematerialisation” of products and economic activities
 - ⇒ by reducing the mass of material used,
 - ⇒ by extending the durability of the product, or
 - ⇒ by developing a new way to provide the service
4. “Decarbonisation” of the energy supply by –
 - ⇒ greater energy efficiency
 - ⇒ using sources of energy with higher H : C ratio [coal < oil < natural gas < hydrogen?]
 - ⇒ introducing renewable energies (e.g. wind, solar)

After > 10 years, Cleaner Production 'puzzle'

- ▶ The adoption of Cleaner Production, particularly among small and medium enterprises, has been very slow.
- ▶ Multimillion dollar programs of donor agencies, some governments in promoting CP have not resulted in widespread adoption.

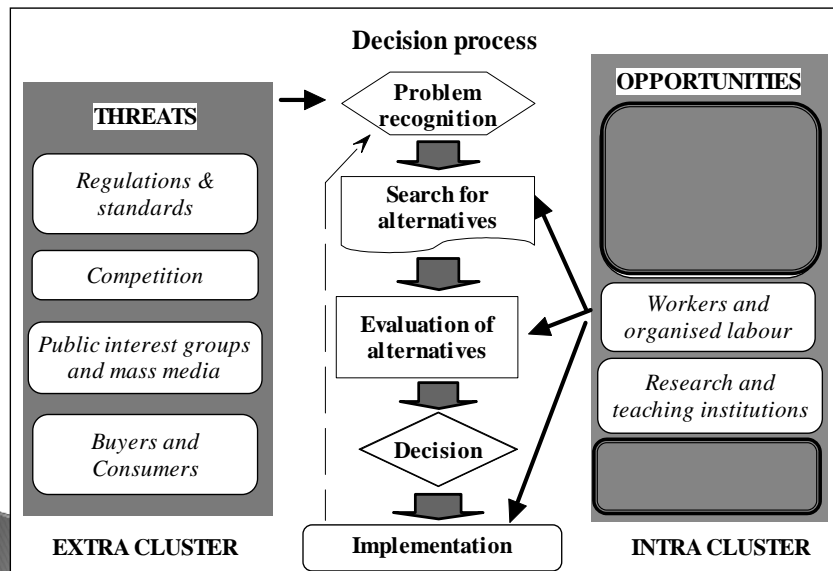
Explanations in the literature

- ▶ Lack of competent technical assistance providers (e.g., Hillary 1999; Johansson 2005; Lebourveau 2004) to
- ▶ Lack of trust in governments and consultants (Bierma and Waterstraat 1995).

Proposed solutions?

- ▶ CP innovations need to be transferred in small steps appropriate to the actual production and business conditions of the companies (Fresner and Engelhardt 2004).
- ▶ Should focus on cost savings and competitiveness, and the innovations explained in plain language, by affordable, independent and trusted experts (Fischer 2003; Frijns and Van Vliet 1999).
- ▶ Participation of science and engineering institutions (Ecotec 2000; Lebourveau 2004).
- ▶ Civil society participation and a strong role for the state (Cannon 1992; Yap 1988 and 2000; Yap et al 2006).
- ▶ None proved sufficient to address the challenge

Corporate Decision framework (Yap 1988)



Why shift interest to Clusters?

- ▶ Publication on craft villages in Vietnam
- ▶ Craft village ➡ clusters
- ▶ Discovered vast literature on clusters
- ▶ Successful greening of MSE through Cleaner Production only possible if situated in the broader *meso* level context – of clusters

What is a cluster?

Sectoral and geographic
concentration of
enterprises

Cluster development

- ▶ Under certain conditions,
 - developing country small and medium enterprises (SME – not MSE) can successfully innovate, and compete globally
- ▶ One such condition is clustering
- ▶ Ability to innovate – key to increasing productivity and economic growth
- ▶ Success stories : Brazil, Chile, Indonesia, India, China
- ▶ considered the most productive strategy in promoting regional and sector growth in developing economies (ILO 2008)
- ▶ credited with raising rural living standards in China and India

Key concepts

- *Innovation* – commercialization of new products, processes, the use of new materials, transport and/or organization that can be radical (competency destroying) or incremental (competency enhancing) (Schumpeter 1934; Tushman and Anderson 1990).
- *Technological capabilities* – “dynamic resources which encompass skills, knowledge and routines involved in generating and managing technological change, whether they concern production, investment, or relation with other firms” (Albu 1997: 8).
- *Trust* – “the willingness to expose oneself to the possibility of opportunistic behaviour by others” (Schmitz 1999: 141).
- *Value chain* is “the series of activities needed to turn raw materials into finished products and sell them on the value added at each link” (Pietrobelli and Rabellotti 2006: 8).

Relevant Bodies of Literature

1. Industrial cluster and cluster dynamics
2. Global value chain, enterprise innovation and productivity
3. Collective learning and innovation

1st – Industrial cluster as a model

- ▶ Inspiration: Remarkable success and resilience of the cluster of SMEs in the industrial districts of Italy
- ▶ Industrial district model of industrial organization – a starting point for analyzing the potential for increasing the productivity and competitiveness among SMEs in developing countries.

Theory

- ▶ “Development requires a process of acquiring technological capabilities, building local skills and competence to improve existing designs, processes and products”
- ▶ Clustering enables firms to overcome productivity constraints , make them profitable and significant contributors to a country’s industrial growth
- ▶ Key to cluster innovative capability is *collective efficiency*
 - *Collective efficiency.*) competitive advantage arising from (a) external economies – e.g., local supply of skilled labour, easier access to specialized inputs, machinery and services, and (b) social cohesion or ‘glue’

Empirical evidence

- ▶ Brazil, India, China, Chile, Mexico, Denmark, Italy (e.g., Rabellotti 1995; Schmitz 1995, Nadvi 1999; Porter 1998; Sandee and Rietveld 2001).

Lesson # 1: on Drivers

- ▶ Local organisations and institutions that promote a balance between cooperation and competition among the firms.
- ▶ Local business associations – very important but
 - effectiveness depends on the nature of the support, the structure, and their competence.
- ▶ Cases: Brazil, India, Mexico and Pakistan (Nadvi 1999; Chile (Perez–Aleman 2000) and India (Foundation of MSME Clusters 2006)

Lesson # 2 – Drivers

- ▶ The state is indispensable in successful cluster development as catalyst and mediator (Foundation for MSME Cluster 2006; Perez–Aleman 2000; Yap 2000) but
- ▶ Interventions need to be “customer-oriented, collective and cumulative” (Humphrey and Schmitz 2002).

Lesson # 3 on Trust

- ▶ Clustering, while important, is not a sufficient condition
 - lack of dynamism of the fashion clusters in Columbia (Pietrobelli and Barrera 2002),
 - atrophy of the Marikina shoe cluster in the Philippines (Scott 2005) and the decline of Sinos Valley shoe cluster in the late 90s (Schmitz 1999b)
- ▶ Key to collective efficiency – trust, whether based
 - on socio-cultural ties (*ascribed* trust) or
 - on deliberate investment in inter-firm relationships (*earned* trust).
- ▶ Experience in Brazil, Chile, U.S. and Denmark : cooperation and trust can be established even in the absence of prior social ties with “skillful external assistance”

Lesson # 4

- ▶ Clusters change over time in response to threats and opportunities.
- ▶ To assess the ability of cluster firms to innovate it is important to define the trajectories of change and the factors driving and sustaining change.
- ▶ We need to study (a) the inter-firm relations, (b) the social context and © history of the cluster (Humphrey and Schmitz 2002; Schmitz 1995).

2nd – Global value chain, enterprise innovation and productivity

- ▶ Insertion in the global value chain – assumed to be key to upgrading among SMEs (e.g., Pietrobelli and Rabelloti 2006)
- ▶ Global buyers influence cluster innovation and productivity – Sinos Valley (Brazil) leather shoe cluster by Schmitz (1995), Torreon' blue jeans industry cluster (Mexico) by Bair and Gereffi (2001), fashion sector in Colombia (Pietrobelli and Barrera 2002) and motorcycle industry in Vietnam by Fujita (2008).
- ▶ BUT evidence – the impact of cluster participation in a global value chain on its ability to innovate and upgrade varies with the sector, and with the type of value chain governance – e.g., Nicaragua dairy cluster, Brazil Agreste clothing cluster

Triggers to innovation

- ▶ International environmental and quality standards
- ▶ Case studies: Sialkot surgical instrument cluster in Pakistan (Nadvi 1999), the Tirupur hosiery cluster (Narayanaswamy and Scott 2001) in India.

Interesting debate

- ▶ Innovation promotion process is almost automatic with insertion into global value chain; OR
- ▶ Innovation is more differentiated and depends on the sector and how the cluster is linked to the global chain

Types of linkages (Humphrey 2003; Régnier 2000; Schmitz 1999b)

1. *arm's length*: many buyers and sellers for equivalent products and the buyer is a "design taker";
2. *Network*: the supplier and buyer combine complementary competences, both are innovators, close to technology and market frontier;
3. *quasi-hierarchical*: one party (usually the buyer) exercises a high degree of control on what is to be produced and how; and
4. *Hierarchical*: the buyer takes ownership of the producers or establishes its own companies in the cluster

3rd – Collective learning and innovation

- ▶ Developing technological capabilities is a cumulative and transformative process (e.g., Bell and Pavitt 1993; Gulrajani 2006).
- ▶ SMEs: technological knowledge flows principally through informal sources (e.g., Porter 1998).
- ▶ Clusters with a long value chain have richer innovative capability than those with no inter-firm division of labour– there is learning through interaction with local buyers (e.g., Bair and Gereffi 2001; Rabellotti 1995)
- ▶ For small firms: the entrepreneur is the most important resource–her knowledge, skills, experience, ability to make informed choices and forge relations with other firms and with stakeholder institutions (e.g., Lall 2001)

The picture that emerges...

- ▶ Growth of clusters cannot be understood by focusing on individual firms (e.g., Matos and Hall, 2007; Schmitz 1999b).
- ▶ 3 components of technological capabilities of a cluster:
 - (a) intra-firm resources
 - (b) cluster-level collective resources ;
 - (c) intra-cluster links

Some case studies

Brazil – rise and fall of Sinos Valley Shoe Cluster

- ▶ Brazil share of global trade in shoes: 0.5% in 1970 to 12.3% in 1990
- ▶ 1993: close to \$2B in sales; 3rd largest shoe exporter in the world, 12% of market
- ▶ Sinos Valley Shoe cluster – 1800 firms, 150 000 workers; grew 280% in 70s, 80% in the 90s
- ▶ produced 30% of Brazilian shoes but 80% of the exports

Cluster characteristics

- ▶ 500 shoe producers – 48.2% small, 34.6% medium and 17.3% large firms plus 700 stage units and 700 ancillary agents
- ▶ Backward linkages between shoe producers and local suppliers of inputs, machinery, and producer services
- ▶ Forward linkages between producers and buyers,
- ▶ Strategic intervention of local support institutions facilitating cluster's ability to move into higher value added products and markets

Explanation: collective failure

- ▶ 1997: shoe exports declined by 30% because of penetration of cheap China made shoes into US
- ▶ The challenge – technological upgrading
- ▶ 6 business associations, 2 professional associations, 4 technology and training institutes and 1 trade fair body
- ▶ As the cluster grew, the sector became differentiated by size and fragmented
- ▶ The narrow and conflicting interests of the different segments (e.g., tanners, component producers, machinery suppliers, export agents and large shoe producers – dominated the collective interest
- ▶ Business associations failed to bring about a collective response to cheaper Chinese shoes; uneven spread of upgrading

Chile: tomato processing industry

- ▶ Export sales: \$2M (1981) to \$100M (1995)
- ▶ 1981: 14, 420 metric tons; 1995: 113, 650 metric tons
- ▶ 1994: Chile became 5th tomato paste producer in the world
- ▶ 1995: 9 large firms working with ca 5000 material suppliers; 1985: only 2 with 210

How? Building institutions to encourage collective learning

1. Redefining relations between large firms and small suppliers
 - network of small suppliers attached to large firms
 - creation of 'leader' processing firms that assist in widespread diffusion and adoption of foreign technology and teaching skills to smaller suppliers – knowledge sharing
 - Minimisation of suppliers' risk – weekly field visits of tecnicos to supplier's farms
 - contracts set price and stabilised prices

Building institutions to encourage collective learning...2

- ▶ Reorientation of business associations from lobbyists to business service providers
 - business associations assist exploration by member firms of new markets, new designs, new processes, new technologies
 - promoted new quality control practices, independent quality control laboratories
 - discouraged competitive and opportunistic behaviour of firms

Building institutions to encourage collective learning... 3

- ▶ State encouraged the establishment of *developmental associations*
- ▶ State focused on modernisation of production with social equity
- ▶ State promoted export competitiveness based on increased productivity, better technology and enterprise reorganisation.

Los Lagos salmon cluster – Chile

- ▶ provides more than 40,000 direct and indirect jobs,
- ▶ 2002, produced 25% of the world's farmed salmon and trout, earning revenues of \$1B.
- ▶ The transformation of this once traditional fishing economy was made possible by public agencies – Fundación Chile and Instituto de Fomento Pesquero, its dramatic penetration into the world market and continuing ability to respond to international quality, health and environmental standards, is sustained by joint training, promotion, and research programs of private and state regulatory agencies – the Salmon Producers Association, Pro Chile, CORFO and CONAMA (Maggi 2006).

Pakistan: Sialkot Surgical Instrument Cluster

- ▶ 1992–1993: 300 family-owned enterprises exported over \$100M of surgical instruments; 60% to U.S.
- ▶ 1994: US FDA restricted imports from Pakistan – failing to meet QA/QC standards
- ▶ Focus shifted from product to process quality
- ▶ Total Quality Management – procedures, training of personnel, management, internal and independent quality auditing

Response

- ▶ Association organised a trip to the U.S. to negotiate phasing in of QA certification and resumption of exports – failed
- ▶ Association turned to Pakistani govt for support of bringing in foreign consultants to assist local producers in upgrading QM practices
- ▶ Established an internationally recognised metal testing laboratory
- ▶ 1997: exports 25% higher than 1993.

Pietrobelli et al (2006) conclude...

- ▶ “Global buyers are not necessarily the optimal solution for upgrading; national chains also offer alternative, promising, and often more sustainable opportunities”
- ▶ “the role played by local government and support institutions cannot be underestimated” (p. 289).

Weaknesses of literature

- failure to examine innovations that
 - not only enhance the productivity and competitiveness of MSEs but
 - also lead to a cleaner environment and
 - translate into better working conditions and wages for the workers

New research agenda

- Goal: to contribute to our understanding of the conditions that enable MSE clusters in developing countries to compete on factors such as product quality, environmental friendliness, and improved working conditions and wages.
- Innovation is seen as key. Research questions : *What factors (threats) trigger innovation among micro and small industry clusters and what are the key success factors?*
- Focus: marginal, evolutionary improvements of products, processes, organizations and management systems (Pietrobelli and Robellotti 2006).

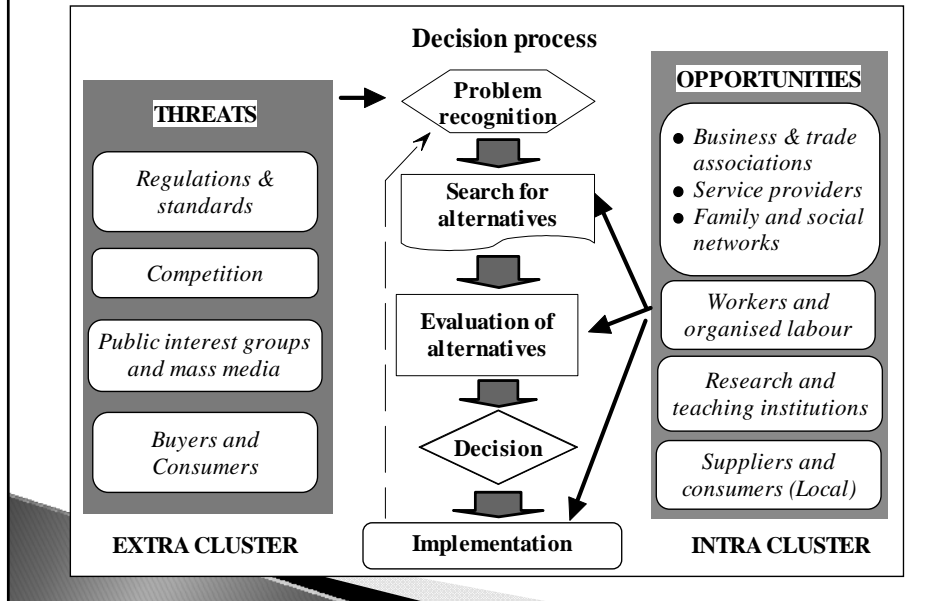
Two related hypotheses

1. a cluster's innovation is a response to perceived threats arising from factors external to the cluster and
2. a cluster's success in innovation will depend on the willingness and ability of member firms to undertake joint action in response to the threat.
 1. Level of social capital
 2. Role of technological leaders

Analytical framework

1. Decision to innovate is not triggered unless a problem is recognized, e.g., environmental or worker health regulation, international standards on quality and process such as ISO 9000/ ISO 14001, Quality Assurance and Quality Control (QA/QC), cheaper products, new designs.
2. There is then a search for solutions,
3. an evaluation of the options,
4. a decision made; the decision implemented and implementation monitored.
5. Different factors influence the different stages of decision process.

Corporate Decision framework (Yap 1988)



Collaborative comparative research?

- ▶ China
- ▶ Vietnam
- ▶ Thailand
- ▶ Philippines

- ▶ These would have lessons for successful cluster development in the other ASEAN countries

**Anyone interested?
Thank you.**

nyap@uoguelph.ca